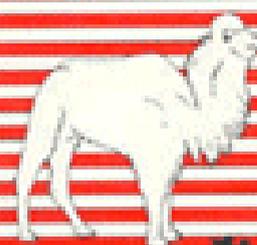


Animal genetic resources of the USSR

FAO
ANIMAL
PRODUCTION
AND HEALTH
PAPER

65



FOOD
AND
AGRICULTURE
ORGANIZATION
OF THE
UNITED NATIONS

FAO ANIMAL PRODUCTION AND HEALTH PAPER

Animal genetic resources of the USSR

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1989

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PREFACE

The proposal for a book on the Animal Genetic Resources of the USSR was made at the 1980 FAO/UNEP Technical Consultation on Animal Genetic Resources in Rome where about 100 member countries were represented. It was widely felt that information on the extensive livestock populations of the Soviet Union would be of great interest to many other nations. To date, there is no comprehensive publication in English covering this vast and important topic. It is therefore with pleasure that I write this foreword marking the end of 4 years work by many different individuals and organisations.

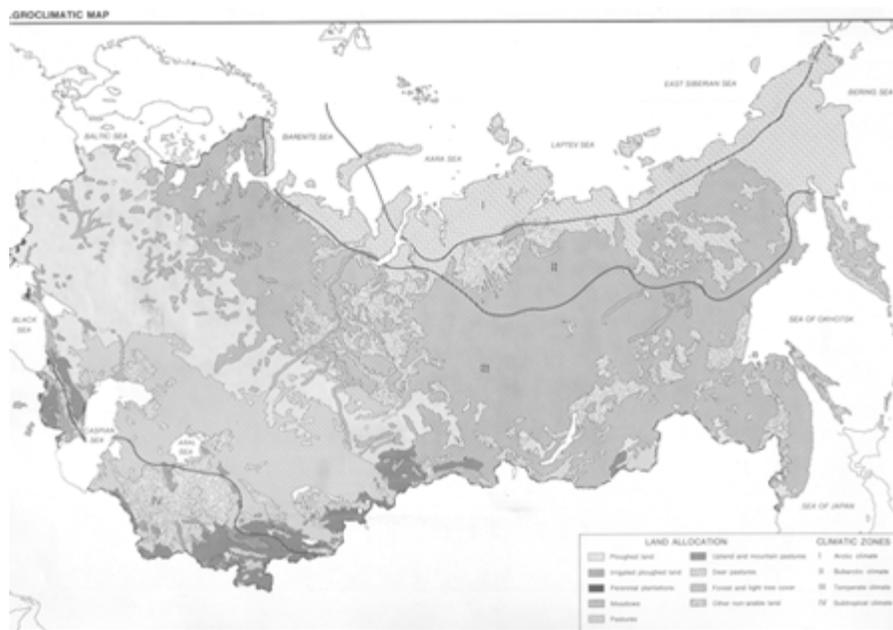
The USSR has many diverse topographical, climatic and cultural settings which have affected the development and use of domestic animals over long periods of time. The book presents a wealth of information covering 17 species and more than 100 breeds. Some breeds are clearly related to those of neighbouring countries in Europe, the Near East and Asia; others are very different and are found only in the USSR including the new synthetic breeds developed by Soviet scientists in the last 50 years. The book will therefore be of interest to many people in addition to those seeking directly to increase world animal production, and will include those concerned with conservation, biological sciences, education and research, social, cultural and economic fields.

On behalf of FAO I thank the many people who have contributed to its completion and commend it to the wide readership which will certainly receive it with pleasure and profit.

H.A. Jasiorowski Director, Animal Production & Health Division

Maps





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EXPLANATORY FOREWORD

This monograph "Animal Genetic Resources of the USSR" has been produced jointly by the Food and Agriculture Organization of the United Nations, the Centre for International Projects, Moscow and the USSR All-Union Academy of Agricultural Sciences. The funding has been provided principally by the United Nations Environment Programme (UNEP). The text was written specifically for this book by 25 leading Soviet scientists and specialists in agriculture in the USSR where the first translation into English was made. FAO then undertook the technical and English editing, followed by a period of consultation and revision with the Soviet authors and editors. The photographs which add so much to the understanding of livestock were specially commissioned for this publication.

The monograph follows a uniform layout in each chapter. Description of breeds within each species include the following: taxonomic group, origin, history, area of distribution at January 1980, environmental conditions, population dynamics, biological features, production traits, biochemical polymorphisms, breed structure, breeding centres, conservation herds and programmes for breed improvement and preservation. Major species are represented by improved, indigenous, rare and endangered breeds and for each, the most valuable qualities are emphasized. The material used derives from state herdbooks, lists of progeny tested sires, and registers of high producing animals. To be registered in a herdbook, animals must meet certain requirements of pedigree, breed characteristics, live weight, type, constitution, productivity and breeding value. These data are given for all improved breeds. The description of each breed is illustrated by outstanding individuals. Photographs show the conformation and sexual dimorphism of animals. . Sketch maps indicate the principal areas of occurrence of each

species or breed.

In general, the shading shows continuous and the triangles discontinuous distribution. The circles are intended only to draw attention to the triangles.

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JOHN HODGES

TERMINOLOGY

Organizations

GKNT = USSR State Committee for Science and Technology

VASKhNIL = V.I. Lenin All-Union Academy of Agricultural Sciences

Administrative Divisions

RSFSR = Russian Soviet Federated Socialist Republic (or Russian Federation)

SSR = Soviet Socialist Republic

ASSR = Autonomous Soviet Socialist Republic

territory = Russ. krai

region = Russ. oblast'

province = Russ. guberniya (obsolete)

district = Russ. raion

area or zone = Russ. zona

Breeding Terms

breeding centre = Russ. plemennoi zavod (plemzavod)

conservation herd = Russ. genofondnoe stado

germ plasm = Russ. genofond

improved breed = Russ. zavodskaya poroda (or kulturnaya poroda) i.e. one suitable for intensive production

taboon = Russ. tabun, a herd or drove of horses on free range

udder index = percentage of milk produced by the forequarters

Fleece Terms

blocky staple = Russ. shtapelnoe runo

breaking length of wool = the theoretical length of wool which would break under its

own weight when suspended from one end

fleece hangs in pointed locks = Russ. kosichnoe runo

guard hair = Russ. ost'

kemp = Russ. mërtvyi volos (dead hair)

lambskin or fur = Russ. smushka

pelt = Russ. shuba

sheepskin = Russ. ovchina

tan = Russ. ryzhyi

tippy staple = Russ. shtapelno-kosichnoe runo

true wool = Russ. pukh i.e. down or undercoat

yolk = Russ. zhiropot i.e. sweat or suint plus sebum or fat

INTRODUCTION

In the contemporary world the provision of food and adequate levels of nutrition for the ever-increasing world population are important economic, social and political problems. Agriculture has been and will remain the principal source of human food. In the years to come it is important not only to increase energy intake but also to provide a balanced diet. Livestock production is one of the most valued components of human diet and the rational use of farm animals is gaining importance.

The USSR has a great diversity of climatic zones. For example, there are mountainous regions with rough terrain and seasonal forage supplies. Vast areas lie in the north with low temperatures and insufficient sun in winter and myriads of blood-sucking insects in summer. Hot continental climates prevail in Central Asia and Transcaucasia where animals are subject to blood protozoan diseases. The Soviet Union features a great variety of breeds of farm animals with 52 breeds and breed groups of cattle, 30 of pigs, 90 of sheep and 50 of horses. Of different types and purposes these breeds are adapted to a variety of climatic, topographical and geographic zones in the country.

The livestock industry uses various techniques for breed improvement and breed formation. The indigenous animal genetic resources have been studied in all regions of the country and the characteristics of indigenous populations defined. Although not noted for high performance, these animals showed good adaptation to local environmental and feed conditions. On this basis, crossbreeding programmes were initiated to form new breeds and types to combine the genotypes of high producing breeds and local populations. Almost all animal production in the USSR has been built on these principles. Populations of Simmental, Red Steppe, Black Pied and other cattle breeds, Large White pigs and Finewool sheep were produced by replacement crossbreeding (grading up). The process is exemplified by the dairy cattle breeds based on the Swiss Brown. Crossing this breed with local populations and intense selection have resulted in new breeds - Kostroma, Lebedin, Ala-Tau, Caucasian Brown and Carpathian Brown. Also there are now large populations of dairy cattle in Central Asia bred from crosses between Swiss Brown cattle and local zebu. Another example is the Bushuev breed which features rather high productivity, resistance to blood protozoan diseases and adaptability to a hot and extreme continental climate.

Many sheep breeds have been formed by crossing imported and national breeds. For instance, the Kirgiz Finewool was formed by crossing local fat-rumped sheep with finewool breeds. This method was also employed in the formation of the North Kazakh Merino and Kazakh White-headed cattle; the latter is now being crossed with Charolais and Aberdeen-Angus to produce a new type of beef cattle. Kushum horses, which are triple-purpose, originated from crosses of Kazakh horses with the Thoroughbred and other breeds. Qualitative changes in Soviet animal husbandry were predominantly due to pure breeding of many native and indigenous varieties through systematic selection. This pattern was followed in the formation of such breeds as Kholmogory and Yaroslavl cattle, Romanov, Karakul, Hissar and

Sary-Ja sheep, Akhal-Teke, Lokai, Karabair and Iomud horses, Arvana one-humped camels and others. Many of these breeds subsequently served as improvers. For example, Sary-Ja sheep were used in the formation of the meat-wool Tajik and Alai breeds. Intense selection of the Sary-Ja resulted in the highly productive Ashkhabad intra-breed type.

Distant hybridization can in certain cases, play an important role in the formation of high producing animal populations adapted to extreme environments. Mating of Argali rams with finewool ewes resulted in a unique high producing mutton-wool Arkhar-Merino adapted to mountainous areas. Hybrids have been produced by crossing cattle with American bison, European bison and banteng. Of particular interest for hot climates are cattle x banteng crosses. In horse hybridization the following crosses have been made: domestic horse x zebra species, Przewalski horse x domestic ass, Przewalski horse x Chapman zebra, and zebra species hybrids. Intense investigations continue into horse hybridization. Also under study are mouflon x domestic goat and Barbary sheep x domestic sheep crosses. Accelerated scientific and technical progress in animal husbandry and intensive livestock production in many countries including the USSR are narrowing the diversity of animal breeds and leading to the replacement of many native breeds by those which are specialized and more productive. The extinction of indigenous breeds causes serious genetic loss. This reduction in the number of indigenous breeds should be kept under control. Otherwise, many valuable, rare and unique breeds formed by traditional selection over centuries and in various environments, may vanish. In most cases these local breeds have valuable traits such as high adaptability to extreme environments, viability, longevity, disease resistance, strong constitution and in some cases high quality of products. In the vast areas in the Soviet Union where intensive husbandry is prevented by environmental factors, specialized high-production breeds can hardly survive because of the limited feed resources and extremes of climate. In such regions it is advisable to use well-adapted local breeds and also to try to combine local adaptability with higher production from introduced breeds.

Due to the changes in pig production and the wide use of industrial techniques, meat or meat-lard breeds are spreading throughout the country (Large White, Lithuanian White, Latvian White, Landrace). This is leading to the elimination of native breeds which are predominantly lard and semilard types. This category includes 20 breeds and breed groups in various regions and characterized by valuable productive and unique biological traits. There are 25 native sheep breeds in the USSR. Most of them are the result of centuries-old selection in different parts of the country and primarily in Central Asia and Transcaucasia. All these local sheep breeds are characterized by strong constitution, hardiness, adaptation to mountainous environments, high fertility with good meat, milk and wool production. The wide use of vehicles and mechanization in agriculture, causes little, if any attention to be given to horses, asses and mules. This neglect has caused a drastic drop in numbers of many breeds or even their extinction. Energy saving policies call for the use of work animals for load carrying and draught in those places where it is appropriate. Attention is needed for their preservation and improvement. Today the highly concentrated and specialized poultry industry is based on a small number of breeds, lines and crosses. Over 80 poultry breeds which have not been changed by intensive

selection now fail to compete with the improved breeds and are being removed from production.

All these aspects show the necessity of preserving the germ plasm of indigenous breeds of farm animals in the USSR not only for current selection and breeding work but also for future breeding programmes. The question of preserving animal germ plasm was first raised in the USSR in 1927 by a Soviet geneticist, A.S. Serebryakovski. This problem needs to be comprehensively planned taking into account social, economic, scientific and managerial aspects. General guidelines for conservation of genetic resources have been established. The USSR is establishing semen banks and conservation farms to preserve the germ plasm of national animal breeds. At present the semen banks contain frozen bull semen of nearly all the cattle breeds. As embryo conservation becomes practicable it will facilitate animal genetic resources preservation and parallel the world-known collection of plant seeds made by the Soviet biologist, N.I. Vavilov. The international development of theoretical aspects and practical techniques of animal breeding and selection, advances in artificial insemination and closer contacts between countries are providing increasing access to genetic resources of rare and local animal breeds. This monograph is intended to contribute to improved animal production by giving the reader the most up to date and comprehensive information on the indigenous and improved breeds of the USSR.

1. CATTLE (excluding zebus)

L.K. Ernst and N.G. Dmitriev

The USSR has more cattle than any other country in the world except India. The total is 115 million. Of these 80% belong to the socialized sectors and the rest are on farmers' individual holdings. The 92 million cattle on state and collective farms include 633 000 zebus and zeboids, buffaloes and yaks as well as 22.29 million young fattening cattle. The remainder are the breeding cattle listed in Table 1.1 and described in this chapter.

The decades since the Second World War (1945-85) have seen profound changes in the breed composition of cattle. Some breeds with small numbers have disappeared -the local Kirgiz (Kazakh), Siberian, polled Pechora, northern polled Karelian, Buryat. Some populations of valuable local breeds have formed the basis of new breeds and varieties, for example the Kazakh Whiteheaded breed and the Pechora type of the Kholmogory breed. They introduced to the gene pool of the new breeds such characteristics as sound constitution, longevity, good adaptation to local husbandry conditions, resistance to tuberculosis and brucellosis.

At present 36 dairy and dairy-beef and 12 beef breeds are bred on the state and collective farms, 12 breeds having been developed in the last 40 years. Eleven foreign breeds are not described here. Of the large diversity of cattle breeds the most numerous are the Simmental (26.7%), Black Pied (25.2%), Red Steppe (19.2%), and Brown breeds (9.5%).

The long-term selection programme for improving the existing breeds and lines and developing new ones is being accomplished through the network of large breeding centres and farms and the state breeding and artificial insemination stations.

The present state and collective farms have large herds - from 1500 to 2000 head and more. On such large farms the conditions are available for production specialization and the introduction of industrial technology, the latest scientific advances and improved working methods.

In the USSR livestock farms are divided into two categories - breeding and commercial. Such a division is somewhat arbitrary since in any commercial farm one-half of the herd is represented by a breeding group. Many farms raise purebred animals (i.e. 15/16 blood or more). The principal difference between breeding and commercial farms is in their specialization.

Breeding stations and their branch farms improve the breeding efficiency and performance of the breed, rear bulls for A.I. stations and young breeding stock for commercial herds. Breeding farms carry out progeny testing of sires. Taking into account that, on the average, one improver bull can be found among 4 bulls on test, it is reasonable to have at least 8-10% of the total cow population in the breeding farms.

The main purpose of the commercial farms is to produce milk and meat. The work of these farms is evaluated by the quantities produced and the cost of production.

Every year a comprehensive evaluation of cattle is carried out. Sires, cows, replacement heifers and young breeding bulls are subject to evaluation in both breeding and commercial farms. The evaluation includes the proportion of blood of the basic breed, origin, performance, live weight, conformation, progeny test and reproductive capacity.

The evaluation covers 75% of cows and bulls of dairy and dual-purpose breeds. Each is classed as Super Elite, Elite, 1st class or 2nd class. According to the results of the evaluation animals are selected for registration in the State Herdbooks. These herdbooks register animals which meet the breed standards and belong to breeding stations, breeding state farms, breeding centres and breeding herds of commercial farms.

Table 1.1 CATTLE NUMBERS ON 1 JANUARY 1980
(in thousands)(excluding cattle for fattening)

Breed	Total	Purebreds
Simmental	17 708	4 198
Black Pied +	16 449	4 632
Red Steppe	13 282	7 579
Swiss Brown	2 999	753
Kholmogory	2 407	1 001
Bestuzhev	1 890	582
Kazakh Whiteheaded +	1 570	257
Latvian Brown	1 417	889
Caucasian Brown +	993	174
Ala-Tau +	930	343
Yaroslavl °	927	553
Kostroma +	838	285
Lithuanian Black Pied	740	585
Sychevka +	739	138
Lebedin +	599	236
Tagil °	599	179
Lithuanian Red	567	427
Estonian Red	492	341
Byelorussian Red °	429	65
Kalmyk °	381	217
Kurgan +	322	43
Gorbatov Red °	294	74
Aulie-Ata +	265	133
Ukrainian Whiteheaded °	230	29
Estonian Black Pied	208	173
Carpathian Brown +	203	127
Polish Red °	183	58
Istoben °	106	40
Georgian Mountain *	80	71
Tambov Red +*	45	5
Bushuev +°	21	6
Suksun *	20	6
Mingrelian Red *	11	7
Yurino *	6	1
Estonian Native *	2	1
Ukrainian Grey *	1	0.5
Yakut *	0.6	0.6
Other breeds 1/	1 124	0.6
Total	69 078	

- ° declining breed
- vanishing breed
- + new breed

^{1/} This includes breeds of foreign origin more recently imported, new breed groups resulting from their crosses with local breeds, and minor local breeds.

Purebred and crossbred (at least 7/8 blood) animals to be used for breeding, are entered in the State Herdbook for Cattle. Bulls must be at least of the elite class and their pedigrees must include data on their dam's parents and grandparents and sire's parents, grandparents and great-grandparents. To be registered in the herdbook, cows must be judged at least 1st class on the basis of the 1st lactation records, and their pedigrees must include dam's and sire's parents and grandparents. There are herdbooks for every breed described in the monograph except the local breeds.

The breeding farms have a financial interest in the registration of a large number of animals in the herdbooks because in this way the price of young stock for sale is increased.

There are 820 breeding farms in the dairy sector and 77 in the beef sector. On average, 32% of the total cow population are inseminated with semen from improver bulls and in the Baltic Republics up to 80%.

NOTE: On most farms cows are milked three times a day. Therefore, unless otherwise specified, milk yields quoted here refer to thrice-daily milking.

In this monograph the breeds are described in the following order:

DAIRY BREEDS

PIED DAIRY BREEDS

Black Pied
 Estonian Black Pied
 Lithuanian Black Pied
 Aulie-Ata
 Istoben
 Kholmogory
 Tagil
 Ukrainian Whiteheaded
 Yaroslavl

RED DAIRY BREEDS

Byelorussian Red
 Estonian Red
 Latvian Brown
 Lithuanian Red
 Polish Red
 Red Steppe
 Suksun

OTHER DAIRY BREEDS

Bushuev
 Estonian Native

DUAL-PURPOSE BREEDS

RED DUAL-PURPOSE BREEDS

Bestuzhev
 Gorbatov Red

Tambov Red

Yurino

STRAW-AND-WHITE BREEDS

Simmental

BROWN BREEDS

Swiss Brown

Ala-Tau

Carpathian Brown

Caucasian Brown

Kostroma

Lebedin

OTHER DUAL-PURPOSE BREEDS

Kurgan

BEEF BREEDS

Kalmyk

Kazakh Whiteheaded

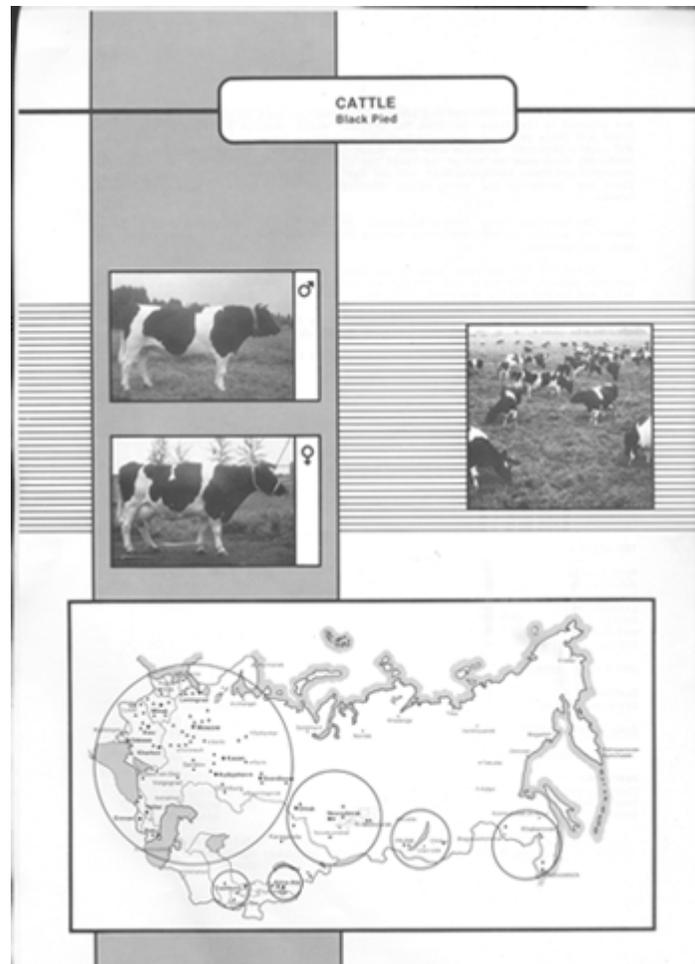
LOCAL BREEDS

Georgian Mountain

Mingrelian Red

Ukrainian Grey

Yakut



DAIRY BREEDS

Pied Dairy Breeds

BLACK PIED (Cherno-pestraya)

The Black Pied breed developed from crossing the local cattle in various areas with the Dutch Black Pied and East Friesian breeds. Pure breeding of Dutch cattle in Russia was conducted on only a small scale. The Central, Ukrainian, Siberian and other strains of Black Pied cattle were formed by absorptive and reproductive crossing.

The various strains of Black Pied cattle were approved as a planned breed in 1925. Therefore, some animals were imported from Germany, the Netherlands, Estonia and Lithuania during 1930-40 and distributed in various parts of the country. The imported sires improved milk production, feed conversion efficiency, and beef qualities. Five thousand head of the Dutch breed were imported during 1957-65. The production of the female ancestors of 107 bulls was 6-7000 kg of milk with butterfat content of 4.4-4.6%.

The Black Pied breed is noted for high milk production (the highest among the dairy breeds), good conformation and good beef qualities. Due to the high productivity, adjustment to machine milking, well-defined beef features

and the ability to acclimatize, the population of this breed is increasing year by year. By the beginning of 1980 the number of Black Pied cattle in the USSR was 16 449 000 excluding the Baltic population. In numbers they are second (25.2%) among 50 cattle breeds in the country.

The Black Pied breed includes varied groups of animals, originating from different maternal stocks under different climatic and feeding conditions. The crossing of the local low-grade cattle - Great Russian, Siberian, Trans-Ural, Central Asian, Grey Ukrainian - with Dutch bulls started at different times. The basic aim was to form a breed adapted to many different regions but originating from a single foundation breed. This unified breed was recognized in 1959.

The Black Pied breed comprises five large populations: Central (Mid-Russian), Baltic, Ural, Siberian, and other zones, namely Ukraine, Byelorussia, Central Asia, and parts of Transcaucasia.

The animals of the Central group are the largest (live weight 550-650 kg), with a more compact conformation, relatively shortlegged and a good exterior appearance. This group is noted for the highest milk production (5500-6500 kg) with low butterfat content (3.6-3.7%).

On the other hand, the Ural strain is of a lighter, fine-boned solid type (500-600 kg live weight) with longer legs, less pronounced beef features, and high milk yield (5000-6000 kg) and butterfat content (3.8-3.9%).

The Siberian strain is an even lighter type (450-550 kg), with good milk yield (4500-5000 kg) and medium butterfat content (3.7-3.8%).

The remaining groups are intermediate between the three leading strains. The Baltic population is described separately under the headings Lithuanian Black Pied and Estonian Black Pied.

A network of selection centres was set up in the USSR in 1975. The Ail-Union Research Institute for Livestock Breeding and Genetics has become the centre for work with the Black Pied breed. It unites the breeding activities of the leading breeding stations and zonal institutions that deal with this breed. The main goal of this selection centre is to breed highly productive strains, types, herds, and lines of the Black Pied breed, by raising valuable sires for the A.I. stations, progeny testing them, storing semen of the improved sires, and using it for improving the great mass of the Black Pied cattle.

The comprehensive measures undertaken have made it possible to improve the productivity and the pedigree value of the Black Pied cattle in the working zones of the selection centres. The principal indicators of the activity of the breeding farms are the number and quality of the pedigree young stock produced and primarily of the sires. Realization in the last 15 years of this large-scale selection programme has allowed a new approach to line breeding of the Black Pied cattle. In the breeding herds, bulls are produced by intra-line assortative mating with the use of moderate inbreeding. In the commercial farms the breeding activities are confined to the rotational crossing of lines within the breed. This increases the productivity, viability and fertility of the offspring.

The successful use of selection to breed, assess and use the better genotypes assisted in the formation of highly productive herds of the national Black Pied cattle. The average milk yield of 11 100 cows of the leading herds surveyed in various regions of the RSFSR in 1984 was 5559 kg, with a butterfat content of 3.82%. The best breeding stations are as

follows: Petrovski in Leningrad region (1080 cows, 6671 kg milk, 3.91% butterfat); Lesnoye (750 cows, 6604 milk, 3.89% butterfat); Petrovskoye in Moscow region (750 cows, 5630 kg, 3.94%); Zarya Kommunizma in the same region (3150 cows, 5450 kg, 3.78%); Imeni Lenina collective farm in Tula region (1000 cows, 5480 kg, 3.90%).

The milk production of the champion Black Pied cows with a milk yield per lactation of over 10 000 kg and with a lifetime production of 90-100 000 kg points to the high potential of this breed. At the six base farms of the Ail-Union Institute of Animal Breeding and Genetics alone over 100 cows with a milk production of 10 000 kg or more have been bred.

In Sverdlovsk region the milk yield of over 22 000 cows was 4800-5000 kg with 3.86-3.90% fat. At the leading breeding stations over 240 cows have a yield of 6500-7500 kg of including 206 cows with a yield of over 7000 kg.

The milk production of the best cows on the farms of the Ural area is as follows: Aida 220 (the record holder for lifetime production) produced in 13 lactations 117 720 kg of milk with a butterfat content of 3.75%, or 4415 kg of milk fat; she belongs to the stud farm No. 9 of Perm region. Cow Volga 3790, in her 3rd lactation produced 17 517 kg of milk with 4.20% butterfat; she was kept at Rossiya breeding centre in Chelyabinsk region. Gornaya 6329 at the same farm - 5th, 13 849 kg, 4.10%; Yagoda 6010 - 3rd, 13 146 kg, 3.93%.

The Black Pied breed accounts for the greatest numbers of champions with milk yields over 10 000 kg - 79 out of 212.

The breeding programme of the Black Pied breed aims to produce a type with a milk yield of 6.0-7.5 thousand kg, butterfat content 3.8-3.9%, live weight of cows not less than 600 kg, udder index of 43-45% and milk flow speed of 2.0-2.5 kg per minute by using Holstein-Friesian sires from the U.S.A. and Canada. By the beginning of 1985 the basic numbers of highly productive halfbreeds were bred at the leading breeding centres namely: Lesnoe and Petrovski in Leningrad region, Zarya Kommunizma in Moscow region and at Imeni Lenina collective farm in Tula region. Valuable sires have been bred in these herds as well.

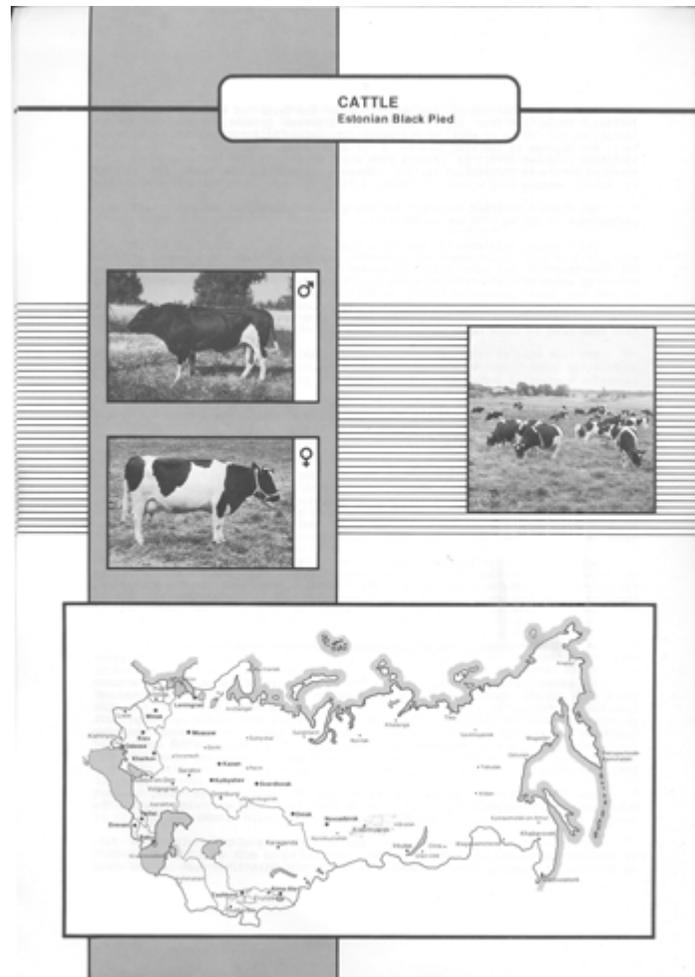
The best cows at the leading farms of the selection centre are united in the super-elite group. The milk production of these animals is 6.2-7.7 000 kg with a butterfat content of 3.99-4.27%. They are used to produce replacement bull calves.

The breeding establishments of this country have valuable sires. The milk production of their dams and of the female ancestors of their sires ranges from 6250 to 8300 kg with butterfat content 3.99-4.48%. The major suppliers of the replacement bulls for the breeding centres are the farms of Moscow, Leningrad, Perm, Chelyabinsk, and Sverdlovsk regions.

Bulls of more than 70 related groups and lines are currently in use; 45 of them are represented by small numbers of descendants and have only local importance. The sires of the lines Rikus 25415 (16.5%), Poseidon 239, and Oreshek 1 are widely used among the national lines. The descendants of the well-known Dutch bull Annnas Adema 30587 through the related groups of Keimpe 48326/43454 (21.7%) and Frizo Vouter 44116 (8.4%) have been widely distributed (30.1%).

Studies at the breeding station Lesnoye and at the breeding farm Torosovo in the Leningrad region have shown that selection has had only a minor

effect on the frequency of specific erythrocyte antigens. This relative stability suggests that these polymorphisms are of adaptive significance.



ESTONIAN BLACK PIED (Cherno-pestraya estonskaya)

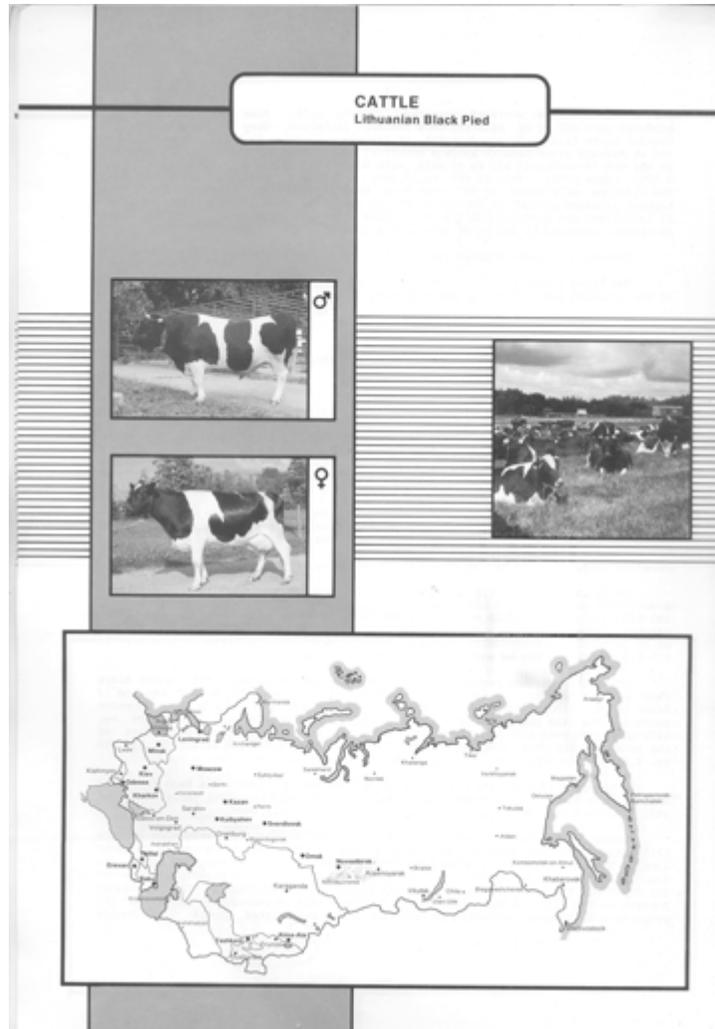
The breed was developed by crossing the local cattle of Estonia with the Dutch Black Pied and the East Friesian beginning in the second half of the last century. Long-term inter se breeding of the crosses combined with selection for milk production led to the creation of a large group of Black Pied cattle with high milk yield but relatively low fat content. Since 1885 these cattle, named Estonian Dutch-Friesian, have been registered in a herdbook. To increase the fat content of the milk, bulls of high fat lines from the Netherlands have been used since 1930. In 1951 this group of cattle was renamed the Estonian Black Pied.

The characteristic features of these animals are: large size, compact conformation, strong skeleton, light, rather long head, deep and wide chest. The average live weight of cows is 500-600 kg; that of the bulls is 900-1000 kg.

In recent years 93 206 cows have averaged 3674 kg of milk with 3.84% fat; 10 604 cows registered in the herdbook averaged 4402 kg of milk with 3.96% butterfat; 48 000 cows at breeding farms averaged 4059 kg of milk with 3.83% fat; at the three best farms the cows averaged more than 5000 kg milk. Some cows of this breed produced over 400 kg of milk fat in a 305-

day lactation. They have been raised at Vyandra state farm in Pyarnu district, at Estonia collective farm of Paides district and at Pydragu state farm in Rakvere district. Cow Kolli 1265 from Vyandra produced in her 4th lactation 13 927 kg of milk with 4.47% fat; Atsi 1802: 3rd, 13 580 kg, 4.39%; Luyva 1294: 4th, 12 965 kg, 4.26%; Stella 1302: 4th, 11 838 kg, 4.65%. The lifetime milk yield of 847 cows from 69 farms exceeds 50 thousand kg. The highest lifetime production was by cow Mirvik 1462 from Estonia collective farm: in 13 lactations she produced 106 016 kg of milk with 3.91% fat. Cow Layki 1144 in 15 lactations produced 91 565 kg of milk with 4.02% fat. The breed includes 4 major lines.

The breed zoning plan for the republic envisages the extension of the habitat of the Estonian Black Pied. At the beginning of 1980 the total number was 208 000.



LITHUANIAN BLACK PIED (Cherno-pestraya litovskaya)

The breed developed from crossing the local Lithuanian cattle with the Dutch Black Pied breed. The East Friesian and Swedish Friesian also participated in its formation.

In 1951 the Lithuanian Black Pied breed was approved as a planned one for this republic. It is bred at present in 25 regions of Lithuania. In 1980 the population of this breed was 740 000; it accounts for 57% of all cattle of recognized breeds in this republic.

The modern Lithuanian Black Pied cattle are characterized by a wide barrel and a strong constitution. There are animals with clearly pronounced dairy, intermediate, and dairy-beef conformation. The live weight of pedigree heifers is 513 kg and that of mature cows is 553 kg. The optimum live weight of cows on breeding pedigree farms is considered to be 600 kg or more.

These cattle are early maturing; the young stock are noted for their rapid growth rate and good feed conversion. Intensively raised calves reach a weight of 380-420 kg by the age 17-18 months. At the best farms the live weight of young stock reaches 433 kg. On performance test steers reach

the weight of 450-480 kg by the age of 15 months; average daily gain is 1050 g, and feed conversion efficiency is 6.6-6.8 feed units per kg gain; dressing percentage is 58-59.

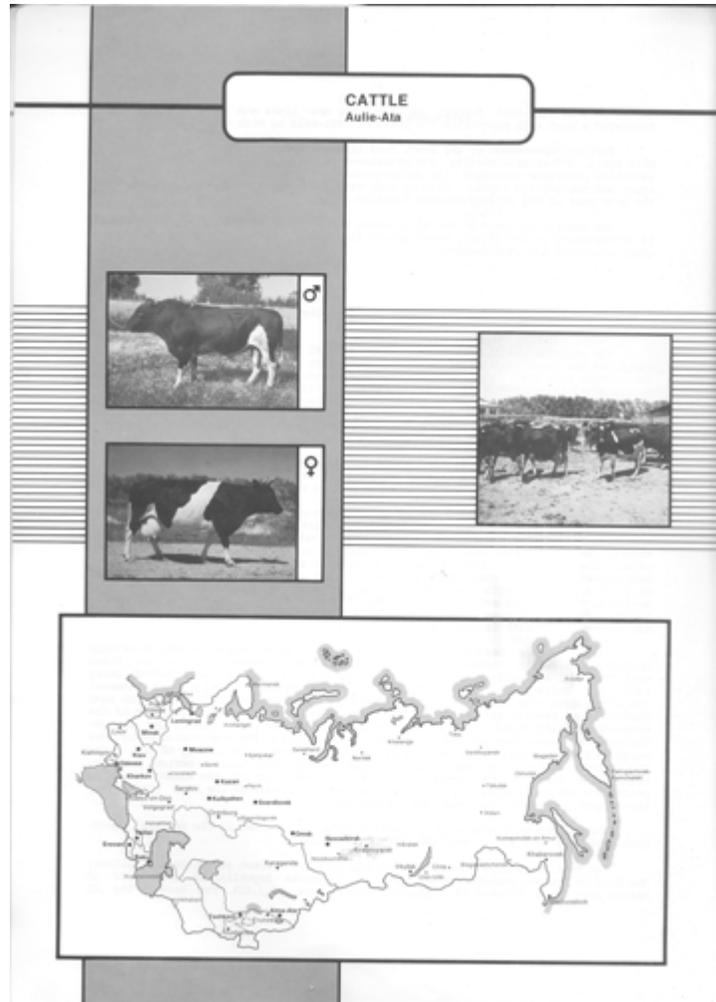
The milk recording results' point to the high productive potential of the Black Pied Lithuanian cows: on 64 farms the annual milk yield averages 4000 kg; on 4 farms it is 4500 kg and in 2 farms it is 5000 kg per cow. The most productive animals within the breed are as follows: 9246 cows with milk yields over 5000 kg, 1251 cows with over 6000 kg, 179 cows with 7000 kg and more. The record holders of the breed are the cows Yava 6297 (3rd, 11 201 kg, 4.08%), Tserke 6163 (4th, 10 229 kg, 4.01%), Lele 6269 (4th, 9167 kg, 4.78%).

A highly productive herd with high butterfat content of milk has been formed at Vilnius stud farm. The average milk yield for this herd in recent years has been 5428 kg with 4.19% fat.

Dutch cattle have considerably influenced the genealogical structure of the Lithuanian Black Pied cattle: initially the best Dutch sires were founders of most lines. Then the creation of their own lines began. In 1979 six new stud lines and four related groups accounted for 42.4% of the cows kept at the breeding farms and for 65.4% of the bulls that belong to the breeding establishments. The butterfat content of the milk of the Lithuanian Black Pied cows is increasing along with the proportion of animals belonging to the new lines and related groups. The female descendants of the best founder bulls of the new lines and related groups have displayed a high milk production - a yield of 5881-6624 kg with 4.19-4.42% fat.

Further improvement of the Black Pied Lithuanian cattle aims at the increase of milk yield, better milk quality and adjustment to twice-daily machine milking. The selection programme envisages the differentiation of the breed into conformational types and specialized lines. Side by side with pure breeding it is planned to use the gene pool of the related British Friesian breed.

The genetic analysis of the breed using blood groups has shown that the degree of homozygosity is low (6.3%), which points to a high heterogeneity of the breed and great potential for improvement.



AULIE-ATA (Aulieatinskaya)

The creation of this breed started in 1885 in the Aulie-Ata district of Kirgizia. The local Kazakh cattle were crossed with the Dutch Black Pied breed and the crosses were bred inter se. The crossbreds gradually spread to other regions of Kirgizia and Kazakhstan and to some areas of Uzbekistan. They were recognized as an official breed in 1950. Planned breeding of Aulie-Ata cattle began in 1935 when collective breeding farms and state breeding stations were set up; local cows were initially crossed with East Friesian bulls and the crosses were raised under improved conditions of feeding and management.

Modern Aulie-Ata cattle are well adapted to the local natural and climatic conditions; they can easily withstand hot weather, can be kept on mountain pastures, and they are more resistant than imported breeds to theileriosis and piroplasmiasis.

In conformation the Aulie-Ata resembles Dutch cattle: the body is long, with a light head, small horns, and thin neck with few wrinkles. The top line (withers, back and loin) is level with slightly raised rump. The udder is medium in size and cup-shaped. Coat colour is mainly black, frequently with

white spots on the abdomen, udder, lower chest and legs; light grey animals are also observed. The average measurements of mature cows are as follows (in cm): withers height 128.8, chest depth 69.2, oblique body length 153.0, heart girth 186.2, cannon bone girth 18.7 (National Herdbook, vol. 4). The average live weight of mature cows at breeding farms is 480-510 kg; the heaviest cows weigh 575 kg. The live weight of mature bulls is 810-960 kg; the maximum weight is 1160 kg.

In one of the best herds, that belonging to the breeding centre at Pobeda collective farm in Chimkent region of the Kazakh Republic, there are three conformational and performance types: narrow-bodied dairy (31.4%), wide-bodied dairy (38%), and dairy-beef (30.6%). The types differ in both external and internal characteristics - in both live weight and milk and beef productivity. Under the same conditions of feeding and management the most productive mature cows are those of the wide-bodied dairy type; their milk yield is 20.5% higher than that of the narrow-bodied dairy cows. They also have more regular lactations. The wide-bodied dairy cows weigh 33 kg more than the narrow-bodied type. The reproductive ability of the wide-bodied cows, measured by the average calving interval and service period, is also higher. For farms of the "whole milk zone" in the south of the Kazakh Republic preference should be given to wide-barrelled dairy animals as the most productive, the largest and having the best food conversion.

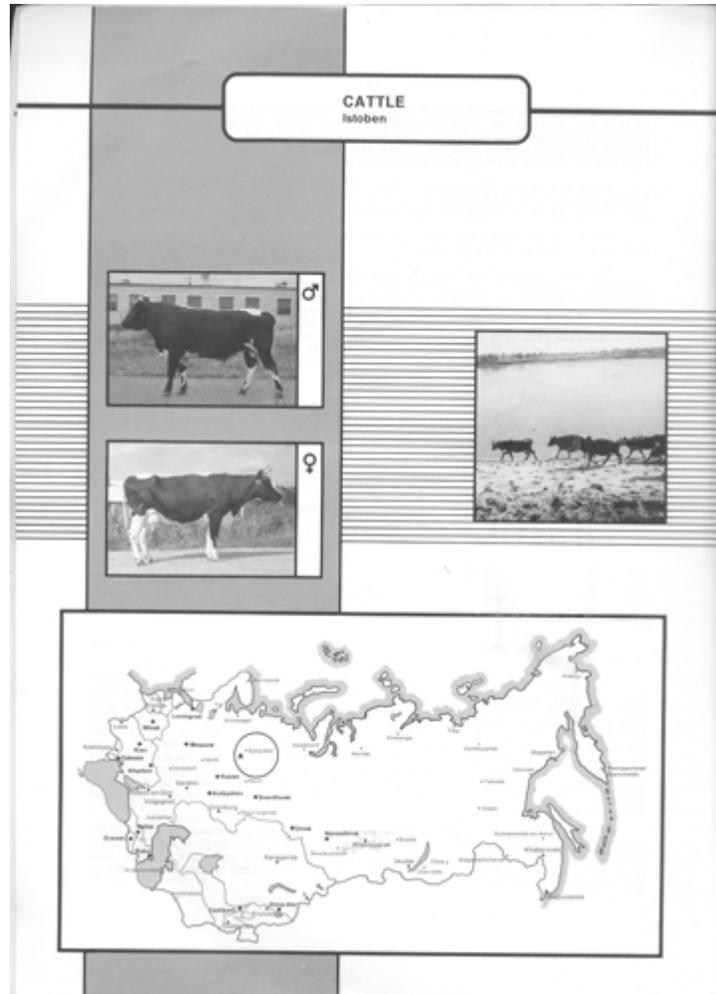
The average milk production of mature cows, as recorded in the National Herd-book (vol. 4), is 3735 kg, with fat content of 4.01%.

The most productive herds of Aulie-Ata cattle in recent years are as follows: The herd of Jambul sugarbeet state farm of the Kazakh Republic: the milk yield of mature cows there reached 4971 kg, with fat content of 3.82%. The herd at the 22 Partsyezd collective farm of Jambul region which averaged 4157 kg of milk and 158 kg of milk fat in 1979. In 1982 in the herd of V.I. Lenin collective farm of Jambul region the average was 3806 kg of milk and 146 kg of milk fat. In 1983 the breeding farm of Pobeda collective farm of Talass region of the Kirgiz SSR with 705 head of cows had an average yield of 3636 kg of milk and 136 kg of fat.

Aulie-Ata cattle fatten well. When fattening on pasture without additional feeding the daily gain of steers is up to 1 kg. The dressing percentage is 52-56; for some animals it is up to 60. The beef is tender, very tasty, highly nutritious.

The breed includes 6 blood lines and 2 related groups. Its numbers at the beginning of 1980 were 265 000 head.

The most valuable features of this breed are as follows: adaptation to the ecological conditions of the breeding zone, high vitality and strong constitution. To preserve and better use this genetic resource it is necessary to improve the economic basis of the breeding farms, to intensify the techniques of selection, to set up an adequate bank of frozen semen of the best sires of the breed. The major breeding aim is to increase milk yield and fat content and to improve the conformation and beef qualities. To help with this programme it will be expedient to use the blood of related breeds - the Dutch Black Pied and the Holstein.



ISTOBEN (Istobenskaya)

The breed was established in the former Vyatka province (now Kirov region) by crossing the local Great Russian cattle with the Kholmogory, Swiss Brown, Dutch and East Friesian breeds. The development of dairy husbandry in this region was aided by a good feed base (from flood lands in the alluvial plains of the Vyatka and Moloma rivers), the near-by markets for selling dairy products and organized butter-making. The breed was named after the settlement of Istoben where a large creamery was set up; the best herds were concentrated in its vicinity.

The importation of the Kholmogory and Swiss Brown breeds began late in the 19th and early in the 20th century; later the Yaroslavl breed was imported. During 1936-37 there was an infusion of East Friesian blood. Nevertheless, crossing of the local cattle with the above-mentioned breeds was quite limited and had no major effect on the productivity of the local herds. During selection the major emphasis was placed on fat content. In 1935 the National Herdbook of the Istoben cattle was opened. The breed was recognized in 1943.

The animals of this breed have clearly-defined dairy features; their constitution is strong and conformation compact. The head is somewhat

coarse with a long face. The chest is deep and long but not wide enough; the ribs are well sprung, flat with a large distance between them. The withers are narrow and medium in height. The back and loin are long enough; the rump is long and fairly wide at the hips but narrow at the pinbones. The legs are frequently wrongly set; cow hocks and knock knees as well as bowed hind legs are occasionally observed. The musculature is poorly developed. Common defects are as follows: narrow chest, sway back, sloping and narrow rump, wrongly set legs. Coat colour is mostly black or black-and-white (up to 70%), sometimes (about 25%) red or red-and-white. The udder of most cows is cup-shaped and medium in size. Istoben cows on the best farm (Kirovsk Lugobolotnaya experiment station 1976) have the following measurements (in cm): withers height 129, chest depth 70, chest width 49, width at hips 51, oblique body length 162, heart girth 190, cannon bone girth 18.5. The live weight of newborn calves is 26-30 kg; that of cows is 430-480 kg and of bulls 720-790 kg.

According to the results of the 1981 evaluation the average annual milk production of pedigree animals (mature cows) was 3107 kg, and the fat content was 3.83%. The best breeding herd of the Kirovsk Lugobolotnaya experiment station produced earlier (in 1976) 4238 kg of milk with 3.96% fat. The best cows in this herd produced during their best 305-day lactation 5990-6286 kg of milk with 4.05-4.15% fat. The 1200 cows at the 50-letiyе SSSR breeding state farm in Orichevsk district of Kirov region averaged, in 1983, 4023 kg of milk and 156 kg of butterfat.

Some Istoben cows have reached a record milk yield. The cow Beluga KIO-64 during her 6th lactation produced 8127 kg of milk with 4.07% fat; over 12 lactations she produced 53 278 kg of milk with 3.90% fat. Fara K10-1315 produced 8366 kg of milk with 4.98% fat.

Istoben cattle have satisfactory beef qualities.

The structure of the breed comprises 6 major lines.

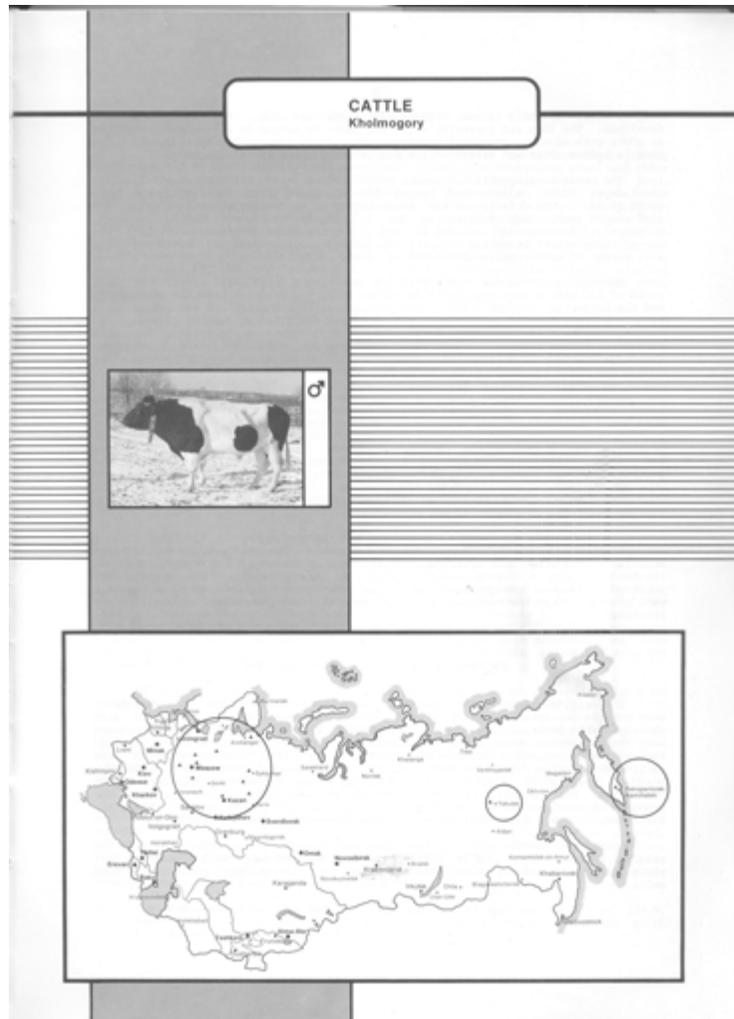
The valuable features of this breed are its good adaptation to the local ecological conditions and resistance to infectious diseases. Cases of leucosis among Istoben animals are 20 times less than among the Black Pied breed.

The number of Istoben cattle on 1 January 1980 was 106 000 head.

Numbers have decreased because these cattle are not competitive compared with the leading dairy breeds.

In accordance with the long-term plan of Istoben cattle breeding in Kirov region a conservation herd was established in Istobenski breeding state farm in Orichev district. The main purpose of this farm is to produce valuable bulls of the tested lines. The major technique is outbreeding; moderate inbreeding may be used within lines followed by line crossing. To proceed with the breeding of the approved lines of this breed, a bank of deep-frozen semen of the 24 best sires representing the leading lines is being set up.

With complete diet feeding the Istoben breed can be rapidly improved by crossing with the related Dutch breed.



KHOLMOGORY (Kholmogorskaya)

The Kholmogory breed was formed in Kholmogory and Archangel districts of Archangel region. It is the oldest and one of the best breeds in the country. Even in the 17th century Kholmogory cattle were noted for their fast rate of growth and high milk production. The development of cattle breeding in the alluvial plain of the Severnaya Dvina river was aided by the available flood plain meadows and pastures with legume-grass mixtures. Excellent pastures in the summer and liberal feeding with high quality hay in winter were the bases for developing such valuable characteristics as the large size, harmonious conformation and high productivity. The local residents attached much importance to the correct methods of raising the young stock by hand nursing not by suckling; they used special methods of feeding, management and milking of the cows. The first selection of the animals was performed by the Kholmogory peasants as far back as 250 years ago. A considerable economic outlet for the Russian cattle products (butter, beef, tallow, leather) in Europe in the 17th and 18th centuries gave a new impetus to the local peasants to develop dairy and beef cattle breeding.

According to the available historical data the Kholmogory breed had been formed long before foreign cattle were imported into Archangel and the adjacent areas. Kholmogory cattle had been exported beyond the boundaries of their initial habitat in 1693, 1713 and 1728 before they were crossed with foreign breeds. Highly productive Kholmogory cattle were used in various parts of the country for improvement of the local cattle. This intensive export resulted in the decline of the Kholmogory cattle husbandry. First attempts to improve the local Kholmogory cattle by crossing with the Dutch breed were undertaken in 1725, but there are no data available on the numbers of the imported cattle and their influence on the local cattle breeding.

During 1765-1898 cattle from the Netherlands and from Holstein were imported in small numbers into Archangel province. According to Reznikov during that period 137 head of cattle, including 62 bulls, were imported. Nevertheless, the proportion of imported Dutch cattle was very low: in Kholmogory and Archangel districts the cattle population varied at that period from 19 to 23 000; the percentage of cows varied from 52.3 to 72.3. It is difficult to define how great the influence of the imported sires on the Kholmogory cattle was. In a monograph entitled "Kholmogory cattle" by A.A. Vityugov (Archangel 1928) and in the work by F.I. Reznikov under the title "New Data on the History of the Kholmogory Cattle" (Archangel 1949) it was stressed that the influence of foreign breeds on Kholmogorys was slight. Studies of Kholmogory cattle in 1911-12 (A.A. Kalantar) and in 1921-24 (A.A. Vityugov) showed that there are several basic and transitional types within the breed. They differ in conformation and productivity.

In 1913-14 inspecting associations, cooperative dairy plants and mating stations were set up in the breeding zone of the Kholmogory cattle. The National Herdbook of the Kholmogory breed was started in 1927; in 1934 the state breeding station was established. They assisted in the breeding work with Kholmogory cattle by classification and selection of the animals, control of the raising of the replacement young stock, and identification of valuable animals.

In 1936-37 on some farms a single cross with sires of the East Friesian breed was used to improve milk yield and conformation. The butterfat content of the crosses was considerably lower than that of their purebred Kholmogory parents; therefore crossbreeding was halted and the crosses were deported from the principal breeding zones of Kholmogory cattle. Good acclimatization of the Kholmogory cattle in various parts of the country encouraged their distribution to many republics, areas and regions. At present Kholmogory cattle are bred in 24 regions and republics, mainly in Archangel, Vologda, Kirov, Moscow, Kalinin, Ryazan, Kaluga, Kamchatka regions and in the Komi, Yakut, Tatar and Udmurt ASSRs. Each region or republic has its own specific climatic and feed conditions. The Kholmogory cattle are well adapted in those different geographical areas and show high milk production and such qualities as early maturity, hardiness, strong constitution and resistance to disease. In milk production, among the national cattle breeds the Kholmogory cattle are second after the Black Pied. Kholmogorys are not as productive as the imported breeds but the main reason for this is the low level of feeding and management and insufficiently intense selection and use of sires. In each region where the Kholmogorys are bred there are outstanding animals which are the founders

of the lines, related groups and progenies. These animals should be used for pedigree activities on a wide scale.

By the beginning of 1980 the total population of Kholmogory cattle was 2 407 000.

The constitution of these cattle is strong and conformation is compact. The prevailing colour is black-and-white; less frequently it is black, red-and-white or solid red. These cattle are large; the legs of the cows are upstanding and the body is long. The head is refined and of medium size. The neck is thin. The chest is deep but not wide enough, with a small dewlap. The back and loin are level. The rump is wide, slightly raised. The hindquarters are wide. The skeleton is well developed. The legs are" correctly set. The udder is medium in size; most cows have an udder with equally developed quarters. The teats are usually cylindrical. The hide is medium thick and elastic. The muscle development is satisfactory.

The basic measurements of mature cows (in cm) are: withers height 133-135, chest depth 70-72, oblique body length 160-162, heart girth 196-198, cannon bone girth 19-20. The defects of the conformation are: narrow chest, sloping and roof-shaped rump, legs incorrectly set. Pedigree Kholmogory cattle are well developed. According to volumes 25 and 26 of the National Herdbook (1982), the average live weight of mature cows is 570-590 kg, varying from 480 to 810 kg; the live weight of mature bulls is 820-950 kg, going up to 1170 kg.

Kholmogory cattle are early maturing and have a high milk yield. The milk yield of 370 mature cows registered in volume 25 of the National Herdbook was 5394 kg and the butterfat content 3.93%. The average milk production of 949 mature cows registered in volume 26 of the National Herdbook was 5259 kg ranging from 3313 to 8901 kg. The butterfat content was 3.70-4.79%. The record holders for milk production are as follows: Khana 19 - 5th lactation, 8889 kg of milk, 3.93% fat; Khvoinaya 8 - 3rd, 7350 kg, 4.15%; Khartchevnyya 30 - 3rd, 7000 kg, 4.57%; Tsavashka 8090 - 6th, 8010 kg, 4.06%.

In 1983 the highest yields were at the educational and experimental farm of the Kazan Veterinary Institute (Tatar ASSR): the average annual milk yield per cow was 4583 kg of milk and 178 kg of fat; at the breeding station of the Zavet Ilyicha collective farm (Moscow region): 4746 kg of milk, 179 kg of fat. The highest production was displayed the same year by cow Gusenichnaya 682 SH-10510 from Kholmogorski state breeding farm in Archangel region: in the 5th lactation she produced 9804 kg of milk with 3.95% fat and 387.2 kg of fat.

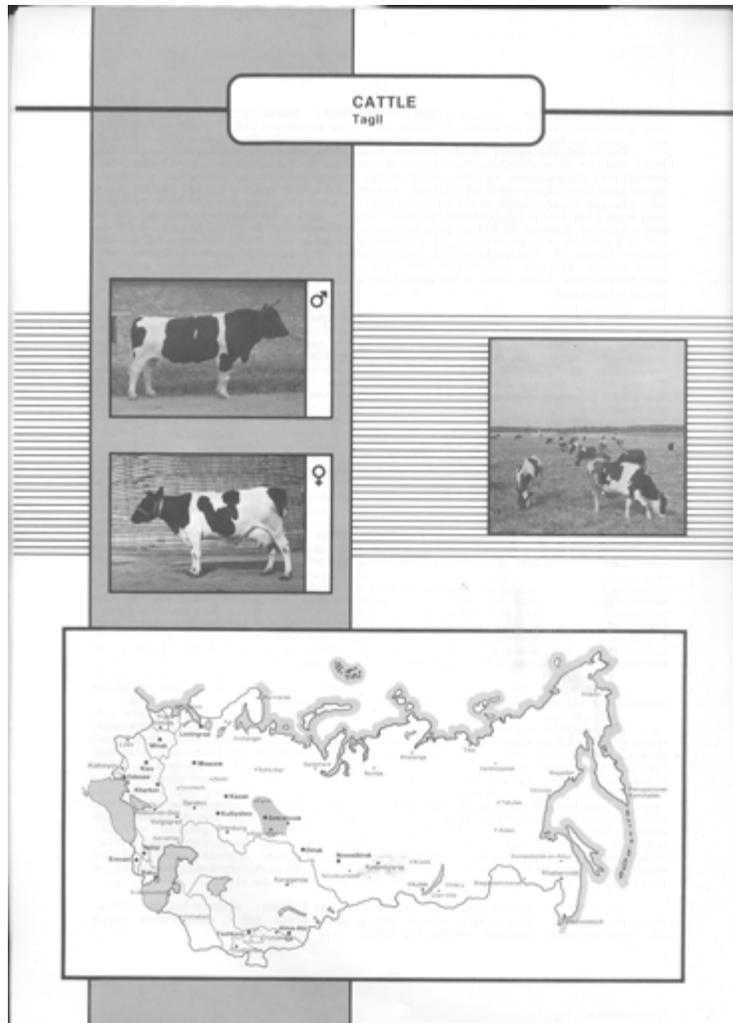
Breeding work with this breed is aimed at the intensive exploitation of its genetic potential in adaptivity and productivity.

The study of the genetic characters of the Kholmogory cattle from various ecological zones by the erythrocyte antigens has shown that one antigen was 10 times more frequent in the herd of Polyarny state farm in Krasnoyarsk territory, than in the herd of Lesnye Polyany breeding centre in Moscow region. The authors are inclined to explain the genetic differences between the populations by a specific gene profile and by the adaptive purpose of some alleles (but other explanations are possible).

The Pechora Type of the Kholmogory Breed

The original Pechora cattle developed in north European Russia (the Komi ASSR) were notable for their adaptability and high milk fat content - 4.0-4.2%. But with these valuable features they had low milk yields. For this reason they were crossed with the Kholmogory breed (1930-47). Later the improved Pechora cattle of desired type of the second and third backcross generations were bred inter se. In 1972 these cattle were given an official status and called the Pechora type of the Kholmogory breed. These cattle produced on the breeding farms of the Komi ASSR are highly productive. For instance, over several years the reproductive state farm Novi Bor produced on average over 4000 kg of milk per cow. Record holders include: Skala 5th lactation, 7343 kg, 4.17% fat; Ajda 4th, 6681 kg, 4.05%; Nauka 5th, 8355 kg.

Animals of Pechora type also have good meat characteristics inherited from the original Pechora cattle. On the natural pastures (without supplemental concentrates) young cattle have a daily weight gain of over 1 kg for a consumption of 6.5-7.0 food units.



TAGIL (Tagilskaya)

The breed was formed in the Central Urals. The centre of its breeding is Nizhny Tagil and the adjacent districts of Sverdlovsk region. The developing steel and other industries, accompanied by the population growth and higher demand for food, encouraged the improvement of animal husbandry in the Urals. Early in the 18th century, the local people began to breed cattle, selecting for use the best yielding cows with high butterfat content of milk and the bulls by the production of their mothers. Good grasslands and keeping the cows outdoors even in cold weather (-20 to -30 C) assisted in the creation of a valuable dairy breed, hardy and adapted to the severe climate of the Urals. Until 1862 Kholmogory sires were used to upgrade the local cattle. For the two decades that followed no systematic improvement measures were undertaken. After 1882 a few Yaroslavl bulls were used for crossing, but they had little effect.

Early in this century the Tagil cattle began to be crossed with the Dutch breed. This resulted in a better constitution and higher milk yield but caused a decrease in butterfat content. According to some reports, Swiss Brown and Tyrolean cattle were imported in small numbers but their effect was not

great. Overall, only two breeds, namely Kholmogory and Dutch, had an improving effect on the Tagil cattle. The popularity of the Tagil breed increased after the cattle exhibition in Nizhny Tagil in 1905 at which the average milk yield of the cows exhibited was 2931 kg and the butterfat content was 4.83%. Thereafter Tagil cattle were in great demand and they were exported in great numbers to the neighbouring districts of west Siberia, to east Siberia and even to Kamchatka.

During the following decade the Tagil cattle were intensively mated to the Dutch breed which resulted in a considerable decrease in the butterfat content of their milk. To preserve a valuable property of the Tagil cattle, that is the high butterfat content, the Dutch sires were replaced by purebred or crossbred Tagil bulls.

Since 1917 the improvement of Tagil cattle has been carried out by the husbandry association set up in Nizhny Tagil; since 1933 this work was done by the State breeding station, and later it was performed at breeding stations.

In 1930 the Tagil breed was officially approved as planned breed for improving cattle in some regions of the Urals and Siberia. In 1931 the first volume of the National Herdbook was published. Late in the 1930s experiments were undertaken at some state farms to cross the Tagil cattle with the East Friesian. The Tagil-East Friesian cattle group was formed; it was noted for high milk production and high butterfat content. The population of Tagil-East-Friesian cattle in the vicinity of Sverdlovsk later became a part of the Black Pied breed.

The colour of the animals is diverse; nevertheless black and black-and-white predominate (47-48%); red and red-and-white are also common. Tagil cattle are subdivided into three types: Tagil-Dutch, mainly of black-and-white colour; Starotagil (old Tagil) with a somewhat coarse and short deep head showing the influence of Tyrolean and Swiss Brown cattle in the past; the standard type of the second half of the last century, uninfluenced by Dutch cattle, with prevailing red-and-white colour.

The animals of the first type have a lighter skeleton, long head, long body, wide hindquarters, normally shaped udder, correctly set legs. The standard type animals are characterized by fairly heavy and long head and neck, pointed withers, not very deep chest but with a considerable dewlap, level back, capacious belly, wide, long and often sloping rump with a roof-like shape, high tail head, strong medium-long legs. The hind legs are frequently bowed or sickle-hocked. The udder is fairly large, with a good excess of skin. The teats differ in size.

The measurements of the cows (in cm) are as follows: withers height 129.5, chest depth 70.9, oblique body length 158.3, heart girth 187.5, cannon bone girth 19.2 (the National Herdbook, volume 12, 1980).

The constitution of the animals is strong and conformation is compact. The size of the animals is medium. The live weight of newborn calves is 28-32 kg; at the age of 6 months they weigh 160-190 kg. The live weight of cows averages 460-500 kg; that of mature cows registered in Volume 12 of the National Herdbook (1980) is 552 kg (going up to 705 kg). The average live weight of bulls older than 3 years is 836-942 kg. The largest animals reach the weight of 1 000-1 120 kg.

The beef qualities of the Tagil breed are considered to be satisfactory. The dressing percentage of yearling steers is 54; at the age of 17 months it is 58%. Feed conversion is 5.6-7.2 feed units per kg live-weight gain.

The milk yield of cows on the best commercial farms is in the region of 3000 kg; in pedigree herds it reaches 4500-5000 kg. The average milk yield of the cows registered in Volume 12 of the National Herdbook was 3989 kg, with 4.29% fat. The most productive cows of the Tagil breed produce 7323-7805 kg of milk in 305 days with 4.12-4.31% fat.

The record holder of the breed, cow Amazonka 474 is kept at Savinski state farm in Perm district. She produced in 305 days of the 6th lactation 8243 kg of milk with 4.36% fat. Her production per 100 kg of live weight was 1540 kg of milk. In 10 lactations she yielded over 60 000 kg of milk. Cow Lyustra 367 of the same farm produced, in 305 days of the 4th lactation, 7252 kg of milk with 4.31% fat, or 1250 kg of milk per 100 kg of live weight. Cow Rodinka 351 produced in the 5th lactation 10 222 kg of milk with 3.97% fat; Marta 46: 8th lactation, 9367 kg of milk, 4.10% fat; Dorogaya: 6th lactation, 9040 kg, 4.15% fat.

In butterfat content the Tagil cows are second only to the Gorbatov Red breed. The average butterfat content is 4.0-4.2% and some cows have 5.0-5.4%. The herds with the highest butterfat content are on farms of Perm and Sverdlovsk regions, where cows with butterfat content of over 4.0% account for 18-25% of the herd. The protein content is 3.3-3.6%. At the breeding farm of Tagil cattle at Trifanovskoe breeding centre of the Ural Agricultural Research Institute in Sverdlovsk region 1019 cows produced in 1983 an average of 4264 kg of milk and 167 kg of milk fat.

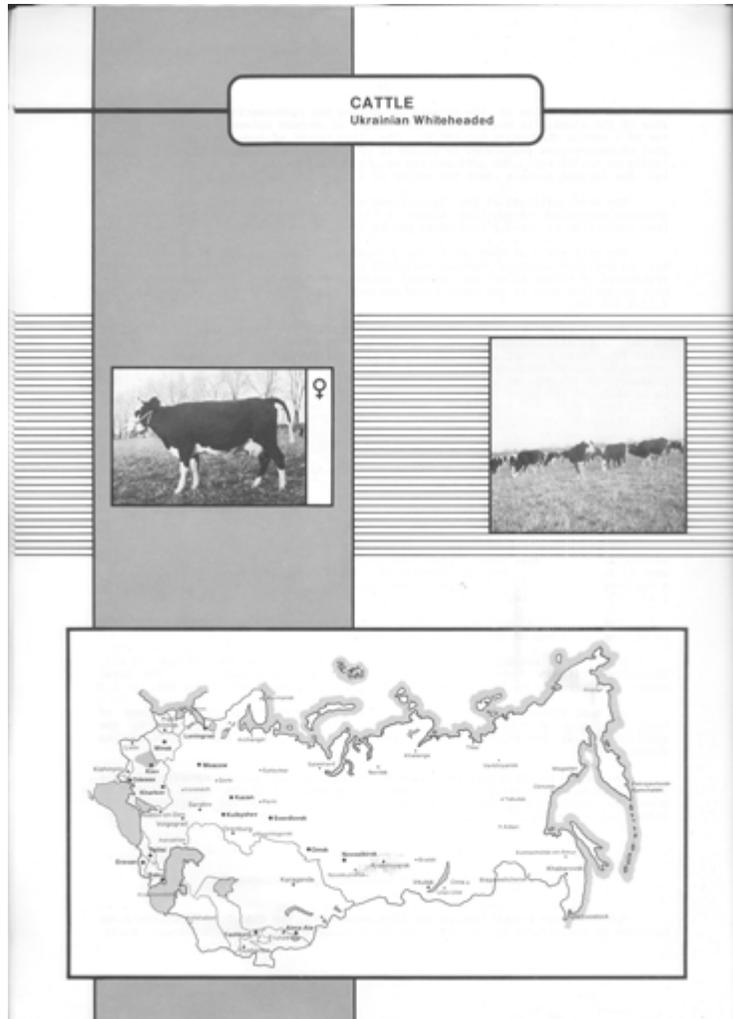
Due to the shape and function of the udder the Tagil cows are suitable for machine milking: udder index varies from 40.7 to 45.2%. At the farms of the service zone of Kamyshlov state breeding station 31% of the cows have a tub-shaped, 59% have a cup-shaped, and only 10% have a spherical udder. The speed of milk flow is 1.22-1.67 kg per minute.

These commercial properties and biological features of Tagil cattle allow them to be considered one of the best national breeds.

Tagil cattle are distributed in Sverdlovsk (46%), Perm (36%), Kurgan (5.8%), Chelyabinsk (4%) and Tyumen (0.2%) regions and in the Udmurt ASSR (8%). The total number has decreased by 13% during the last decade and now stands at 599 000.

The most valuable features of Tagil cattle are the high butterfat content of their milk, high milk production, good beef qualities, complete adaptation to the specific natural and economic conditions of the Ural region and resistance to disease.

The cattle breeding plan envisages the growth of Tagil cattle numbers and their improvement by intra-breed selection and by introduction of the blood of related breeds to improve conformation, to increase milk production and adaptability to industrial technology.



UKRAINIAN WHITEHEADED (Belogolovaya ukrainskaya)

The breed was formed late in the 18th century in the districts of Zhitomir and Korosten in the Ukraine by crossing the local Polesian cattle with Groningen bulls. In the Netherlands the Groningen Whiteheaded cattle were bred as a beef-and-dairy breed, whereas Ukrainian Whiteheaded were selected to form a dairy breed.

At present these cattle populate Kiev, Zhitomir and Khmel'nitski regions of the Ukraine. On 1 January 1980 they numbered 230 000.

The colour of the breed is red or black but always with white head, frequently with dark spectacles around the eyes. Some animals also have a white udder, abdomen, lower legs and switch.

The cattle are of medium size with a deep but narrow chest. The head is light, small, bony; the neck is long. The musculature is poorly developed; the skeleton is thin. The development of the udder is satisfactory; it is of medium size with properly placed teats; many cows have rudimentary teats. The skin of the udder is medium thick, with sufficient "reserve"; it is covered with thick, fine hair.

The basic measurements of mature cows (in cm) are as follows: withers height 127.1, chest depth 66.4, chest width 39.5, length of the barrel 151.1, chest girth 182.4, cannon bone girth 18.6.

The constitution is strong and the conformation compact. The live weight of bulls over 3 years old averages 743-807 kg; the record figure is 1100 kg.

The live weight of 4-5-year-old cows is 445 kg; the record figure is 700 kg.

The milk yield of mature cows registered in the National Herdbook, vol. 6, 1975, was 3815 kg with 3.74% fat. According to the 1981 evaluation the average yield of pedigree cows was 2770 kg of milk with 3.55% fat. At the best breeding farms, Antoniny in Khmelnytskyi region and Komsomolets Polessya in Kiev region, the average was 4500-4800 kg.

The most highly productive cows yield 6-7000 kg of milk in a 300-day lactation: Gitara 332 - 9th lactation, 7736 kg milk, 3.72% fat, 287.7 kg fat; Gornychka 9133 - 3rd lactation, 6270 kg, 3.90% fat, 244 kg fat. The record milk yield belongs to cow Orbita - 7th lactation, 12 393 kg milk, 3.40% fat.

The greatest number of highly productive cows belong to Antoniny breeding centre in Khmelnytskyi region of the Ukraine.

The breed comprises 8 major lines.

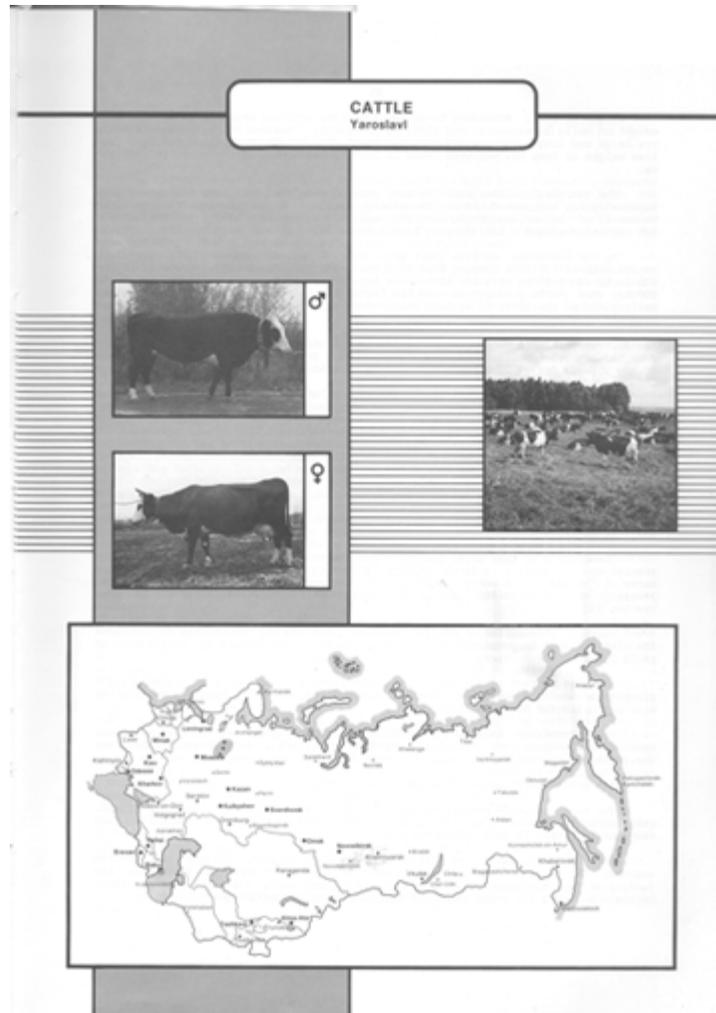
A valuable feature of these cattle is that they are nutritionally undemanding.

They possess a high feed-conversion efficiency. Among the 1st and 2nd calvers the most productive are the animals with a live weight of over 550 kg. Ukrainian White-headed cattle are well adapted to the local conditions and resistant to diseases.

The major defects of the breed are the low fat content (3.6-3.8%, varying from 3.3 to 4.65%) and that it does not fully meet the requirements of specialized dairy complexes.

It is expedient to further improve Ukrainian Whiteheaded cattle by crossing them with the related Groningen breed.

The conservation of the germ plasm of this breed, in accordance with the long-term plan for cattle breeding in 1980-90, will be done by forming conservation herds at the best farms.



YAROSLAVL (Yaroslavskaya)

The breed was formed in the 19th century in the territory of the former Yaroslavl province as the result of isolation and long-term inter se breeding of the local variety of the northern Great Russian cattle with selection, under conditions of improved feeding and management. The excellent meadows and pastures in the alluvial plains of the Volga, Sheksna, and Mologa rivers contributed to this process. The increased demands for cattle products of the local urban population and the development of butter and cheese industries late in the last century also favoured the formation of this breed. Animals of the Dutch, Tyrolean, Angeln, Simmental, Allgau and Kholmogory breeds were imported into the Yaroslavl province at different times in small numbers. However, these breeds had little effect on the formation of the Yaroslavl breed since the exterior of these cattle differs considerably from that of the imported breeds. Besides, after 1882-83 there were no cattle importations into this region; hence there is no basis to consider their influence on the Yaroslavl breed.

The greatest emphasis in the formation of the Yaroslavl breed was placed on the development of the dairy characters and less importance was

attached to their conformation. This resulted at first in the defects typical of the Great Russian cattle e.g. angular barrel, narrow chest, short sagging hindquarters with poorly developed muscles, wrong stand of the hindlegs. After 1917 the breeding work with the Yaroslavl breed was conducted by the recording associations and peasant breeding stations who faced the problem of improving the conformation of the animals and increasing their productivity.

In 1924 the Provincial Herdbook was started; later it was replaced by the National Herdbook. By 1940 four volumes of the National Herdbook had been published with 12 000 registered animals. Since 1933 the breeding work in the collective farms was conducted through the system of State breeding stations.

Typically, Yaroslavl cows are black with white head, abdomen, lower legs, and switch and with black spectacles around the eyes. The muzzle is dark. Animals of red, solid black, red-and-white or black-and-white colour are less frequent. Considering that cattle colour has no effect on their productivity, no emphasis is placed on it and animals of all colours are entered in the herdbook. Nevertheless, in the pedigree breeding areas black white-headed animals prevail because of customer preference for the typical colour.

Yaroslavl cattle have a somewhat angular conformation and well-developed mid-barrel. The head is light and bony with a relatively small distance between the horns. The horns are medium thick and medium long, light in colour with dark tips. The neck is thin, of medium length and with small wrinkles. The dewlap is not large; the withers are pointed, projecting slightly above the topline; the loin is straight; the hindquarters are almost square but slightly sagging. The mid-part of the barrel is long; the abdomen is capacious. The skin on the barrel is elastic, thin, stretching easily. The legs are not long. The skeleton is usually thin and poorly developed. The udder is well developed; the teats are cylindrical, the front ones widely spread but the back ones sometimes close together; rudimentary teats are frequent. The skin on the udder is thin, covered with soft, thin hair; there are folds of skin at the back.

Bad set of the legs is rarely observed in pedigree animals. Cow-hocked hindlegs are usual. Such defects as sagging hindquarters, pointed rump and bowed hindlegs are very infrequent. With unsatisfactory raising of the young stock the following defects may later appear: narrow chest, hollowness behind the shoulders, poorly developed muscles of the back, loin and rump.

The basic measurements of mature Yaroslavl cows are (in cm): withers height 127-129, chest depth 68-70, chest girth 183-186, oblique body length 155-157, cannon bone girth 17.8.

The live weight of the calves at birth is 28-32 kg. With intensive raising the steers reach a weight of 170-180 kg by the age of 6 months.

Formerly Yaroslavl cattle had a low live weight and a number of conformational defects due to insufficient feeding. Improved feeding and management increased the live weight of cows. According to Volume 17 of the National Herdbook (1979) the live weight of bulls 3-years-old and older is 804-844 kg (maximum 960 kg). The animals are large and long. The average live weight of cows is 483 kg (maximum 649 kg). The live weight of cows on pedigree farms is 500-580 kg; that of the bulls is 700-800 kg.

The Yaroslavl cattle have for many years been noted for high milk yield and especially for high fat content. The average yield of the mature cows registered in Volume 17 of the National Herdbook (1979) was 3943 kg (maximum 6855 kg). The butter-fat content averaged 4.14%, varying from 3.98 to 5.19%.

By the beginning of 1941 there were over 20 record holders in the Yaroslavl region with milk yields ranging from 6000 to 11 700 kg. Cow Zolotaya produced in the 4th lactation 9267 kg of milk with 4.15% fat. Her lifetime milk yield was about 80 000 kg. Cow Marta produced in the 5th lactation 11 690 kg of milk. The highest daily yield in the USSR, 82 kg, was produced by cow Vena, in a 300-day lactation she produced 8438 kg of milk with 4.0% fat.

Cow Boyarka produced a record yield: 5th lactation, 8795 kg, 4.11% fat. Some cows had high yields for a number of lactations. Thus the annual average milk yield of cow Tainaya for 17 lactations was 4218 kg of milk. The best herds of Yaroslavl cattle are as follows: the breeding centre of Gorshikha collective farm in Yaroslavl region, Svetoch breeding centre in Ivanovo region and Sheksna collective farm in Vologda region. In the first herd the average milk yield in 1983 was 4697 kg and of milk fat 221 kg; in the better years it reached 5020 kg and 4.60% fat. According to the catalogue of highly productive animals (1983) the highest milk yield was in the herd of Svetoch breeding centre, which averaged 4260 kg of milk and 163 kg of milk fat.

This leading pedigree establishments have bulls with highly productive female ancestors. Zhitomir 181 is the son of a cow that yielded 7464 kg of milk at 4.39% fat or 327.7 kg of fat; Granit 775: dam gave 7281 kg of milk, 4.43% of butterfat, 322.5 kg of fat.

The animals of this breed are early maturing: at Gorshikha breeding centre the average age of heifers at first calving is 2 years and 5 days. Some heifers are mated at the age of 14 months and calve at the age of 23.5 months; in the first lactation they average 3900 kg of milk with 3.6% fat. The live weight of cows reaches 530 kg.

The strong constitution of cows ensures longevity and the ability to increase the milk yield; many animals are highly productive and fertile up to the age of 15-20 years.

High fat content of the milk of Yaroslavl cows is combined with a considerable protein content (3.5-3.6%) and dry matter content (13.6%).

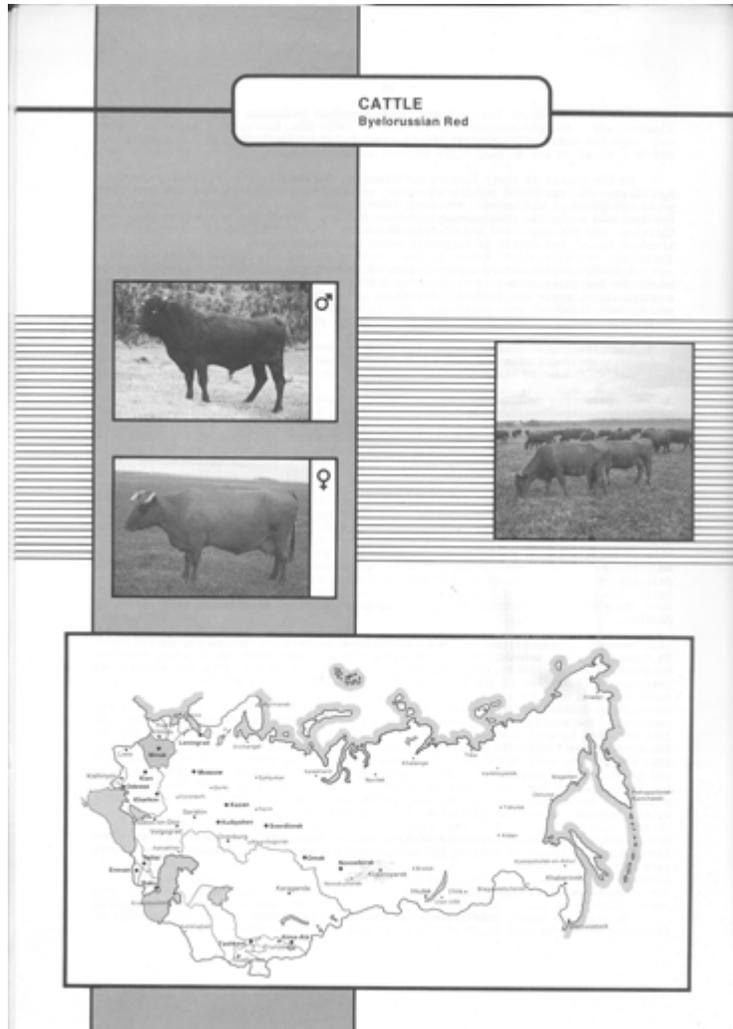
The cheeses made from the milk are noted for high quality.

Under intensive raising the beef and fattening qualities of the Yaroslavl cattle are satisfactory: the animals produce carcasses of a sufficient weight and their dressing percentage is 52.7; the beef is tender and tasty.

The breed comprises 15 lines and related groups.

The most valuable properties of this breed are rich milk, high milk yield, resistance to tuberculosis, brucellosis, infectious mastitis and leucosis, high response to better feeding and management.

The Yaroslavl cattle are bred in Yaroslavl, Ivanovo, Vologda and Kalinin regions. The total population in 1980 was 927 000. It is expedient to improve the feeding at the leading breeding stations and to improve the selection so that these cattle could meet the requirements of modern industrial technology.



Red Dairy Breeds

BYELORUSSIAN RED (Krasnyi belorusskii skot)

In the course of their history Byelorussian Red cattle were repeatedly improved by infusion of the blood of the superior related red breeds. During the last 100 years the blood of six breeds was used, namely: Angeln and German Red at the end of the last and early in this century, Polish Red and Danish Red in the twenties and thirties, and Estonian Red and Latvian Brown in the fifties of this century. The blood of Danish Red cattle is currently being introduced again.

A study carried out in Grodno region in 1948-49 proved that it is expedient to breed the Byelorussian Red inter se. They are of a single type, adapted to the local ecological, climatic and feeding conditions, and undemanding as to feed. They respond to improved feeding and management by increased milk production and high fat percentage.

The breeding of these cattle was carried out at the Vasilishkovskaya animal husbandry experiment station. In 1967 volume 1 of the National Herdbook of the Byelorussian Red breed was published.

At present, Byelorussian Red cattle are found in all regions of the Byelorussian Republic; however, they are commonest in Grodno and Minsk regions. In 1980 they numbered 429 000. The exterior of the Byelorussian Red cows is characterized by the following features. The head is medium long, not wide, with a long face. The poll is pronounced. The horns are of medium size. The neck is thin and of moderate length. The withers are not sharp, occasionally divided. The chest is of medium depth, wide enough. The back is level, slightly narrow. The loin is long and level, of medium width. The mid-part of the body is well developed. The abdomen is capacious, not drooping. The rump is level, slightly raised. The hindquarters are of medium length and width, with protruding hips. The legs are comparatively thin, bony, not long, correctly set. Sometimes legs are splayed or bowed. The udder is medium in volume, glandular, cup-shaped or roundish. The teats are cylindrical, of medium size. The skin is thin, elastic, mobile. The skeleton is light and strong. The musculature is moderately developed. The conformation is harmonious and compact; the constitution delicate. The colour is red or rust-red of various shades. Many animals are noted for their longevity, while maintaining normal reproduction.

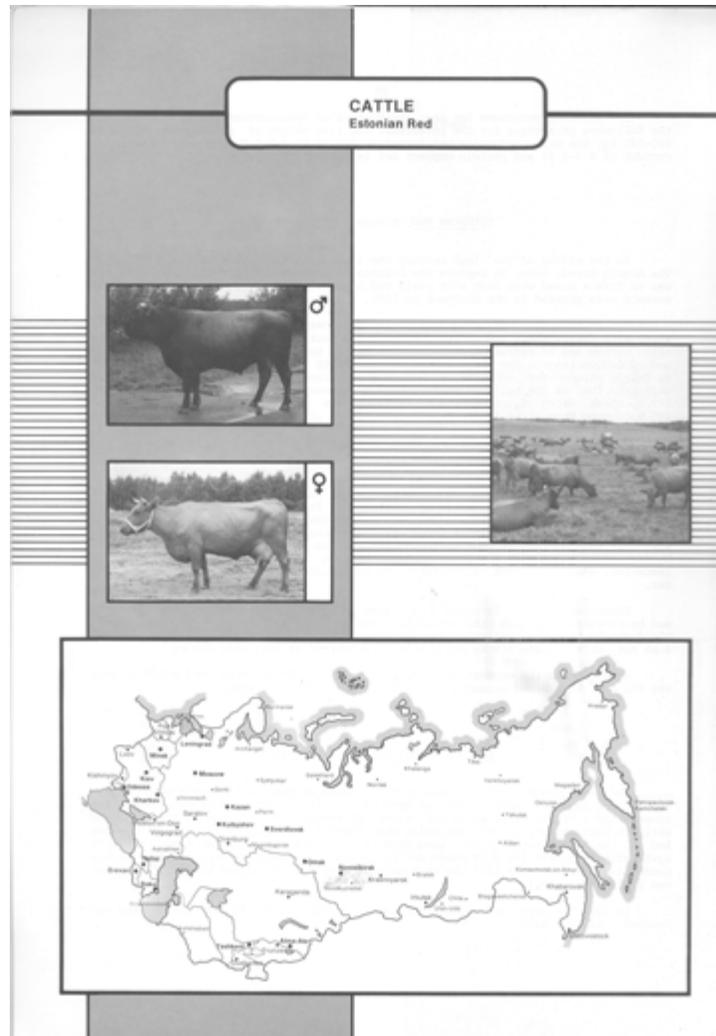
Body measurements (in cm) are as follows: withers height 128.7, chest depth 68.6, oblique body length 158.3, chest girth 189.8, cannon bone girth 19.4 (National Herdbook, vol. 1, 1967). The average live weight of mature cows is 420-500 kg (maximum 530 kg); that of the bulls is 750-850 kg (950-1000 kg maximum).

The potential of the modern Byelorussian Red cattle has not been completely realized. The average milk yield of the stock evaluated at the breeding farms in 1981 was 2557 kg with 3.69% fat; at the best farms it was 3053 kg with 3.62% fat. In the herd of Vasilishkovski breeding centre in Grodno region the average milk yield in 1982 was 2507 kg with 3.73% fat. In recent years several groups of cows of this herd and of Shchuchin experimental station averaged 4514 kg of milk with 4.08% fat. In her 4th lactation cow Vyetv 2016 produced 5986 kg of milk with 3.91% fat and 3.70% protein; Malta produced, in her 3rd lactation, 6056 kg of milk with 4.55% fat; Volna produced, in her 4th lactation, 5906 kg with 4.85% fat. Beef and fattening qualities of Byelorussian Red cattle are satisfactory: under favourable conditions of feeding and management the young stock display a high growth rate and early maturity.

The breed comprises 6 basic lines and 23 families.

To preserve these cattle conservation herds have been set up and a bank of frozen semen of the best sires of all basic lines has been established.

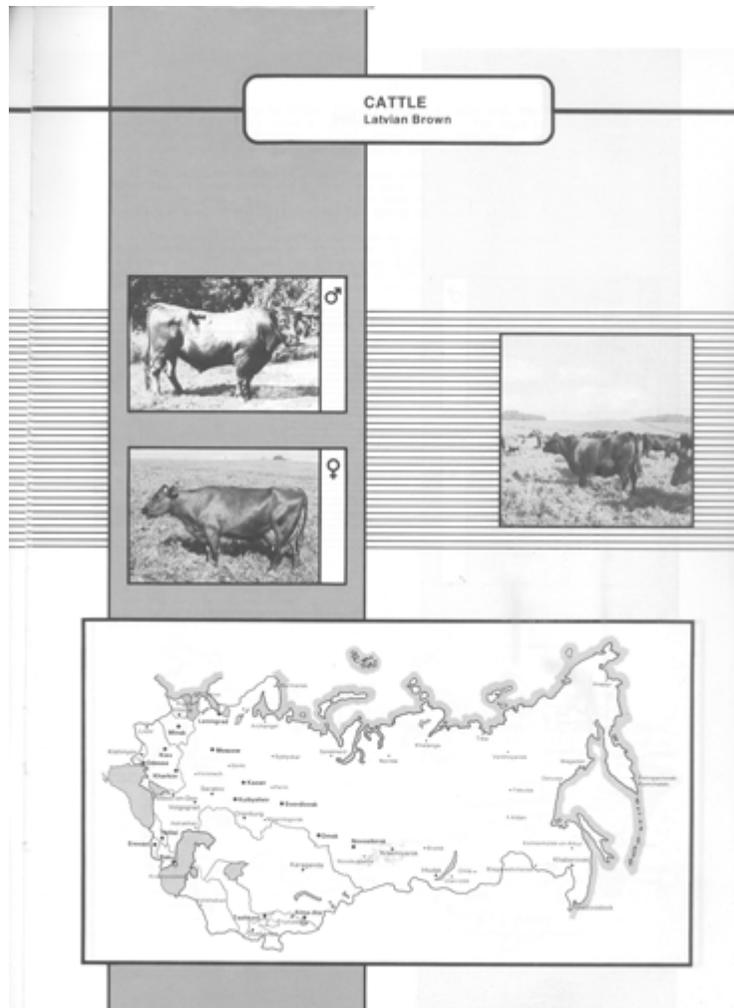
The breeding programme for the improvement of Byelorussian Red cattle aims at the following parameters for the purebreds: the live weight of mature cows should be 500-540 kg, the milk production per lactation should be 4.5-5.0 thousand kg with fat content of 4.0-4.2% and protein content not less than 3.6%.



ESTONIAN RED (Krasnaya estonskaya)

In the middle of the last century the local Estonian cattle were crossed with the Angeln breed. Later to improve the crosses Danish Red animals were used. The aim was to form a breed with high milk yield and high fat content. The first Estonian Red animals were entered in the herdbook in 1885. The animals of this breed have a strong constitution. The head is medium in size, with fairly short and narrow forehead. The neck is of medium size. The chest is often narrow and of medium depth. The withers and back are level; the rump is wide and of medium length. The legs are of medium length and correctly set. The skeleton is fairly strong. The udder is of medium size, glandular. Coat colour is light or dark red; that of the bulls is darker. Body measurements (in cm) are: withers height 127.5, chest depth 70, chest width 45.5, oblique body length 157.9, heart girth 195.5, cannon bone girth 18.3. Better cows have a wide barrel with a solid skeleton and muscles. The live weight of calves at birth is 31-33 kg; cows weigh 450-550 kg (maximum 780 kg); mature bulls weight 800-900 kg (maximum 1000 kg).

The milk yield of 164 900 evaluated cows was 3456 kg with 3.92% fat. The production of Estonian Red cattle at 77 breeding farms is as follows: average milk yield per cow 3784 kg, fat content 3.98%, protein content 3.30%. In 12 high producing herds the average milk yield per cow during a 305-day lactation amounts to 4127-5029 kg, and fat content is 3.90-4.18%. There are 25 record holders in these herds: including cow 5338 - 5th lactation, 9610 kg milk, 4.14% fat; cow 4519 - 7th lactation, 8554 kg of milk, 4.47% fat; cow 2431 - 2nd lactation, 7806 kg milk, 4.65% fat. Improvement of the Estonian Red cattle is being carried out by pure breeding and by crossbreeding with the Danish Red and the Angeln. The new type with Angeln blood should have the following performance: milk yield not less than 7000 kg with 4.0% fat, milking rate 1.9 kg per minute, live weight of cows over 600 kg. According to the census the total population of the Estonian Red breed in 1980 was 492 000. This breed accounts for 63.3% of all cattle in Estonia.



LATVIAN BROWN (Buraya latviiskaya)

The breed began to be formed in the middle of the last century when Angeln cattle were imported into Latvia to improve the local, low-productive cattle. The crosses had a higher milk yield but lower fat content. At the end of the last and early in this century Danish Red bulls were imported and used on the Angeln crosses and on the local cattle. The long-term breeding of the crosses inter se with systematic selection for milk yield and fat content ensured the development of highly productive cattle. Since 1885 the best animals were registered and the first herdbook was published in 1911. In 1947 the breed was given a new name - Red-Brown Latvian. By 1980 numbers had reached 1 417 000 head.

These cattle vary in colour from light-red to dark-red. The head, neck and legs are often darker. They have a strong constitution. The head is small, light and moderately long. The skeleton is light, chest deep, body long, rump slightly raised, udder usually well developed. The best herds have marked dairy features.

The basic measurements of mature cows (in cm) are: withers height 129.6, chest depth 71.1, chest girth 193.3, oblique body length 163.7, cannon bone

girth 18.0 (National Herdbook, vol. 29, 1983). The live weight of mature pedigree cows is 520-560 kg and that of bulls is 750-850 kg, going up to 1000 kg.

The milk yield of purebred Latvian Brown cows is high. The average milk yield of the mature cows recorded in Volume 29 of the Herdbook (1983) in their best lactation was 4537 kg and the fat content 4.28%. The average yields of the nearest female ancestors of the bulls recorded in Volume 29 of the National Herdbook were 5970-6036 kg of milk and the fat content was in the range 4.38-4.73%.

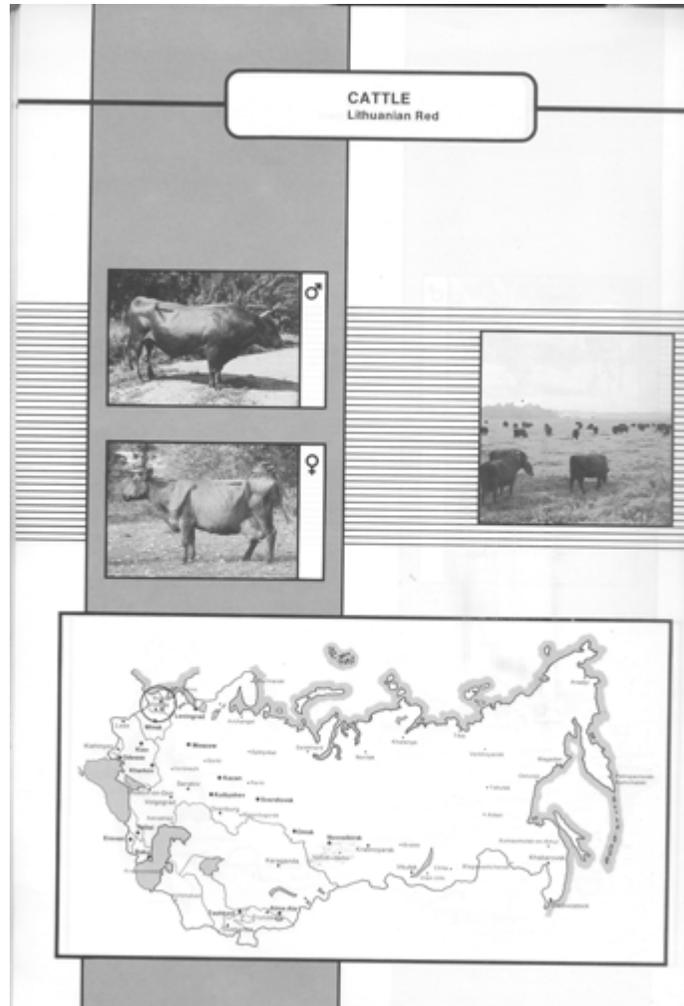
The champion milk producers are: Nadze 8977 - 8457 kg milk with 3.93% fat; Yetse 6320 - 8170 kg, 4.21%; Grieta 4915 - 8113 kg, 4.26%; Roya 5212 - 8021 kg, 4.10%.

As a genetic resource for Latvia, Latvian Brown cattle are of primary importance: they account for 99% of all cattle in this Republic. The breed includes 4 major lines.

In the improvement of Latvian Brown cattle much importance has been attached to line breeding. In 1979 a new breeding line was tested and approved; it was named BL-1 (Brown Latvian No. 1). The number of the BL-1 line is over 50 000 head. This line is being developed in four branches by the assortative mating of sires to cows from the best families and by periodical moderate inbreeding. The major selection herds belong to the breeding centres Vetsautse, Sigulda and Sarkanais Octobris.

The BL-1 cows are noted for their harmonious conformation. The udder is large, glandular, usually cup-shaped or spherical with equally developed quarters (average index is 45%). The milk yield of the cows in the selection group is 5287 kg; fat content averages 4.16%, and protein content 3.45%. There are many champions in this line; they combine high yield with increased fat content: Undra 6088 - 4th lactation, 9298 kg milk, 4.75% fat, 3.84% protein; Baka 3469 - 4th, 8544, 4.82%, 4.05%; Dalasa 4044 - 8th, 10 106, 3.76%.

The Latvian Brown breed of cattle is being improved with the aim of increasing milk yields to 5000 kg with the same fat and protein content and to meet the requirements of the industrial methods of cattle management.



LITHUANIAN RED (Krasnaya litovskaya)

The breed was formed early in this century by improved feeding and management of the local Lithuanian cattle, assortative mating and mass selection and crossing with the improved breeds: Ayrshire, Angeln, Dutch, Danish Red, Swiss Brown and Shorthorn. The crosses were selected for milk production.

Most animals are of clearly defined dairy type. Basic measurements of the pedigree cows (in cm) are as follows: withers height 126, oblique body length 157, chest width 43, chest depth 69, chest girth 188, cannon bone girth 19. Coat colour is red. The average live weight of cows is 470 kg; those in the herdbook weigh 520 kg and bulls 750 kg.

The young stock of the Lithuanian Red breed are noted for their rapid growth rate, good food conversion and high carcass quality. When intensively fattened, steers weigh 413 kg as yearlings and 503 kg when 15 months old. Up to the age of 15 months one kg of gain requires 5.32 feed units. The dressing percentage is 58.6 and proportion of meat 81.6%. The average daily gain of steers from 6 to 15 months of age is 1032 g.

The milk yield of 83 500 mature cows was 3362 kg with 3.69% fat; 2700 cows at pedigree farms produced 4337 kg with 3.87% fat. The record holders of the Red Lithuanian breed are as follows: Sloga 35 - 7th lactation, 10 754 kg milk, 4.20% fat; Zhabine 1355 - 4th, 10 242 kg, 4.33%; Gerve 1246 - 6th, 10 196 kg, 4.09%.

The breed consists of 18 lines and related groups.

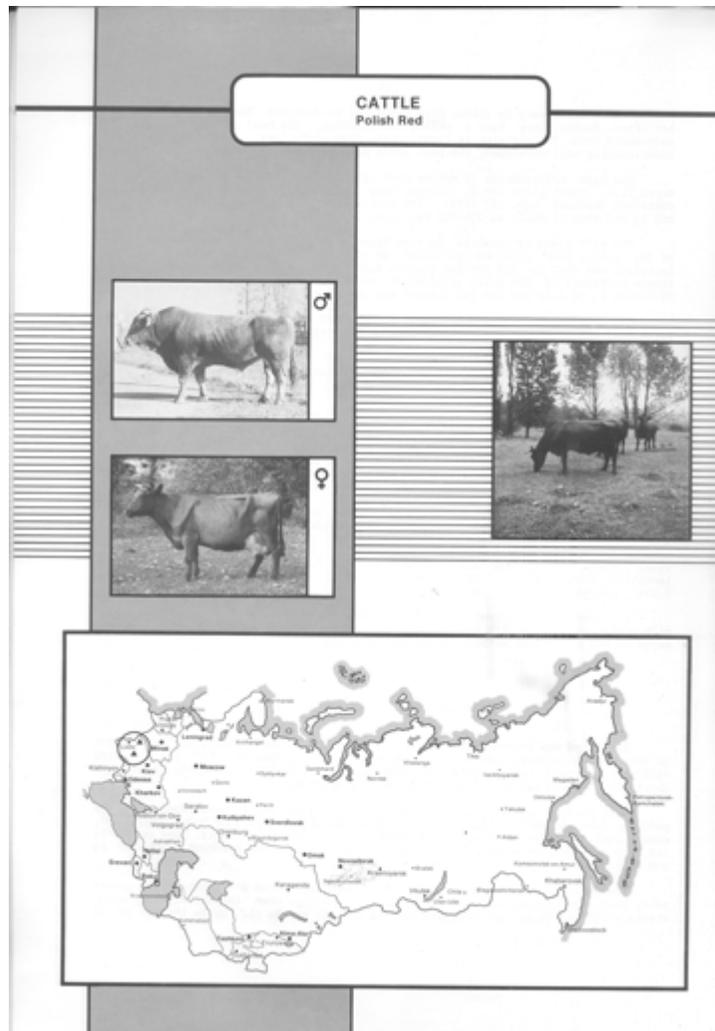
The best bulls are kept at Pasval, Shaulyai and Vilnius breeding centres.

The average milk yield of the nearest female ancestors of these bulls ranges from 6346 to 7210 kg and the fat content is 4.39-4.72%.

The Lithuanian Red breed is found in 18 districts in the north and northeast of the Lithuanian SSR. In 1980 the total population was 567 000. Up to 10 000 head of young pedigree stock are exported annually to the Kazakh, Uzbek and other Soviet republics.

The programme for the improvement of Lithuanian Red cattle, along with pure breeding, envisages the use of Danish Red and Angeln bulls to form high butterfat lines.

Blood group analysis has shown that the homozygosity rate is fairly low (6.8%). It points to a high heterogeneity of Lithuanian Red cattle and to a great potential for improvement by accumulating the useful genes.



POLISH RED (Krasnaya polskaya)

The breed derived from the local cattle of Poland and western Ukraine. In the early 20th century they were improved by crossing with the Angeln and Danish Red and, since 1956, in the USSR with the Latvian Brown, Estonian Red and Byelorussian Red. The greatest impact in terms of the increase of production was of Angeln and Danish Red cattle.

The total population of the breed in 1980 was 183 000. It is found chiefly in the western Ukraine, namely in Volyn region and, to a lesser extent, in Ternopol region and is being improved at Olykski breeding centre in Volyn region.

Polish Red animals have a delicate constitution and a compact conformation. The colour varies from light yellow to brown; most typical is light to dark red, or cherry-red with lighter markings. The horns are light in colour; the bulls have short and thick horns of medium size. The head is medium in size, not wide enough. The back and loin are straight, usually narrow. Some animals have a sway and wedge-shaped back. The rump is narrow, frequently wedge-shaped and sloping. The udder is medium in size, glandular, cup-shaped. The fore-legs are strong, properly set; sometimes

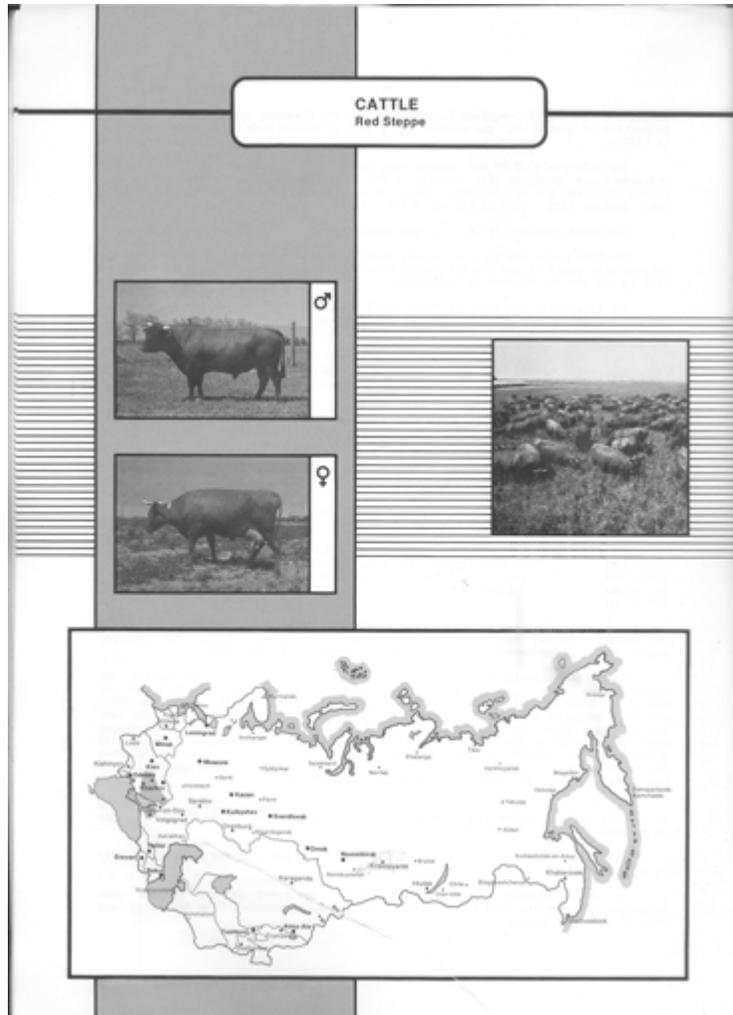
they are knock-kneed or bow-legged. The skeleton is thin. The skin is thin and hard. The hair cover is thick and short. The hooves are dark in colour. The basic measurements of cows are (in cm): withers height 124.4, chest depth 64.2, oblique body length 145.4, chest girth 174.6, bone girth 16.9. The live weight of pedigree cows is 450-480 kg.

The milk production of mature cows recorded in Volume 1 of the herdbook is 3782 kg with 3.96% fat.

The characteristic features of the Polish Red breed are the compact conformation, undemanding feed requirements, resistance to disease, high fertility and high milk fat percentage.

The breed consists of 25 lines and related groups.

The breeding programme includes the improvement of reproduction in the purebred local-line animals, setting up of conservation herds at the better breeding farms, and forming a bank of frozen semen of the major line sires. On commercial farms cows are mated to bulls of related improved breeds - Danish Red and Angeln.



RED STEPPE (Krasnaya stepnaya)

There is no single view on the origin of Red Steppe cattle. It is known that it was formed as a local breed in the middle of the 18th century. One group of investigators see the origin of Red Steppe cattle as linked with the movement of settlers from various areas of Germany to the south of the Ukraine. They assume that the founders of these cattle were the Franconian, Brown and other German breeds. There are also references to a Tyrolese and Polish Red origin. Another group of investigators believe that the common type and productivity point to a link between the Red Steppe and the Angeln and Red Trondheim breeds. Some experts think that the East Friesian breed considerably influenced its formation. But there is no doubt that the local cattle in the south of the Ukraine, especially the Ukrainian Grey, played a considerable part in the formation of Red Steppe cattle. This is the basis for the statement that the Red Steppe are of local origin.

Late in the last century, to improve the exterior, beef qualities and milk production, the crossing of Red Steppe cattle with foreign improved breeds was started. After the 1917 Revolution breeding farms and the State

breeding stations for Red Steppe cattle were set up. Of great importance for the improvement of this breed was the establishment of the herdbook in 1923. The experience of several individual farms in selecting and propagating the best animals of this breed was summed up and their work was centralized.

At present, the majority of Red Steppe cattle are in Donetsk, Zaporozhye and Crimea regions. Other areas of concentration are western Siberia and Kazakhstan.

In conformation Red Steppe cattle are considered to be of a dairy type; they have poorly developed muscles and low live weight. The head is light, moderately long. The neck is long, narrow and bony; the dewlap is usually undeveloped. The chest is fairly flat and not deep. Forequarters are commonly poorly developed. The withers are pointed; the back is long and fairly level; the loin is well developed. The rump is not well developed; some animals have sloping and pointed hindquarters. The legs are strong and straight. The udder is of medium size, glandular, proportionally developed, with loose skin.

Coat colour is red of various shades from light to dark. Some animals have white markings on the lower barrel, legs, abdomen, dewlap and udder. The bulls are usually darker in colour than the cows. The basic measurements of mature cow are (in cm): withers height 128-132, chest depth 68-71, heart girth 184-190, oblique body length 155-160, cannon bone girth 18-19.

The live weight of calves at birth is 30-34 kg; that of mature cows is 480-520 kg (maximum 700 kg) and bulls weigh 750-850 kg.

The Red Steppe cattle form a population of animals adapted to a specific environment, namely the markedly continental climate in the south of the Ukraine. It is the most numerous breed in that Republic (5.4 million).

After the end of the Second World War three zonal types, namely: Zaporozhye, Donetsk, and Crimean were formed within the breed. The Zaporozhye type have high milk production; the Crimean type cows combine high milk yields with high fat content; the Donetsk animals combine high milk production with high live weight.

One of the leading breeding farms that deals with the breeding and improvement of the Red Steppe breed is the Diktatura breeding station in the Donetsk region. On 1 January 1983 the farm had 2180 head of cattle, including 800 cows. The cattle are characterized by heavy weight, harmonious conformation and ability to increase milk yields to meet the requirements of machine milking. The average daily gain of the young stock exceeds 700 g. By the age of 18 months the heifers reach a live weight of 380-400 kg. In the last decade the milk yield has been constantly increasing: in 1982 the herd average was 4678 kg of milk. In Dzerzhinski state farm in the Crimean region milk yield in 1983 was 4037 kg with 4.02% fat.

Volume 84 of the National Herdbook of the Red Steppe cattle (1983) contains the data on 563 purebred animals, including 424 cows. The average 305-day milk yield of these cows was 4385 kg with 3.94% fat. Milk yields vary from 3383 to 8375 kg and fat content from 3.70 to 5.31%.

The book of high producing Red Steppe cattle (1982) reported data on 2018 record holders that produced during 305-day lactations more than 6000 kg of milk with fat content of 3.7% or more. The majority of high producing cows were raised and milked at the breeding farms Kirov in Zaporozhye

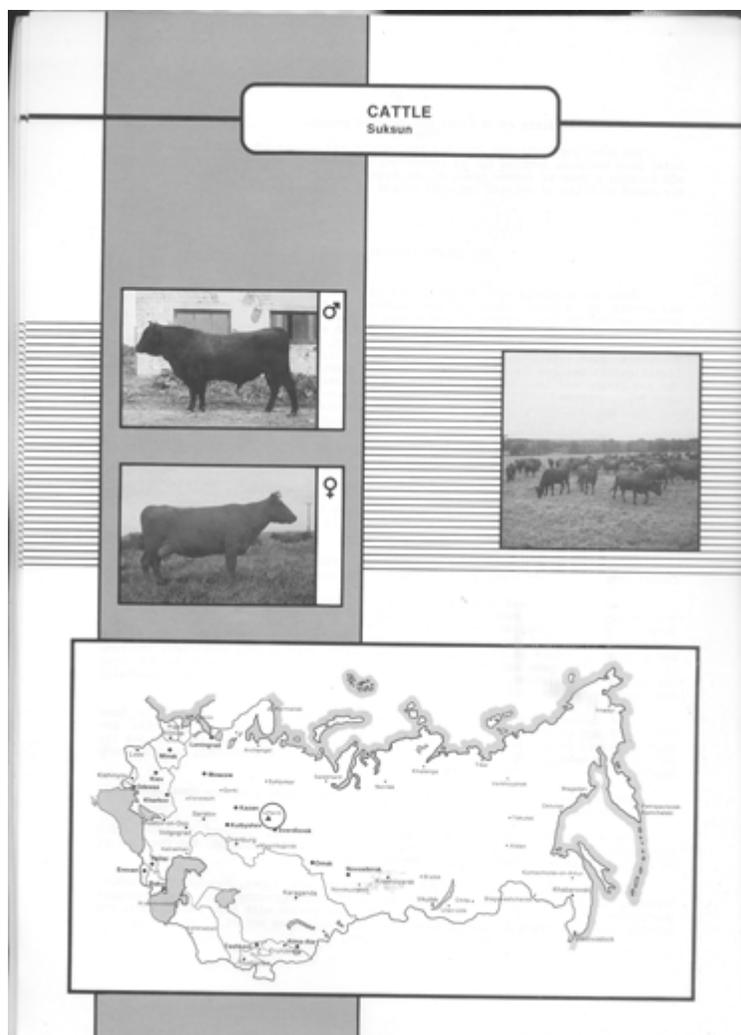
region, Diktatura in Donetsk region, Chervony Shakhter in Dnepropetrovsk region, Ventsy-Zarya in Krasnodar territory, Shirokoye in Crimea region and Karagandinski in Karaganda region.

During the last 50 years, 14 record holders have been recorded with milk yields of over 10 000 kg in a 300-305-day lactation. The average milk yield of these cows was 10 354 kg with 3.69% fat; the average live weight was 612 i.e. 1691 kg of milk per 100 kg live weight. There were 32 record holders with milk yields of 9000-9999 kg. The unbeaten prize winner is cow Moroshka 201 from Karagandinski farm with 12 426 kg of milk and 3.82% fat; cow Burya 6070 from Proletarski Borets . collective farm in Zaporozhye region produced 10170 kg milk with 4.0% fat and 407 kg fat.

When comparing the red breeds by the proportion of the 10 most widespread B-alleles of the blood groups, the Red Steppe and Danish Red breeds are found to be similar. They have four common alleles (BO_1Y_1D' , BO_1 , BP' and Y_2Y') out of the basic ten. Yet, Gorbatov Red cattle have a large number of B-alleles that are not observed in Danish Red cattle. This allele range is the result of involvement of the other breeds that participated in the formation of the Red Steppe.

The Red Steppe cattle population consists of 24 lines (1193 bulls).

The improvement programme plans to improve the constitution of Red Steppe cattle in all breeding zones, to increase size, milk production and fat content and to improve the technological characteristics.



SUKSUN (Suksunskii skot)

The formation of the Suksun cattle began in the second half of the 19th century and it is linked with setting-up of a copper-smelting plant in the settlement of Suksun in the former Perm province. Favourable conditions of feeding, the use of Danish Red animals for crossing with the local cattle and strict selection of the offspring from the best cows helped to form the Suksun cattle as an individual population. By the end of the 19th century these cattle were noted for good milking qualities and high butterfat content. Early in the 20th century Danish Red and Angeln sires were imported again for crossing. Later (1933-38) the Suksun cattle were influenced by the Red Steppe, Latvian Brown and Estonian Red breeds. The modern Suksun cattle have a high frequency of BO_1Y_1D' and Y_1Y' blood antigen alleles. These are characteristic of the Danish Red and Latvian Brown breeds.

At present, Suksun cattle populate Suksun, Perm, Ordyn, Kishert and Uin districts of Perm region. The principal breeding zone of this breed is the Suksun district where these cattle are approved as a planned breed. During

the last two decades the number of the Suksun cattle has declined from 49 000 head to 20 000.

The modern Suksuns have strong constitution and compact conformation. The head is light; the neck is medium long; the chest is deep, but often narrow; the back and loin are level and wide; the rump and hindquarters are usually level, sometimes slightly raised; the body is moderately long; the skeleton is medium strong; sickle-hocked legs are frequent. The muscles are not well developed. The hide is thin and elastic. The udder development is satisfactory: 9.8% of first-calf heifers have a tub-shaped udder, 76.8% have a cup-shaped one, and 13.4% have a spherical udder. Coat colour is usually red of various shades.

The conformation of the cows at Suksunski breeding state farm is characterized by the following measurements (in cm): withers height 129.3, chest depth 66.1, oblique body length 155.3, heart girth 203.6, cannon bone girth 20.7.

The average live weight of cows is 480 kg; that of bulls at the age of 3-4 years is 768 kg; 5-year-old and older bulls average 922 kg. Bull calves weigh 30-32 kg at birth, heifer calves 27-28 kg.

Experiments have shown that the most desirable type of Suksun cows is wide, deep and compact. The milk production of such cows is higher, the lactation curve is more even and the quantity of milk fat per 100 kg of live weight is higher.

According to the 1982 evaluation mature Suksun cows (5160 head) had a milk yield of 2162 kg with 3.71% fat. The milk production per 100 kg of live weight was 522 kg. The conservation herd of 1226 cows at Suksunski breeding state farm in Perm region in 1982 averaged 2528 kg of milk with 3.88% fat. The limited number of animals in the herd results in an increase of inbreeding which has an adverse effect on their production: an increase in the inbreeding coefficient of 1% results in a decrease in milk yield of 21 kg per lactation.

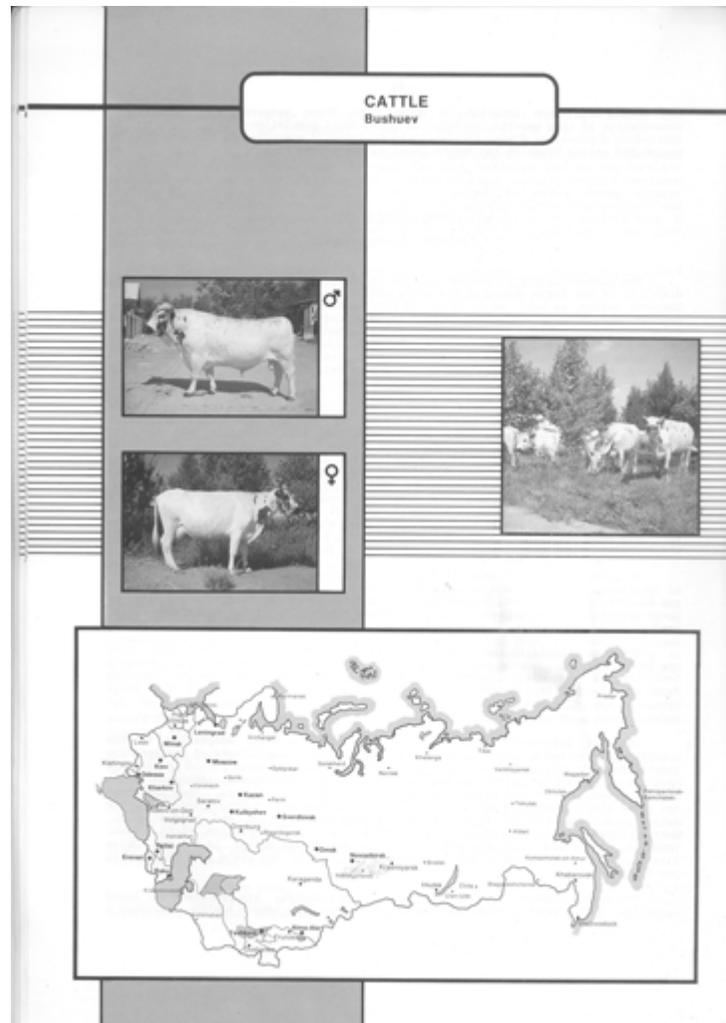
The genetic potential of Suksun cattle is illustrated by the milk yields of the best cows: Knyazhna 4588 - 4th lactation, 8875 kg milk, 3.96% fat; Bomba 970 - 3rd lactation, 7070 kg milk, 3.97% fat; Groza 18 - 4th lactation, 6423 kg milk, 3.98% fat; Yedinstvennaya 2052 - 4th lactation, 6048 kg milk, 4.59% fat.

In 1966 a group of 36 cows with average butterfat content of over 4% and an average milk yield of 4100 kg was selected on the selection farm Suksunski. Under the improved feeding and management conditions the next year the cows averaged 5260 kg of milk with 3.84% fat. The milk production increase over one year was 28.3%. Later the numbers of selected cattle at the farm increased to 90-100 head, but feeding became rather worse. Nevertheless, during the period that followed, the milk production at this farm has been stable at the level of 3.5-4.5 thousand kg per cow, which exceeds the average figures at this establishment by 500-1000 kg.

The most valuable characters of Suksun cattle are as follows: adaptation to the severe climatic conditions of the Central Urals, high resistance to many hazardous diseases (tuberculosis, leucosis, etc.), compact conformation. Suksun cattle consist of three genealogical lines: Kazakhstan 1371, Lebed 1507, Yeruslan 267 and two related groups: Tur 55 and Tir 66. The founders of the first three lines carried the genes of the Latvian Brown and

of the local cattle, and the latter two have the genes of the local cattle and the Danish Red. In recent years the bulls of the Estonian Red breed have become widely spread: along with the sires of the Tir 66 related group they represent the genealogical line of Danish Red bull Loke 4323. The first calf heifers from the related group of Tir 66 at Suksunski pedigree state farm, where the animals of all lines and related groups are concentrated, boast the best milk yield, that is 3002 kg of milk with 3.93% fat.

The unique germ plasm of the Suksun cattle is currently concentrated in Suksun district of Perm region. A store of deep-frozen semen of sires of all lines has been established at the All-Union Institute for Livestock Breeding and Genetics. Outbreeding with line rotation is being used. These measures will ensure the conservation of the genetic variety of this small population with no danger of inbreeding depression. Suksun cattle should be selected according to the same plan as Danish Red cattle treating the Suksun breed as their Ural branch.



Other Dairy Breeds
BUSHUEV (Bushuevskaya)

The Bushuev cattle originated in the Golodnaya Steppe, Syr Darya and Gulistan districts of Syr Darya region of the Uzbek SSR. They spread to many districts of the Tashkent region, as well as to farms of Samarkand, Fergana, Surkhandarya and other regions. The history of Bushuev cattle is associated with the development of the Golodnaya Steppe which started with its settlement early in this century. Many settlers bred imported European cattle. But the severe conditions of this area with the harsh continental climate, intense solar radiation, eccentric atmospheric pressure, and piroplasmiasis in most of the intensively cultivated areas, required the creation of a breed adapted to the local conditions.

The founder herd was formed at the farms of the Vedenski and Golodnaya Steppe experimental station, set up during 1906-18 by M.M. Bushuev. The local zebu cattle were crossed with Dutch and Swiss Brown bulls and some Simmentals and the best crosses were bred inter se. The young stock produced at the farm were distributed among the peasant farms. During 1932-48 to increase milk production most of the cows at the breeding farms

were crossed with purebred and crossbred East Friesian sires under conditions of reduced feeding. It had a bad effect on the development and improvement of Bushuev cattle. The number of pedigree cattle was dramatically reduced, milk production and live weight did not increase and the fat content decreased considerably. In 1948 the crossing was stopped and since then the cattle have been bred inter se. Since 1953 the improvement of the cattle has been done under the auspices of the Uzbek Animal Breeding Research Institute.

At present, in accordance with the plan, Bushuev cattle are bred on the farms of Syr Darya, Gulistan, and Voroshilov districts in Syr Darya, Tashkent, Samarkand and Khorezm regions of the Kara-Kalpak ASSR and the Uzbek Republic. The majority of these cattle (86%) are concentrated in Syr Darya region. The total number was 21 000 head in 1980.

The best animals of the breed (over 6000 head, including more than 2000 cows) are kept at Krasni Vodopad experimental farm of the Uzbek Animal Breeding Research Institute, at Pervomaets-2 breeding centre in Gulistan district, at the breeding farms of Ilyich, Akhunbabaev, Pravda and Lenin collective farms of Syr Darya district, and of Gulistan and 50 Let SSSR state farms in Voroshilov district of Syr Darya region.

The most important feature of Bushuev cattle is their adaptation to the specific natural and climatic conditions of the habitat. The climate of the breeding zone of Bushuev cattle is markedly continental. The vegetation period is 210-220 days (from the end of March till the end of October). Ephemerals, including sagebrush, prevail in the vegetation cover of the Golodnaya Steppe area. They are noted for their short vegetation period and for the uncertainty of fodder crops with high nutritional value of the major species, namely desert sedge and meadow grass. Russian thistle varieties (Bolykhkuz and Azherek) are common on saline plots. Rush, tamarisk, willow and Elaeagnus grow on solonchaks (saline soils) in the Syr Darya river valley. Fodder crops on the arid spring pastures do not yield more than 500 kg per hectare.

The modern Bushuev cattle, like their zebu ancestor, are resistant to blood parasites. When grazed in tick-infested areas Bushuev cows remain healthy, produce a normal amount of milk and calve regularly. Occasional mild cases of piroplasmiasis affect mainly the crossbreds.

This breed is ermine-coloured, i.e. white with black spots on the skin, black ears and rims around eyes, and a black band around the muzzle. The colour remains stable even when the animals are crossed with other breeds. Study has shown that a white hair cover in combination with pigmented skin considerably increases adaptation to the hot climate: the white hair cover reflects the solar radiation and the pigmented skin promotes heat emission. Even at the hottest time of the day, when air temperature is 40-46° C and relative humidity 15-20%, the animals do not need shelter and feel well. Cows with an annual milk yield of 3000 kg or more have 52% more sweat glands per square centimetre and these are 18-31% larger.

The constitution of Bushuev cattle is strong; the exterior is harmonious. They have a medium live weight, deep chest, strong skeleton and well-developed muscles. The udder is well developed; the udder girth of pedigree cows is 90-115 cm, its length 30-35 cm, and its width 22-26 cm or more. The basic measurements of mature cows (in cm) are: withers height

122.8, chest depth 65.1, oblique body length 147.3, heart girth 177.5, cannon bone girth 17.0 (National Herdbook, vol. 2, 1982).

The exterior defects of Bushuev cows are as follows: sloping, narrow hindquarters, underdeveloped chest, poorly developed musculature, small udder (Mustafayev 1982). Newborn heifers weigh 22-30 kg, at 6 months 115-162 kg, at 18 months 280-300 kg; male calves weigh 25-30 kg, 127-180 kg, 300-350 kg at the same ages. The average live weight of mature cows is 380-450 kg; pedigree cows weigh 450-500 kg and mature bulls 750-850 kg.

The young steers are noted for their rapid growth rate and good veal.

According to test slaughter, the average weight of the fresh carcass of a 1.5-year steer was 200 kg. The dressing percentage averaged 61.7.

The milk production of all cows evaluated in 1981 averaged 2493 kg and the fat content was 3.91%; the pedigree stock produced 2693 kg of milk per head with 4.06% fat. At the best farms of the Syr Darya state breeding station in 1980 the milk yields reached 3000 kg and over. The high potential of Bushuev cattle has been proved at some farms of Syr Darya district where the milk yields are 4100-4354 kg per cow.

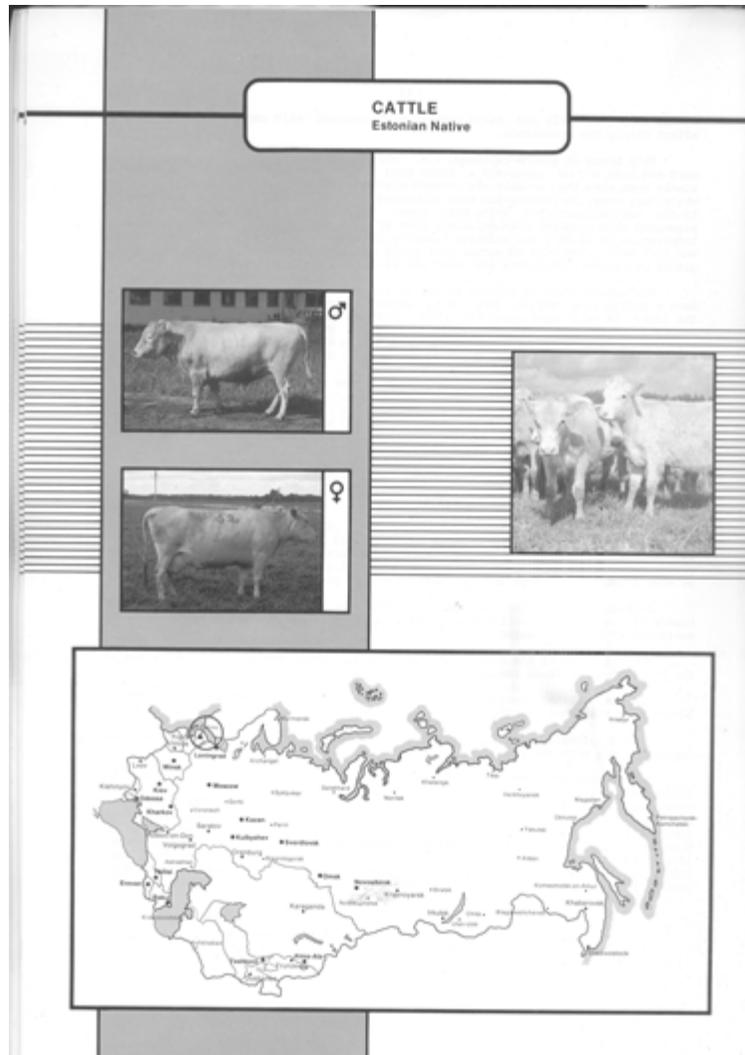
Bushuev cows are the top record-holders for fat content among the approved breeds of the Uzbek Republic. The breeding stock is noted for its high fat content averaging 4% over all lactations.

The structure of the breed comprises 5 major lines. Most breeding stock are in the lines of Gusar TE-10 (46.1%) and Record TE-10 (30.2%).

The cows of the Gusar line have the highest milk yield averaging 3516 kg or 17-24% more than that of other lines.

Over 30 female families, including 20 promising ones, have been formed and improved along with the basic lines.

The further progress of the breed is impeded by its small numbers and by the absence of highly productive breeding herds. To preserve this germ plasm it is necessary to increase numbers by pure breeding and by setting up a semen bank of the best sires of all existing lines. To increase the efficiency of breeding a study of the natural resistance of the cattle to leucosis, tuberculosis, mastitis and other diseases is being conducted. To increase milk production and to breed highly productive lines a single mating to sires of the Holstein-Friesian or the Dutch Black Pied breeds is admissible. The possibility of breeding new lines by crossing zebu-type cows with Dutch bulls should also be considered.



ESTONIAN NATIVE (Mestnaya estonskaya)

This is a native breed but as a result of efficient selection it has reached a production level characteristic of improved breeds. Organized improvement of the local cattle in Estonia began in 1909. At that time the aim was to breed dairy cattle of medium size, rugged constitution, hardy, with high milk production and fat content, economical, polled, and of yellowish or red colour. Since 1914 the best animals have been entered in the herdbook. After the Second World War the population of the Estonian Native cattle decreased considerably and the breed was on the verge of dying out as a result of inbreeding. To stop this, crossing with Jersey and Finnish bulls was undertaken during 1955-67.

At present, the breed numbers 2000 head (1980). Most of the breed are kept at three farms of the Estonian SSR, namely Pyarivere state farm and Vakhnurme collective farm in Pyarnu district and Lekhtse collective farm in Paides district.

The breed is mainly polled. The colour varies from yellow-brown to red; the bulls have darker back and body. The head is light, small, of medium length,

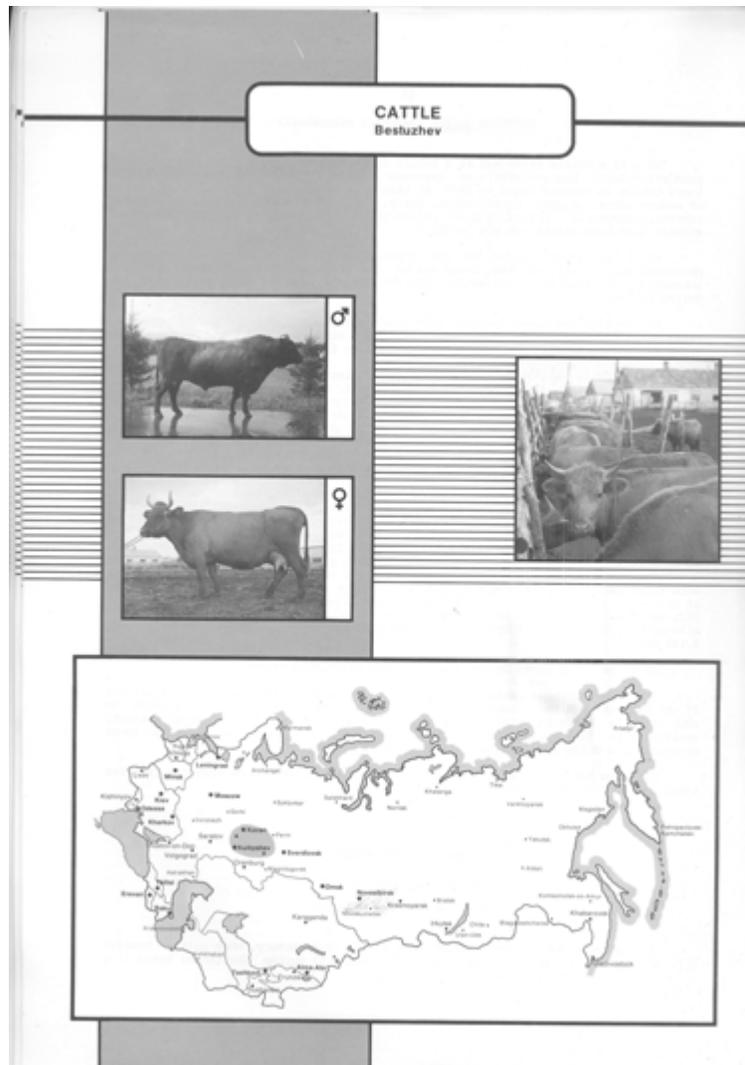
with a narrow forehead. The neck is thin and of medium length. The chest is medium wide and sufficiently deep. The back is level. The hindquarters are long and often roof-shaped. The hind legs are often cow-hocked. The udder is capacious, with equally developed quarters, frequently of roundish or tub-like shape. The constitution is delicate and the conformation compact. The muscles are often not well developed. The measurements of the cows (in cm) are: withers height 124.9, chest depth 66.2, chest girth 186.4; live weight is 519 kg.

The milk yield of Estonian Native cows is little less than that of the principal improved breeds of Estonia and the fat content is higher. In Pyarnu district in 1976 10 530 Estonian Red cows produced 3276 kg of milk with 3.78% fat; 12 404 Black Pied cows produced 3616 kg of milk with 3.83% fat; 680 Estonian Native cows produced 3444 kg of milk with 4.45% fat. In 1977 the average milk yield of 519 Estonian Native cows was 3799 kg with 4.45% fat. The highest milk yield of cow Medi EK 1031-E was 6209 kg with 4.75% fat; cow Ekha EK 1201-E over a lifetime of 15.5 years produced 67 931 kg of milk and 3043 kg of fat; cow Miya produced during a 305-day lactation (the 5th) 5621 kg of milk with 5.87% fat; cow Neazi produced in the 3rd lactation 6951 kg of milk with 4.40% fat; cow Nyapi produced in the 1st lactation 5718 kg of milk with 4.14% fat.

At present the breed consists of 10 lines or related groups.

The plan for these cattle envisages pure breeding at the state farm Pyarivere of the Estonian SSR to preserve the breed. The importance of this breed is based on such valuable characteristics as high milk production, high butterfat content, resistance to tuberculosis and leucosis, hardiness and adaptation to the local environment and low food consumption per unit of production.

Estonian Native cattle are indispensable for crossing because they can transfer their distinctive characters to other breeds.



DUAL-PURPOSE BREEDS
Red Dual-Purpose Breeds
BESTUZHEV (Bestuzhevskaya)

Formation of this breed started late in the 18th century, when cattle breeder S.P. Bestuzhev began to cross the local cattle with the Durham (Shorthorn) breed from England. With the aim of improving milk and beef qualities, the offspring were later crossed with the animals of the Dutch, Shorthorn, Simmental and some other breeds. The formation of this beef-and-dairy breed was completed in the middle of the 19th century. Planned breeding of Bestuzhev cattle started in 1918 when breeding farms were set up in the Tatar ASSR, in Bashkiria, and in Ulyanovsk and Kuibyshev regions. The first volume of the National Herdbook was published in 1928.

A characteristic feature of Bestuzhev cattle is their adaptation to the continental climate of the Volga area. The colour is red, varying from light red to deep cherry red. Some animals have white spots, mainly on the belly, udder and head.

Bestuzhev cattle are not homogeneous in conformation. In most herds dairy-beef animals predominate. In some cows dairy or beef-dairy features prevail. Overall, Bestuzhev cattle have the following features. The head is medium in size, light and clean-cut with a long face; the forehead is narrow; the jaw is wide; the horns are large, white in colour. The neck is medium in length with wrinkled skin; the chest is deep, with well-developed dewlap; the back is straight with wide loin; sloping rump is infrequent. The legs are not long, widely set. The udder is medium in volume; the quarters are clearly defined. Body parts are developed proportionally; the skeleton is strong; the muscles are well developed. The basic measurements of mature cows are (in cm): withers height 131.6, chest depth 71.8, oblique body length 158.3, heart girth 193.8, cannon bone girth 19.9.

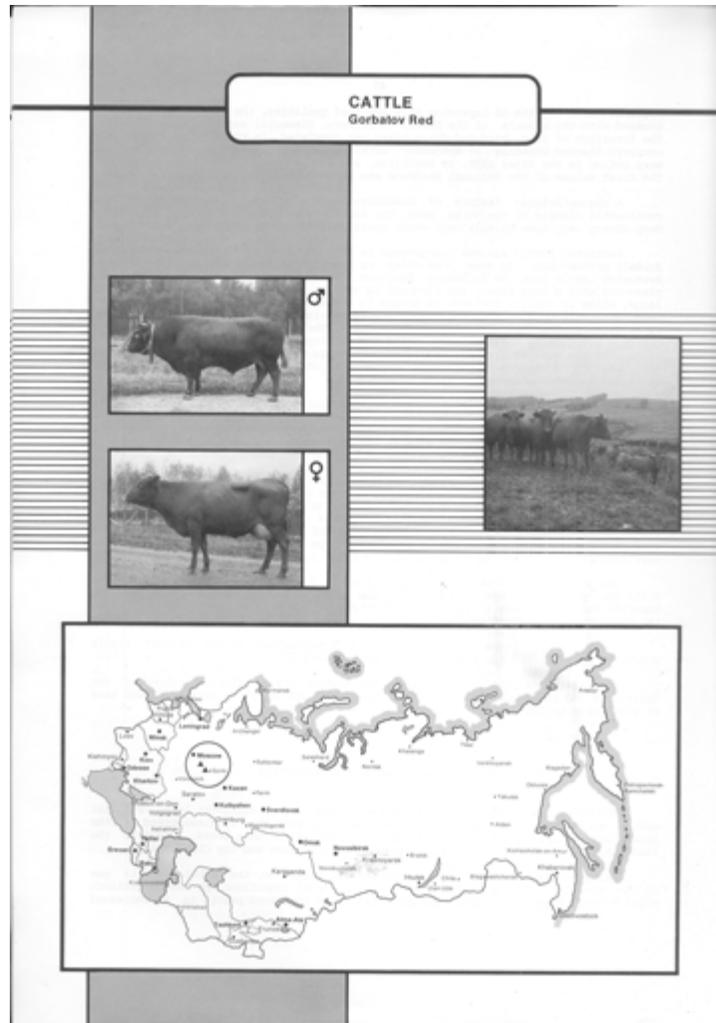
According to volume 10 of the National Herdbook (1982), mature cows weigh 480-560 kg, occasionally up to 710 kg. The bulls weigh 790-950 kg, maximum 1000 kg or more. Bestuzhev cattle are noted for their good beef qualities. The daily live-weight gain of feeder steers is 700-850 g. With lavish feeding yearling steers can reach a weight of 500 kg. The dressing percentage of fattened animals is 58-60.

The milk production of mature cows recorded in volume 10 of the National Herdbook (1982) is 4288 kg, with 3.99% fat. At the breeding farms cows average over 4000 kg of milk. In 1982 the best production records were reached in the herd of the experimental farm Krasnogorskoye in the Kuibyshev region, where the average milk yield per cow was 4015 kg. The record holders of this breed with milk production over 10 000 kg per lactation are as follows: Liya - 4th lactation, 10 046 kg milk, 3.7% fat; Basnya - 4th lactation, 10 386 kg milk, 3.77%.

The average fat content of Bestuzhev cows is 3.8-4.0%, occasionally up to 5.0-5.4%; the protein content is 3.3-3.5%. The most productive herds belong to the breeding stations Kanash in Kuibyshev region and KIM in the Tatar ASSR as well as to the Ulyanovsk stock breeding station.

There are 13 lines in the breed. Milk production of the nearest female ancestors is 5000-7500 kg, and the fat content 4.01-5.21%.

Most Bestuzhev cattle are found in the Kuibyshev and Ulyanovsk regions of the Tatar ASSR and in the Bashkir ASSR. According to the census there were 1 890 000 head of this breed in 1980.



GORBATOV RED (Krasnaya gorbatovskaya)

The breed was formed early in the 19th century by crossing the local Priokski cattle (an improved variety of the Great Russian) with the Tyrolean breed in the former Gorbатов district of Nizhegorod province. Later this breed spread to the floodplain of the Oka river in Vladimir and Ivanov regions and the Chuvash ASSR.

Among the cattle breeds created by peasant selection, the Gorbатов Red is one of the best. The cattle are well adapted to the local conditions and have a distinct physiological adaptivity. High lysozyme activity of the blood points to an increased non-specific immunity. The Gorbатов Red breed is also noted for its resistance to leucosis, tuberculosis and brucellosis.

The current proportion of the Gorbатов Red breed in Gorki region is 11.4% as compared with 31.1% in 1964. This reduction is because, since 1976, the breed has not been included in the breed zoning plan in Gorki and Vladimir regions. Pure breeding of Gorbатов Red cattle is still carried on at two breeding centres: Bogorodski in Gorki region and Zimenki in Vladimir region.

Gorbatov Red cattle have a strong constitution and a harmonious conformation. They have a long body but are not tall. The head is rather short and the neck is medium long and wide. The chest is deep and wide. The top line is level; the loin is wide; the rump is slightly raised, wide, and not wedge-shaped. The tail is set high and is long. The udder is medium in size; its quarters are developed proportionally. The skeleton is light and firm. The hooves are firm. The colour is red of various shades; some animals have white markings on the udder and abdomen. The muzzle is usually light pink and the horns are white with black tips.

The characteristics of 1633 animals recorded in Volume 7 of the National Herd-book indicate that Gorbatov Red animals have a satisfactory development. The average live weight of mature cows is 476 kg. The heaviest cows are kept at the Bogorodski breeding station. They weigh 492 kg on the average, up to 600 kg maximum. The bulls kept at the breeding stations are noted for their high live weight at any age: 3-4-year-olds weigh 752 kg; older animals weigh 830 kg; the heaviest weigh 970 kg.

The measurements of mature cows (in cm) are as follows: withers height 122, chest depth 68.0, oblique body length 152.5, heart girth 182, cannon bone girth 17.7.

The milk yield of 470 first-calvers was 3009 kg with 4.28% fat; that of 746 cows at the 3rd calving and older was 4003 kg with 4.22% fat. The record holder for milk and fat yield entered in Volume 7 of the National Herdbook, is cow Kama GP-7649 from the breeding centre Bogorodski. In her 4th lactation she produced 7211 kg of milk with 4.20% fat, or 303 kg of fat. The champion of the Red Gorbatov breed in 1979 was cow Charodeika 191, who belongs to the same farm. During the 4th lactation she produced 7899 kg of milk with 4.0% fat, or 316 kg of milk fat.

Productivity indices of the cows recorded in Volume 8 of the National Herdbook (1983) that belong to the farms of Vladimir region and the Chuvash ASSR point to the high productive potential of this breed. The most productive cows yield over 5000 kg of milk per lactation. The fat content varies from 4.0 to 5.20%.

There are several cows of this breed with a record production. Cow Lenta 8822 produced 10 218 kg of milk with 4.2% fat in 305 days of the 4th lactation. Cow Balerina in 16 lactations produced 68 546 kg of milk with 3.83% fat.

In fat content (4-4.2%) this breed is among the best of the national breeds. The protein content is also high; it varies from 3.30 to 3.77%. These cattle have a high total solids content in their milk (12.91%).

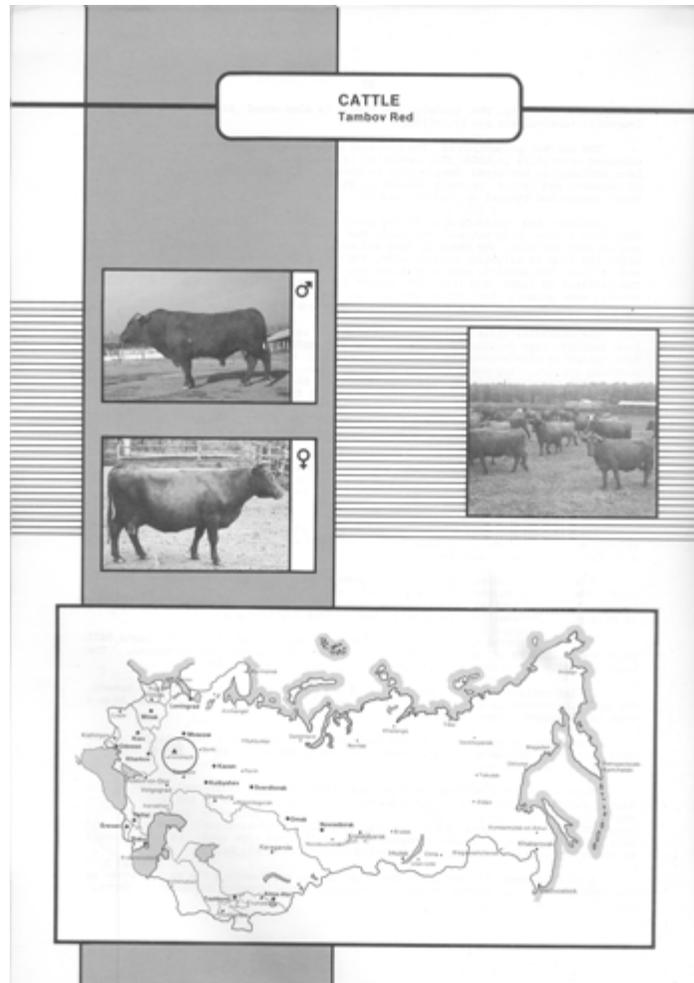
This breed is noted for its good beef qualities. The cattle gain weight rapidly when fattening. The dressing percentage of normally fattened cows is 55% or more and that of steers is 62.7%.

This breed is conserved by long-term pure breeding in several conservation herds. The best pedigree herd is at Bogorodski breeding station in the Gorki region where Gorbatov Red cattle originated. Out of 2965 animals purebreds account for 98%. Over 60% are in the highest evaluation classes. The conservation herd of the Gorbatov Red breed in Vladimir region is a small part (200 head) of the Zimenki breeding centre herd; it is closely related to the Bogorodski herd.

A bank of over 120 000 semen doses of bulls, representing the major lines of the Gorbatov Red, is stored at various breeding establishments and genetic depositories.

Urgent measures are required to halt the decrease in the total population (to 294 000 head by 1980) and the lower proportion of purebreds. It is necessary to create a specialized dairy type that can be used at industrial dairy complexes, as well as to carry out intensive selection to increase live weight and milk yield and to improve conformation, udder quality and milkability. It will be expedient to introduce the blood of the Danish Red and Angeln breeds to increase the adaptability of the cows to industrial methods of cattle management.

Gorbatov Red cattle are characterized by a comparatively high heterogeneity of the allele pool. The common allele U₂U' points to a remote phylogenetic connection of Gorbatov Red cattle with the Latvian Brown breed. The formation of the latter, as is known, involved the participation of Danish Red and Angeln cattle.



TAMBOV RED (Krasnaya tambovskaya)

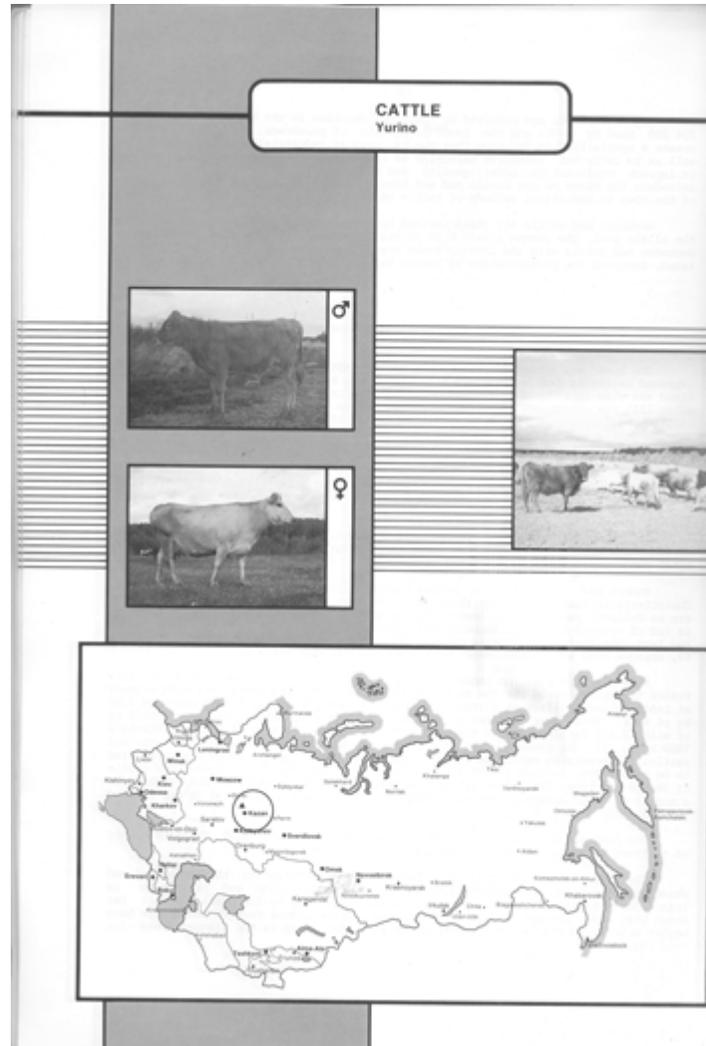
The breed was formed in the middle of the 19th century by crossing the local improved cattle in Tambov province with the Tyrol breed. Some Devon and Simmental blood was also introduced. Following the recommendations of Prof. M.M. Pridorogin, after 1911 the crossbreds were bred inter se. He was against complete upgrading with the total disappearance of the blood of the local cattle; this might have resulted in the loss of their most valuable properties. His well-grounded ideas as regards crossing and its handling promoted the success of the Tambov Red breed.

The directed breeding of Tambov Red cattle started after 1924. Of great importance was Kirsanov state breeding station. Lenin collective farm in Kirsanov district which bred the founders of the lines and families also made a considerable contribution to its improvement.

The breed was recognized in 1948. At present, its principal breeding zone is Kirsanov district in Tambov region, where the population of these cattle is 9500. The total number of the Tambov Red breed in 1980 was 45 000.

Tambov Red cattle have a strong constitution and a compact conformation. Characteristic features are the short head and deep and wide body. Frequent defects are as follows: sway back, hollowness behind the

shoulders, sloping rump. The colour is red of various shades, with occasional white markings on the abdomen, udder, chest and legs. The basic measurements of cows are (in cm): withers height 127, chest depth 67, oblique body length 155, heart girth 183, cannon bone girth 19. Milk yield of cows on conservation farms in 1983 was 2337 kg with 3.63% fat. Before the Second World War the milk production of Tambov Red cattle was much higher; at Lenin collective farm in Kirsanov district of Tambov region 195 cows averaged 4059 kg of milk. There were a number of record holders of this breed: Krasavka - 6650 kg of milk, 4.81% fat; Boginya - 6069 kg, 4.0%; Angela - 6734 kg, 3.70%; Vakhtanka - 7820 kg, 3.71%. At present, this collective farm has 125 head of purebred Tambov Red cattle. The remaining cattle in Kirsanov district (13 600 head) which are considered to be Tambov Red, include recent first crosses with the Danish Red breed, and cattle of Tambov Red type. The latter closely resemble Danish Red cattle in 20% of cases in a number of blood antigens. The most frequent (0.4) are the following in the B blood group system: B₂, O₂, Y₂, Q¹. The beef and fattening qualities of Tambov Red cattle are good. The live weight of fattened bullocks goes up to 1100-1250 kg. The valuable characters of this breed are its adaptation to the ecological and economic conditions of Tambov region, strong constitution and resistance to infectious diseases. Experience at Degtyanski state farm in Sosnovski district has shown that under similar conditions of feeding and management Tambov Red cattle have higher milk yield and fat content than the Simmental which is the planned breed for this region. The aim to preserve Tambov Red cattle and to improve them further is being realized by setting-up a conservation herd at Lenin collective farm in Kirsanov district, and by the establishment of a frozen semen bank for sires of the two original lines.



YURINO (Yurinskaya)

The breed was formed under the influence for almost a century of the Tyrolean and later of the Swiss Brown on the local Chuvash-Mari cattle in Gorno-Mari district of the Mari ASSR. The Tyrolean blood has remained dominant in the type of the Yurino cattle as indicated by the solid red-brown colour. The Tyrolean x Great Russian cattle later named Gorbatov Red also had their influence in the formation of the Yurino breed. The crossing was probably carried on for one generation only with subsequent interbreeding of the first crosses. The result was an increase in size, improved fleshiness and higher milk fat content. Since the 1880s-90s the Swiss Brown, Allgau, Simmental, Dutch, Kholmogory and other breeds have been imported into the area and have had an influence in the further improvement of the Yurino cattle. The Swiss Brown and the Allgau considerably increased milk yield but to some extent lowered the butterfat content. The influence of the Dutch and Kholmogory cattle was slight. After 1908 the Yurino cattle were bred inter se.

The planned breeding work of improving the Yurino cattle started only after the 1917 Revolution: breeding state farms were set up, shows were organized, recording associations began work, competitions for young stock raising and cow milk production were organized, the Gorno-Mari state breeding station was founded. In 1934 the better animals of the Yurino breed began to be registered in the regional and national herdbooks. In Gorki region the first volume of the National Herdbook was published in 1937, and in the Mari ASSR it was published in 1940.

In that period the best farms displayed outstanding Yurino cows at the shows: Sinichka GU-329 (3rd lactation - 5151 kg of milk with 3.84% fat), Lezgina GU-80 (6th, 6396kg, 3.64%), Valka GU-81 (6th, 6684 kg, 4.47%), Diana MU-41 (4th, 6482 kg, 4.18%). The live weight of these cows ranged from 525 to 712 kg.

In 1941 the breed group of the Yurino cattle was recognized as a breed of dual-purpose type.

Yurino cattle were used in Gorno-Mari district of the Mari ASSR till recently. But grading up with the sires of other breeds has resulted in a dramatic decrease in their numbers, from 46 000 in 1974 to 3500 in 1983.

In conformation and colour the animals of this breed are not homogeneous. They are brown or red of various shades; white markings on the lower barrel and on the legs are occasionally observed. The head is light but compact; due to the short facial bones it seems wider and deeper than it is. The poll is protruding. The horns are small, fairly thin, mostly light in colour with dark tips. The neck is wide and level. The dewlap is large. The withers are narrow and emerge beyond the topline. The back is level and straight. The loin is wide, level but frequently roof-shaped. The rump is raised; the hindquarters are wide; the tail is set high. The udder is medium in size with equally developed quarters and well-developed widely-spread teats. The mammary veins and milk wells are clearly defined. The skeleton is thin. The skin is loose, elastic with soft hair cover.

The basic measurements of Yurino cows are (in cm): withers height 120-123, oblique body length 146-149, chest depth 62-64, chest width 34-35, cannon bone girth 17-17.5. The defects are hollowness behind the shoulders, sagging and roof-shaped hindquarters, and incorrect leg setting. The live weight of calves at birth is 23-28 kg. Heifers have a live weight of 415-430 kg. Cows at third calving or older weigh 480-500 kg. The live weight of some cows reaches 700 kg. Bulls are of medium weight: 650-700 kg; some bulls can weigh 900 kg or more.

The milk yield of cows, according to the National Herdbook, is 2500-3000 kg; the best cows produce 5000-6000 kg or more. In butterfat content Yurino cows are one of the first among the national breeds (3.80-4.20%). They are able to maintain high milk production up to the eighth lactation or later. Some cows of that age produced 6000 kg.

Yurino cattle are resistant to diseases: at the pedigree state farm Yurinski in the Mari ASSR no cases of leucosis, tuberculosis or brucellosis were reported in the last decade.

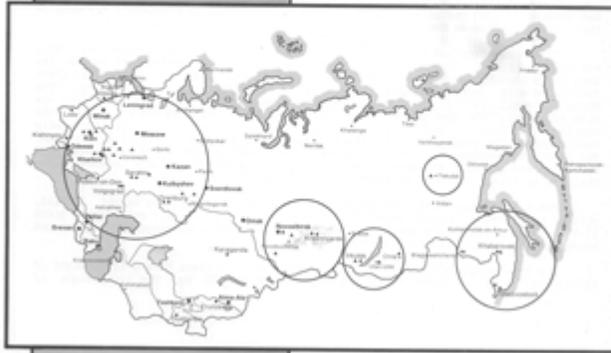
To preserve the Yurino breed the breeding state farm Yurinski has been approved as a conservation farm. The Ail-Union Research Institute for Animal Breeding and Genetics has evolved a scheme of selection and rotation of sires. The milk production of the female ancestors of the bulls of the first rotation is as follows: 4082-4607 kg with butterfat content of 4.04-

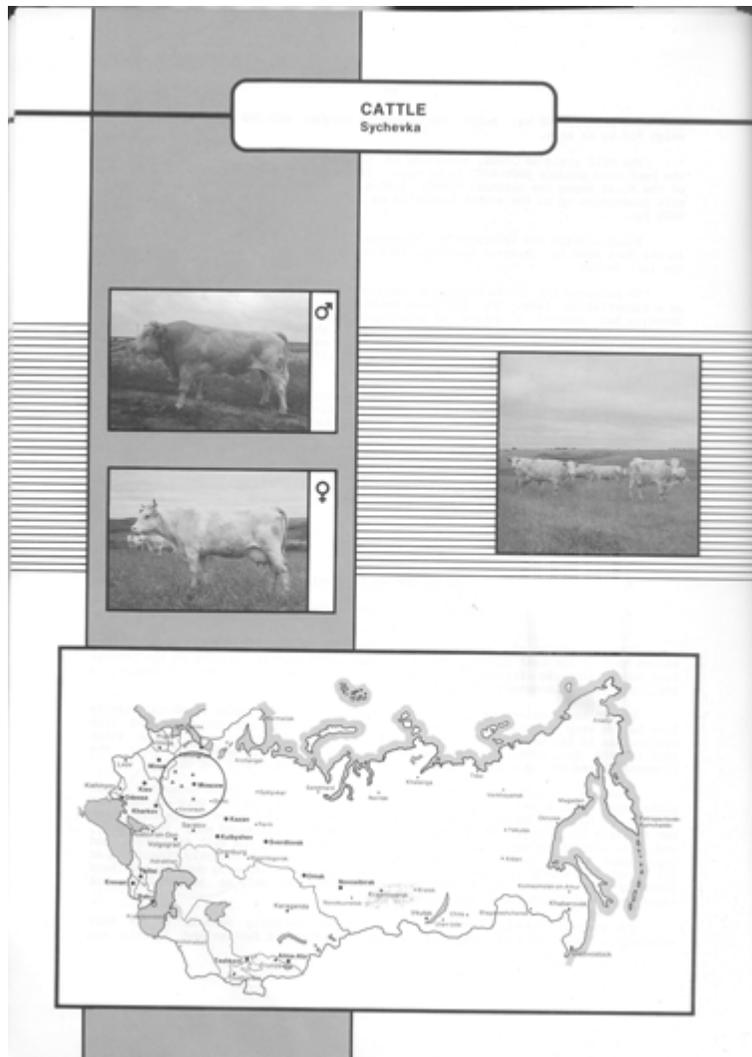
4.11% and 168-186 kg of milk fat; that of the bulls of the second rotation is 4353-5107 kg with butterfat content of 4.15-4.17% and 181-213 kg of milk fat.

At the end of 1984 the dairy herd of the conservation farm at Smena collective farm in the Mari ASSR consisted of 110 cows. The sires of the first rotation in this herd are characterized by a fairly high milk production of their female ancestors: milk yield ranged from 4026 kg to 5134 kg and the butterfat content varied from 4.13 to 4.38%. The sires of the second rotation in the herd have somewhat higher indices of milk production: 5107 kg of milk with 4.17% butterfat.

According to their blood groups the Yurino breed is similar to the Gorbatov Red and Swiss Brown. The genetic distance between the Yurino and Gorbatov Red breeds is 0.2.

CATTLE
Simmental





Straw-and-White Breeds
SIMMENTAL (Simmentalskaya)

The importation of Simmental cattle from Switzerland and Germany began in the second half of the last century. The cattle populated several regions of the Central Zone and Ukraine. To freshen the blood, in the last decades of the 19th century a small number of Simmentals were imported from Austria.

Due to their all-round productivity and good acclimatization Simmental cattle have become very popular in many parts of the USSR. They are currently bred from Byelorussia in the west to Primorski territory in the far east, and from the Yakut ASSR to the Tuva ASSR. In accordance with the breed regionalization plan, the Simmental breed has been approved as an improver in 45 regions of the USSR.

Breeding activities to improve and distribute Simmental cattle began on a wide scale after 1917. Breeding state farms and state breeding stations were set up; and in 1925 the National Herdbook was established. In the period after the Second World War the work to increase the productivity of

Simmentals continued more intensively, and it is now being reorganized. The problem of increasing the milk production and improvement of beef qualities of the Simmental cattle has been recently considered at 211 breeding stations and pedigree state farms. This work is being done at the best breeding farms of the collective and state farms, as well as at the farms of experimental and educational institutions.

The special breeding conditions of most of the dairy animals in the USSR resulted in a lighter type compared with the Simmentals of Switzerland, Austria and Germany. The formation of the Simmental breed in the USSR was influenced by the local natural and economic conditions; as a result 7 regional Simmental types are recognized. They are as follows:

1. Sychevka breed (western type). This dual-purpose breed populates Smolensk, Kalinin, Bryansk, Kaluga and Ryazan regions. In this area the Sychevka breed was formed by Crossing Simmental bulls onto the west Russian cattle followed by long-term breeding of the high-grade crosses.

In 1950, the "Simmentalized" cattle in Smolensk and Kalinin regions were distinguished as the Sychevka breed. The animals of this breed have the conformation and constitution typical for milk-beef cattle. Nevertheless, among the Sychevka cattle the dairy animals are observed in greater number than among the Simmentalized cattle of other areas. The animals of this breed differ little from typical Simmental cattle in their colour, which is straw and white.

The conformation of mature Sychevka cows is characterized by the following measurements (in cm): withers height 135, chest depth 70, oblique body length 162, cannon bone girth 20.

Sychevka animals are noted for a high live weight: mature bulls weigh 900-1200 kg; first-calf heifers weigh 520 kg, after the second calving 590 kg, after the third calving and older 630 kg. Live weight of heifer calves at birth is 32 kg; bull calves weigh 34 kg. Steers at the age of 1.5 years weigh 575 kg; daily gain is 1184 g and dressing percentage is 60.

The milk yield of the cows recorded in the National Herdbook is 3500-4300 kg, depending on their age, and the butterfat content is 3.7-3.95%. In breeding herds, the cows produce an average of 900-1000 kg of milk per 100 kg live weight; the record holders produce 1200-1500 kg. The milk yield of mature cows in selection herds varies from 5015 to 5342 kg with 3.76-3.85% fat, and 3.40-3.47% protein. The best cows of Sychevka breeding farm in Smolensk region produce 8-10 000 kg of milk: Pereleska 3982 in the 4th lactation produced 10 801 kg of milk with 3.85% fat; Depesha 2948: 5th, 8302 kg, 3.82%; Nasedka 4088: 4th, 8382 kg, 3.81%; Severnaya 4479: 4th, 8224 kg, 3.84%.

The breed comprises 6 lines and 2 related groups.

From Smolensk region Sychevka cattle have been exported to various parts of the country: the total number of young pedigree stock exported is 186 000 head. According to the census, the total population of Sychevka animals was 739 000 on 1 January 1980.

2. Steppe Simmental type was formed by crossing the central Russian cattle with Simmental bulls, with subsequent breeding of the crosses of the desired type. These animals populate Voronezh, Tambov, Kursk, Orel, Lipetsk and Belgorod regions.
3. Ukrainian Simmental cattle were formed by crossing the Grey Steppe cattle with Simmental sires, followed by selection. The animals of this type have considerable live weight and good beef and dairy qualities. They populate Kharkov, Kiev, Chernigov, Poltava, Cherkassy and other regions of Ukraine.
4. Volga (Privolzhski) Simmental cattle were bred by crossing the central Russian, Kalmyk and Kazakh cattle with Simmental bulls followed by selection. These cattle populate the semi-arid farming lands in Penza, Saratov and Volgograd regions.
5. Ural (Priuralski) Simmental cattle were formed by crossing the Siberian and Kazakh cattle at low absorption by Simmentals under the conditions of grain farming and well-developed industry. They are bred in Orenburg and Chelyabinsk regions and in the Bashkir ASSR.
6. Siberian Simmental cattle appeared as the result of crossing the Siberian and Buryat cattle with Simmentals followed by inter se breeding of the 1st and 2nd backcross generations. They populate Altai and Krasnoyarsk territories, Novosibirsk, Irkutsk and Kemerovo regions, and the Buryat ASSR.
7. Far Eastern Simmentals were formed under the severe conditions of the harsh continental climate by crossing the local Transbaikal and Yakut cattle with Simmental bulls followed by inter se breeding of the first crossbred generations. They are kept on the farms of Khabarovsk and Primorski territories, in Amur and Chita regions and in the Yakut ASSR.

In numbers Simmental (straw-and-white) cattle head the list of the USSR cattle breeds - they account for 25.6% of all cattle. According to the census, the total population of the Simmental cattle at 1 January 1980 was 17 708 000 (excluding the Sychevka).

The breeding of Simmental cattle is under way at state breeding stations (15 500 cows), at breeding stations of collective farms (8500 cows) and at the breeding state farms (41 800 cows). The breeding farms in various areas have, as a rule, high grade animals.

The colour is usually straw or straw-and-white. Simmental cows are usually large (withers height 130-135 cm); they are proportionally built (oblique body length 158-162 cm), with a strong skeleton (cannon bone girth 18-20 cm) and the chest is deep (67-70 cm).

The weight of calves at birth is 36-45 kg; at the age of 6 months they weigh 190-220 kg. Mature cows weigh 550-620 kg; bulls weigh 850-1000 kg. Simmental cattle fatten well: when grazing and fattening, the daily weight gain of steers is 800-1100 g; the dressing percentage for the fat young stock is 56-58 and that of fattened animals is up to 64%.

The milk yield of cows varies between breeding zones. The average milk yield of the cows recorded in the National Herdbooks is 3500-4000 kg per lactation. In the leading breeding stations the milk yields exceed 4000 kg. At 10 Let Oktyabrya breeding centre in Chernigov region the milk yield averaged 5562 kg with 3.8% fat; at Chervony Veleten farm in Kharkov region it was 4889 kg with 3.79% butterfat; at Ukrainka farm in the same region it was 4851 kg with 3.87% butterfat; at Yelanski farm in Voronezh region it was 4631 kg with 3.87% butterfat; at Terezino in Kiev region it was 4598 kg with 3.95% butterfat.

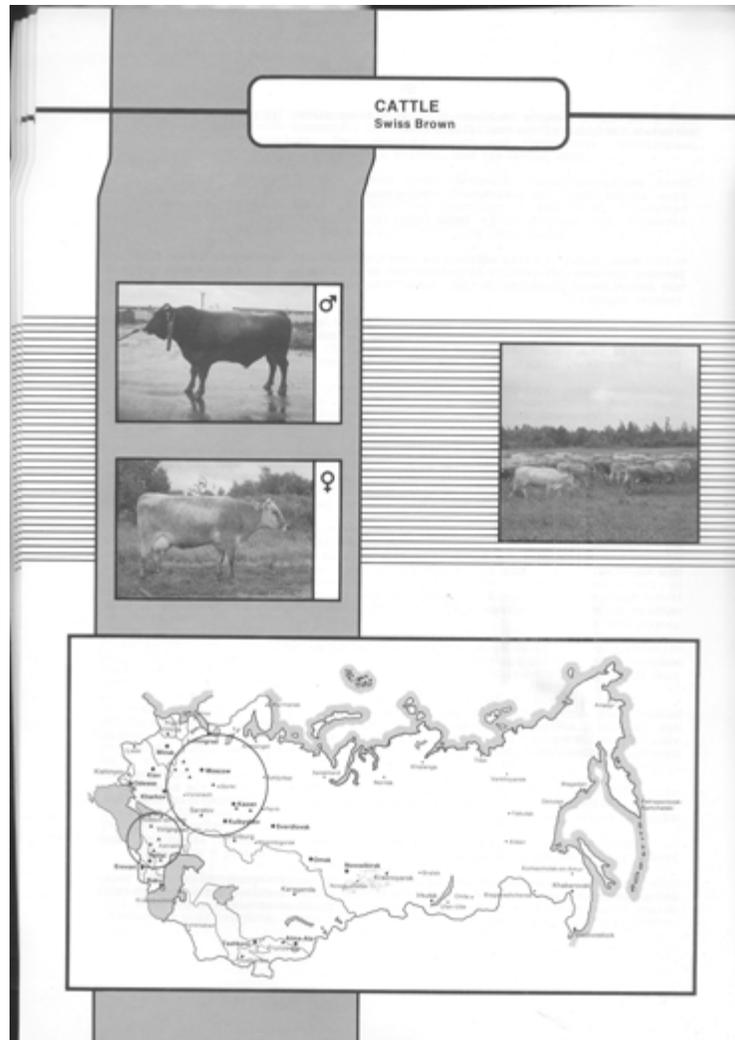
Simmental cattle are divided into three types, according to their conformation and milk production: 1. Dairy, 2. Dairy-beef, 3. Beef-dairy. At Yelanski breeding centre the milk yield of the cows of these types per lactation was as follows: 1 -5007 kg, 2 - 4645 kg, 3 - 3852 kg.

The farms of the Ukraine have two-thirds (over 2380 head) of all cows entered in the Book of Highly Productive Simmental and Sychevka Cattle (1976). All cows with milk yields of 9000 kg or more were raised in the Ukraine. The champions of the breed were also bred there, namely cow Ryabushka 1413 KS-1854 - 4th lactation, 14 584 kg of milk with 3.82% fat; cow Meduza 417-4SM-1934 (a champion for fat content): 4th lactation, 5039 kg of milk, 6.08% fat.

At the sugar-beet state farm of the Matusov sugar factory in Cherkassy region, cow Mavra 5212 produced in 14 lactations over 85 000 kg of milk with 3.83% fat. The yield of butterfat was 3261 kg.

There are 6 promising lines in the Simmental and Sychevka breeds.

The breeding programme envisages improvement of the animals in order to combine high milk production with good beef qualities. To create highly productive herds that will meet the requirements of the industrial technology of milk production, in addition to pure breeding, these cattle are being crossed with the best dairy breeds, namely the Red-and-White Holstein-Friesian and Ayrshire. It is also planned to introduce the blood of the Montbeliard breed.



Brown Breeds
SWISS BROWN (Shvitskaya)

Swiss Brown (Schwyz) cattle have been imported into Russia from Switzerland and Germany for over 100 years. At present the Swiss Brown breed populates many parts of the Soviet Union including Central Asia, Transcaucasia, Byelorussia and the Russian Federal Republic.

Swiss Brown cattle account for 5.5% of all of approved cattle breeds 2 999 000 in all. Swiss Brown cattle are concentrated in Tula, Smolensk, Gorki, Bryansk and Kaluga regions, in Stavropol and Krasnodar territories and the Tatar, Kabardino-Balkar, Udmurt, North Ossetian and Checheno-Ingush ASSRs.

Swiss Brown cattle are noted for their ability to acclimatize in various areas. Thus in the Karachaevo-Cherkess Autonomous Region, in the summer, they thrive on a transhumant system at altitudes of 1500-2000 m. Swiss Brown cattle are resistant to infectious diseases due to their strong constitution.

Eighty percent of the Swiss Brown cows have well-defined dairy features: they produce 800-1200 kg of milk per 100 kg of live weight. Swiss Brown animals are also noted for their good beef qualities. The young stock have a rapid growth rate. The daily gain of steers and fattening animals is 1000-1200 g. At mating age heifers have a live weight of 380-450 kg. The dressing percentage is 55-60. The carcass yield is 80%.

Coat colour is brown of various shades. The light hair cover around the muzzle of pink and grey colour is a characteristic feature of this breed. The hair along the top-line is also lighter.

The basic measurements of the mature cows in the pedigree herds are (in cm): withers height 131.4, oblique body length 157.7, chest depth 70.7, heart girth 189.5, cannon bone girth 21.1.

Calves weigh 33-40 kg at birth and 260-300 kg as yearlings. The live weight of mature cows is 480-550 kg, that of the bulls 800-950 kg; some cows weight 800 kg and some bulls up to 1100 kg.

The milk yield of the cows registered in the herdbook is in the region of 3100-4200 kg with 3.7-3.9% fat and 3.2-3.6% protein. The cows are well adapted to the industrial methods of milk production: the udder index is 43-45% and the milking rate is 1.6-2.0 kg per minute. The milk production of mature cows at the leading breeding stations reaches 4500-5000 kg with a butterfat content of 3.75-3.90%.

In the selection herds in Smolensk region 55 cows have averaged 7791 kg of milk with 3.76% fat; 14 cows averaged 8000 kg of milk.

The best cows of the breed are as follows: Azbuka 8692 (4th lactation, 9551 kg milk, 4.00% fat), Seryozhka 2000 (3rd, 9415 kg, 4.03%), Gavan 2917 (4th, 9220 kg, 3.79%).

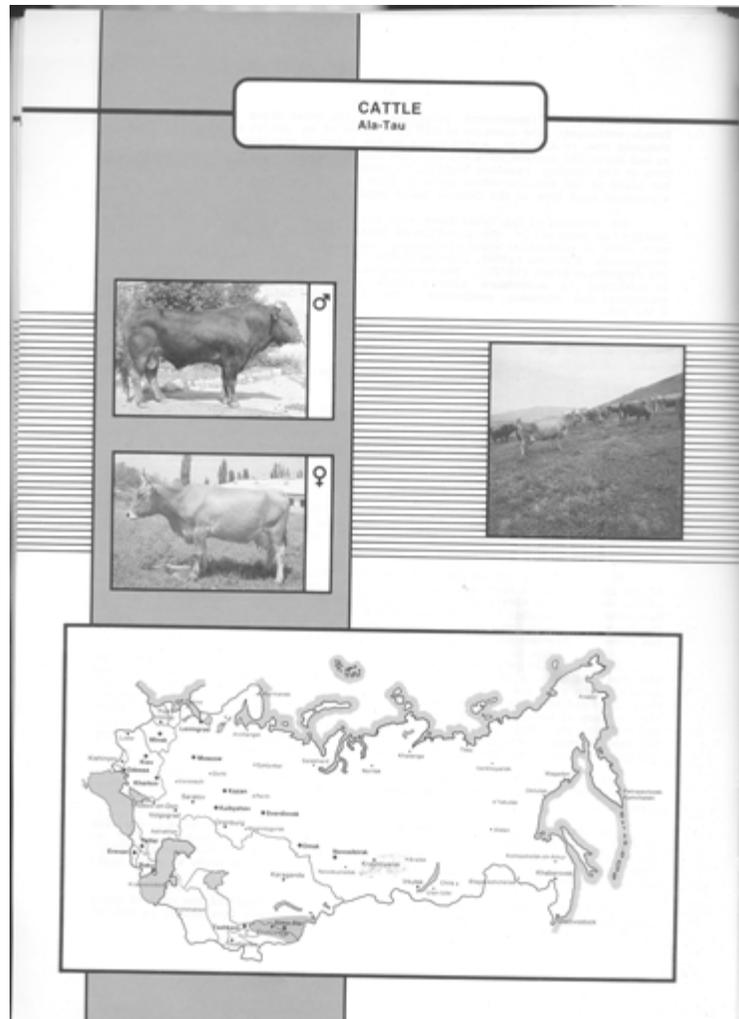
The Swiss Brown breed has a clearly defined genealogical structure, most breeding stock belong to 9 major lines.

At the breeding centres of Smolensk, Tula and Gorki regions which breed Swiss Brown cattle 267 families have been formed. The better families had a considerable effect on the breed as a whole: they produce the founders of new lines.

The long-term improvement programme for the Swiss Brown and the other Brown breeds envisages: the creation within each breed of an active nucleus totalling 130 thousand cows in all with a milk yield at the breeding stations of 4.5-6.0 thousand kg and butterfat content of 3.8-4.0%; the formation of selection herds of dairy type cows at the leading breeding stations to produce the young bulls; introduction of the blood of the American Brown Swiss to form new types. It is also planned to breed a purebred beef type in the Central Asian Republics.

The crossing of the Swiss Brown with the local cattle in different parts of the country has resulted in the formation of local Brown cattle types that differ from each other in production and conformation. Among those types, five breeds have been recognized: Kostroma (1944), Ala-Tau (1950), Lebedin (1950), Caucasian Brown (1960) and Carpathian Brown (1973). The breeding work with all the breeds of Brown cattle is conducted in accordance with a single plan, taking into account the local

ecological and economic conditions. The total head of Brown cattle breeds is 6 562 000.



ALA-TAU (Alatauskaya)

Ala-Tau cattle were created on farms of the Kirgiz and Kazakh Republics by crossing local Kirgiz (Kazakh) cattle with the Swiss Brown and selection of the crosses. The breed was formed in the piedmont areas of the Zaili Ala-Tau. Kirgiz (Kazakh) cattle are noted for their adaptation to the local environment and for their fast rate of fattening. At the same time Ala-Tau cattle are small, late maturing, and produce little milk: mature cows have a live weight of 280-380 kg and produce 500-600 kg of milk with a high fat content. The first crossbreeding was undertaken in 1904. Later, during 1929-40, over 4500 Swiss Brown animals were imported to the Kirgiz Republic and 4300 to the Kazakh Republic. Swiss Brown cattle acclimatized well in the hot climate and mountain conditions. Of great importance for the improvement of Kirgiz cattle was the use of animals of the Kostroma breed from the Karavaevo breeding centre in Kostroma region. Mating of the Swiss Brown Kirgiz crosses to the bulls of the Kostroma breed resulted in descendants with higher milk yields, fat content and live weight which accelerated the

formation of the new breed. This breed was recognized in 1950. By 1 January 1980 the number of Ala-Tau cattle had reached 930 000 head.

Ala-Tau cattle are characterized by a strong constitution, solid and fine skeleton. The body is rounded. The head is large, with long face. The chest is deep and wide; the ribs are widely spread; the dewlap is well developed. The withers are wide, long and straight. The hindquarters are wide and level. The belly is roundish; the legs are of medium length. The musculature is well developed. The skin is thick and elastic. The udder is of medium size and cup-shaped; the teats are cylindrical and mammary veins are well developed. Among defects are sloping and wedge-shaped rump and splayed front legs. The colour is mainly (60%) brown of various shades.

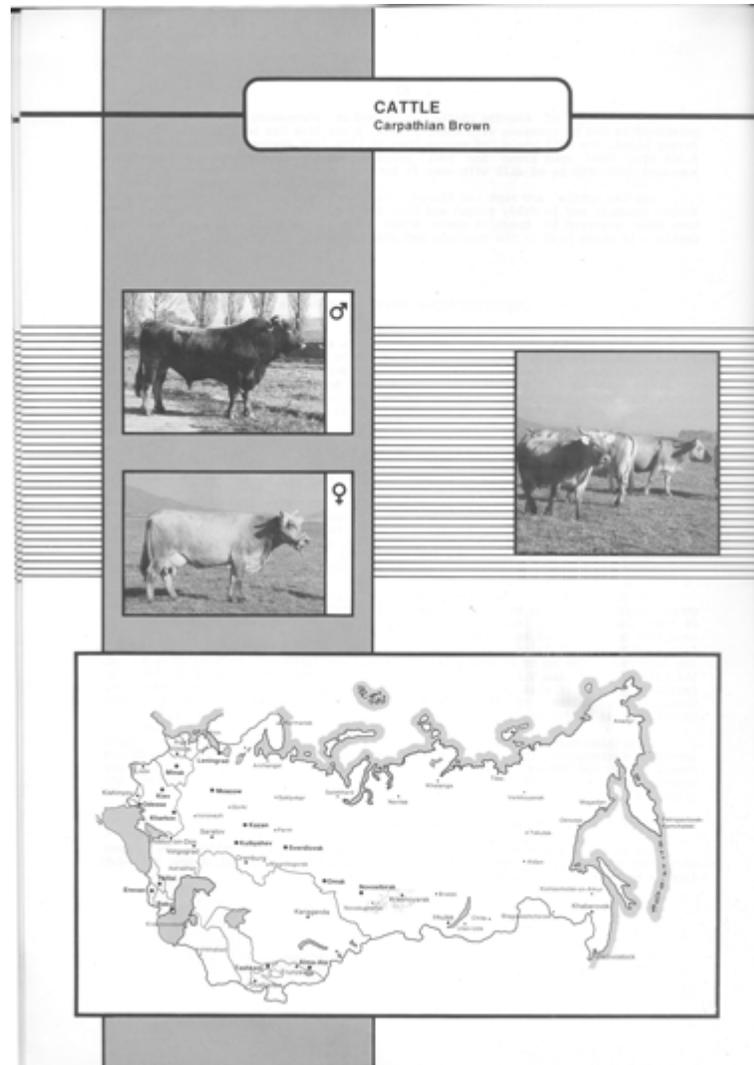
Ala-Tau cattle are noted for their good beef qualities. During fattening the daily gain of steers is 800-900 g; dressing percentage is 53-55 and up to 60 for prepared bulls.

The milk yield of Ala-Tau cattle on the breeding farms of the Kirgiz Republic is 4013 kg; at the breeding stations it is 4575 kg and the fat content is 3.89%; at the Sokuluk breeding station 968 Ala-Tau cows averaged 5001 kg of milk (Kvitko 1982). Some cows produce 8200-10 300 kg. The average fat content in the herds with the highest milk fat percentage is 3.9-4.06%.

The Ala-Tau breed comprises 9 major lines. The milk yield of the cows of these lines ranges from 4500 to 5488 kg, with 3.80-3.92% fat; their live weight is 580-600 kg.

The breeding of Ala-Tau cattle is aimed at increasing milk production by purebreeding and by crossing with other breeds. A new line has been formed containing Jersey blood. The milk yield of mature cows in this line averages over 5000 kg with 4.10% fat. Some cows lived for 15-17 years, produced 13-14 healthy calves and averaged 7000-9000 kg of milk with over 4% fat.

Ala-Tau cattle are kept in Frunze, Tien Shan and Issyk Kul regions of the Kirgiz Republic and in Taldy Kurgan and Alma Ata regions of the Kazakh Republic. They have been exported to Mongolia where a new type - the Mongol-Ala-Tau beef-dairy cattle - is being bred in the mountain and steppe areas.



CARPATHIAN BROWN (Buraya karpatskaya)

The breed was established in Trans-Carpathia region of the Ukrainian SSR late in the last century by crossing the local cattle with the Swiss Brown and its derivatives, namely, Brown Hornoin (a strain of Swiss Brown), Montafon and Allgau. The breed was formed in the highland area on high mountain grazing lands with alpine vegetation. The crosses were bred with the aim of obtaining a dairy-beef animal. The Carpathian Brown breed was recognized in 1973. In 1980 the total population was 203 000.

The cattle have a strong constitution and they are well adapted to the Trans-Carpathian region. In colour this breed resembles the other Russian Brown breeds but it differs in conformation - it is less tall and more compact, with narrower body and deeper chest. These cattle are not homogeneous in size and conformation. In mountain areas they are smaller than on the plains; this is a result of environmental conditions and of the different impact of the various breeds that participated in the formation of the breed in different

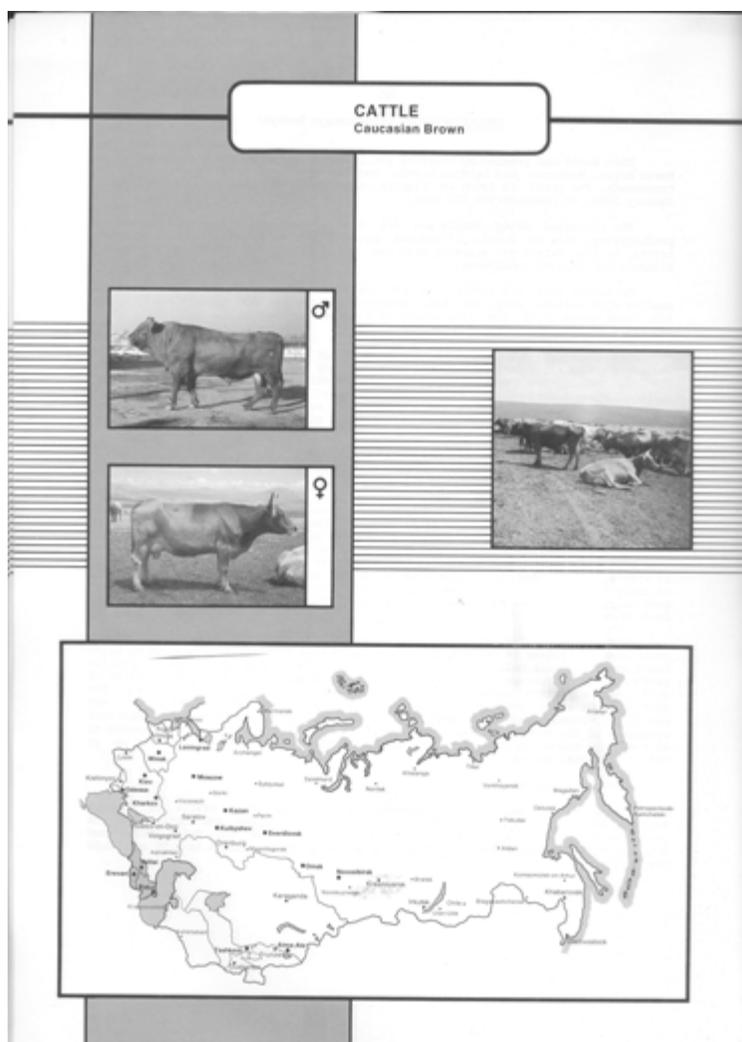
districts. The basic measurements of mature cows are (in cm): withers height 128, chest depth 67.2, oblique body length 155.3, heart girth 181.0, cannon bone girth 19.4 (Herdbook, vol. 5). The average live weight of cows is 489 kg and that of bulls 816 kg (maximum 1000 kg).

The milk production of the cows at the breeding farms points to the high genetic potential of the breed. The cows of the leading groups at the breeding farm of the Trans-Carpathian experiment station averaged 3955 kg of milk, including 30 cows that averaged 4808 kg. On the breeding station of the 22 Partsyezd collective farm in Mukachevo district cows noted for their milk production include Kvitka 6382 -7th lactation, 8246 kg of milk and Malvina 7026 - 5th lactation, 8126 kg of milk. At the dairy farm of the V.I. Lenin collective farm Sinitza 6954 produced in the 6th lactation 8247 kg of milk with 3.96% fat. The fat content in the milk of the cows registered in Volume 5 of the Herdbook was 3.72%. Proportionality index of udder development is sufficiently high (45.7%).

Carpathian Brown cattle are noted for their good beef production. Under intensive fattening in the lowland area of Trans-Carpathia region the 12-month-old steers reach 323-355 kg live weight and their dressing percentage is 58.2%. The ability to put on weight is exploited in the mountain area, rich with meadows and grazing lands.

There are 7 major lines in the breed.

The major breeding aim is a cow that can be used in dairy complexes. To achieve this, the descendants of American Brown Swiss bulls are being used. A new high-fat line is being formed by using bulls carrying Jersey blood.



CAUCASIAN BROWN (Kavkazskaya buraya)

This breed was created by crossing the local Caucasian cattle with bulls of the Swiss Brown, Kostroma and Lebedin breeds and the long-term breeding work with the crossbreds. The breed is found in Armenia, Georgia, Azerbaijan and Dagestan. On 1 January 1980, it numbered 993 000 head.

The Caucasian Brown cattle are not homogeneous in their conformation and productivity. This is due to differences between the local cattle in various districts, to the extent of crossing with the Swiss Brown and to different natural, climatic and feeding conditions.

In colour they are homogeneous and resemble Swiss Brown cattle but they are smaller with narrower body. The basic measurements are (in cm): withers height 123-129, chest width 37-41. The live weight of the cows entered in the herdbook is 430-480 kg; that of bulls is 700-800 kg.

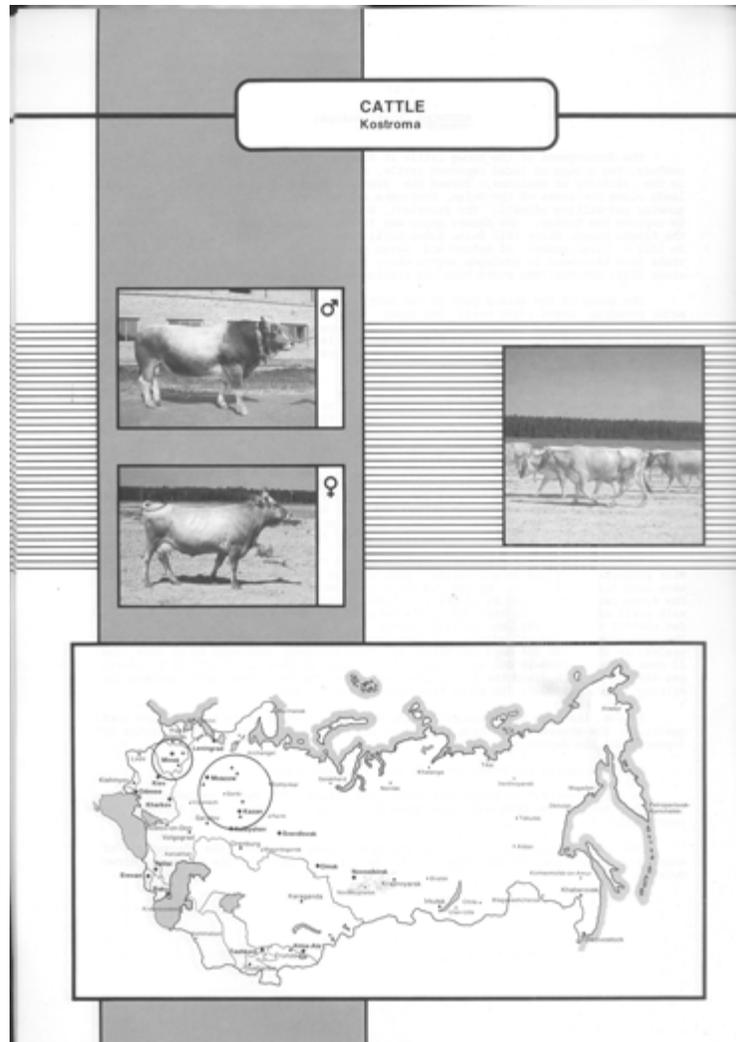
The animals have a harmonious conformation but the short body is their specific feature. Medium-size cows have shorter neck and body than Swiss Brown but longer than the local cattle. The chest is deep, of medium width. The rump is wide and somewhat sloping. The mid-part of the body is well developed. The legs are strong. The udder is satisfactorily developed; it has a sufficient excess of skin and well-developed teats; the mammary veins are clearly defined; the milk wells are large. The skin is elastic.

The Caucasian Brown breed includes three conformational and performance types: dairy, dairy-beef, and beef-dairy. In most herds the dairy-beef animals, predominate. This basic type was inherited from the Swiss Brown. Nevertheless, in some herds in the vicinity of Yerevan, most cows are of the dairy type. For example, in the herd that belongs to Kuibyshev collective farm in Abovyan district they account for 74.2% of all stock; at Shaumyan collective farm in Shaumyan district they account for 76.0%. At these farms the cows produce 23.5% more milk than the dairy-beef cows and 61.1% more than the beef-dairy cows. In some breeding farms the mature cows produce over 4000 kg of milk. The milk yield of 792 mature cows of the dairy type was 4160 kg with 3.78% fat, and of 898 dairy-beef cows 3367 kg with 3.84% fat. The live weight of dairy-type cows is 453-514 kg, that of the dairy-beef cows 470-529 kg and of the beef-dairy cows 514-541 kg. The dairy-type cows are superior to the other types in food conversion.

The programme for the improvement of Caucasian Brown cattle requires a considerable increase in the numbers of the dairy type by pure breeding and by using American Brown Swiss bulls. Mature dairy-type cows should meet the following specifications: milk production in a 305-day lactation of 4000-4500 kg with a fat content of 3.80-3.90%, a protein content of 3.35-3.40% and a live weight of 500-550 kg. The dairy animals should preferably be bred on the farms of the lowland areas with the use of year-round housing, as well as on the large mechanized farms and industrial complexes of the mountain areas with the use of cultivated pastures. It is planned to increase the number of the dairy-type cattle at the farms in the lowland area up to 70% of the total number.

There are 3 popular lines in the breed.

Study of the blood antigen alleles in Caucasian Brown cattle of Nagorny Karabakh shows that genes characteristic of the Swiss Brown and Kostroma breeds predominate. The similarity index between Caucasian Brown and Swiss Brown and Kostroma cattle according to the frequency of the common B-alleles is 0.59 and 0.50 respectively.



KOSTROMA (Kostromskaya)

The development of the Brown cattle in Kostroma region started late in the last century. Two groups of local improved cattle, Miskov and Babaev, in rural settlements in the vicinity of Kostroma, formed the foundation of Kostroma cattle. The flood lands along the banks of the Volga, Kostromka and other rivers provided good feed for growing and milking animals. The Yaroslavl, Kholmogory and Ayrshire breeds were used to improve the Miskov. The Babaev group was formed by crossing the local cattle with the Allgau breed. Since 1912 Swiss Brown bulls have been widely used on Babaev cows. In 1920 a large number of Babaev and Swiss Brown cattle were concentrated in the state farm Karavaevo in Kostroma region where the crossbreds have been bred inter se since 1932. The Kostroma state breeding station was set up in 1934. The study of the allele pool of the Kostroma breed in the pedigree herds in the major breeding areas (7194 head) and among the populations of the founder breeds (1538 cows) has shown that in the

process of improving, the Kostroma breed got a specific gene pool. At present it differs in the frequency of milk protein alleles from the Yaroslavl, Kholmogory, Swiss Brown and Ayrshire breeds which were founders of the initial Kostroma stock.

In 1940 the average milk yield in the herd of the Karavaevo state farm reached 6310 kg. Poslushnitsa II was the record holder in that herd. In 300 days of the 6th lactation she produced 14 115 kg of milk, with 3.92% fat. The Kostroma breed was recognized in 1944. Since 1950 these cattle have been bred in Ivanov, Vladimir, Vitebsk and Mogilyov regions and in the Tatar and Mari ASSRs. In 1974 the number of Kostroma cattle reached 865 000 head; on 1 January 1980 it was 838 100.

Kostroma cattle resemble Swiss Brown in colour, live weight and productivity. In Karavaevo the animals are heavier and wide-bodied, with short legs; they are light grey in colour with yellow or pale yellow top-line. While resembling Swiss Brown and Allgau cattle, Kostroma animals have several distinctive features: longer body and head, narrower forehead, raised withers, straighter and wider back and loin.

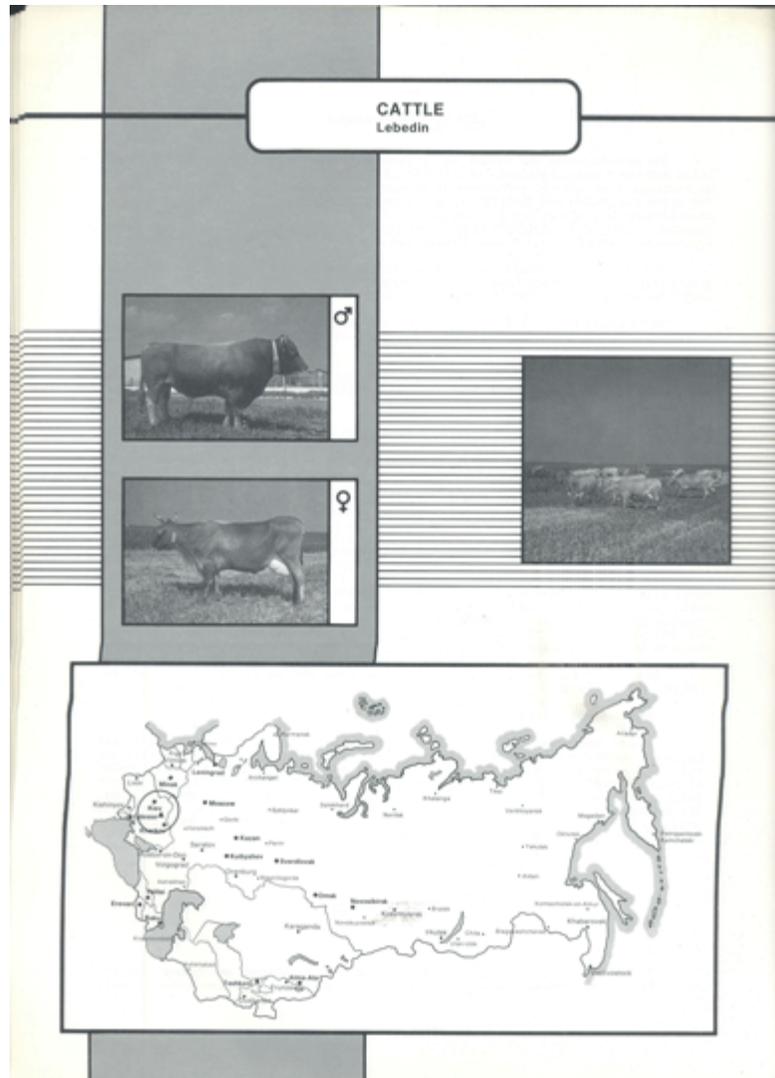
Kostroma cattle are characterized by a strong constitution, hardiness and high milk production over a long lifetime. Some cows at the Karavaevo breeding station were used till 19-22 years of age and their lifetime milk yield was 102-120 000 kg. Cow Krasa produced 120 247 kg of milk, or 5050 kg of butterfat in her lifetime. The milk yield of the animals recorded in the National Herdbook is 3900-5000 kg with the fat content of 3.7-3.9%; the protein content is 3.30-3.60%; udder index is 43-44%. The intensive management adopted at Karavaevo breeding centre produces high milk yields: in 1979, for 305 days lactation, 173 cows averaged 6000-8000 kg of milk, and 23 cows averaged 8000-10 000 kg or more; the average production of 221 first calvers was 4690 kg of milk, and the fat content was 3.84%. The best cows, with twice-a-day milking, produce 9300-10 750 kg of milk with 3.97-4.55% fat.

Besides its high milk production, the Kostroma breed is noted for its good beef qualities. The steers have a high rate of gain; they reach 450-500 kg as yearlings or 2-year-olds; the dressing percentage is 58-60.

Kostroma cattle are being improved at 7 breeding centres.

In recent years 7 breeding lines have been tested. The breed includes over 300 families. All the founders and descendants of the Kostroma cattle lines derived from record holders.

The breeding programme for the Kostroma breed specifies the formation of animals of a new intra-breed type by introducing the blood of the American Brown Swiss.



LEBEDIN (Lebedinskaya)

The Lebedin breed was formed by crossing Ukrainian Grey cows with Swiss Brown bulls and the subsequent inter se breeding of the best of the 1st and 2nd backcross generations under optimal conditions of feeding and management for many generations. The breed was formed and distributed mainly in Lebedin, Akhtyr, Trostyanets and other districts of Sumy region. It was recognized in 1950. At present it is regarded as an improver in 40 districts of Sumy, Chernigov, and Kharkov regions. The total population of Lebedin cattle on 1 January 1980 was 599 000.

In colour Lebedin cattle are similar to the Swiss Brown. The basic colour is grey-brown, with a darker shade on the forequarters and on the sides. Individuals vary from almost grey to dark brown. The muzzle is dark.

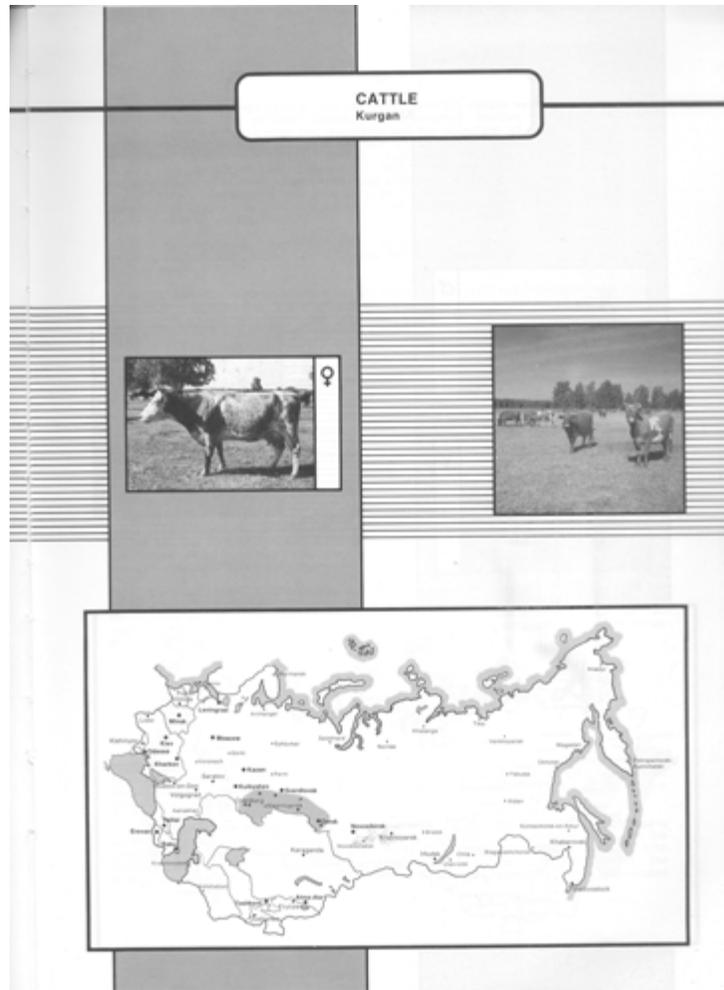
The measurements of the cows (in cm) are: withers height 130-136, chest depth 65-72, chest width 42-49, oblique body length 156-160, cannon bone girth 19-20. The constitution is strong.

The average live weight of mature bulls is 850-950 kg (maximum 1000-1200 kg); the live weight of cows at breeding farms is 500-650 kg; that of calves at birth is 37-45 kg.

In the main regions where they are kept milk production is 3100-3400 kg with 3.76% fat. Eight volumes of the National Herdbook hold data on over 9000 cows and 2000 bulls. Most of them were raised at the breeding stations of Sumy region. In 1979 in that region 1299 cows produced 5000-6000 kg of milk and 154 cows produced 6001-7000 kg of milk. The milk production in the herds of the breeding farms is much higher: in Chupakhovski it is 4616 kg, in Ukrainka it is 4830 kg. At the breeding farms and the leading breeding centres 90 cows produced 7000-12 000 kg of milk per 305-day lactation. One of the record holders is cow Ledi 5372 from Chupakhovski breeding farm in Sumy region; her 7th-lactation yield was 12 838 kg milk with 4.19% fat. Cow Nyrka 213 from Imeni Lenina collective farm in Lebedin district produced 11 115 kg of milk with 4.3% fat; cow Merezhka 410 from the same farm produced 12 349 kg of milk with 3.93% fat. Lebedin cows are noted for the high butterfat content of their milk. At the breeding farm Mikhailovka a large group of record holders for butterfat content was formed: Mudraya - 3rd lactation, 5000 kg of milk, 5.48% fat content; Molluska - 3rd, 4725 kg, 5.24%; Mirnaya - 9th, 6880 kg, 4.86%; Molekula -3rd, 6040 kg, 4.79%. The lifetime milk yields of some cows of the Lebedin breed reach 92 000 kg. The udder index is 43-45%. When fattening, the animals have high live-weight gains: the daily gain of steers is 900-1000 g.

The modern structure of the breed comprises 10 lines.

Further improvement of Lebedin cattle is aimed at increasing milk yield and butterfat content and at breeding animals that can fully meet the requirements of industrial methods. To achieve this, both pure breeding and crossbreeding with bulls of related breeds, namely American Brown Swiss, are being used. The American Brown Swiss bulls have a high breeding value for milk production with twice-daily milking. The programme envisages an increase in the milk yields of mature cows in the stud herds up to 5000-5200 kg with 3.9-4.0% fat and 3.35-3.40% protein. It is planned to stabilize the live weight of cows at 550-600 kg.



Other Dual-Purpose Breeds
KURGAN (Kurganskaya)

In the 19th century local cattle in west Siberia (Kurgan and Tyumen regions) were improved by crossing with Tagil, Simmental, Yaroslavl and some other breeds. From 1901 these improved cattle and the local Siberian cattle were crossed with the Shorthorn breed. The planned breeding that involved further crossing of these improved Siberian cattle with the Shorthorn and the selection of the crosses started in 1922 when a breeding State farm was set up; in 1935 a State breeding station was established. During the initial period, replacement crossing was used; then the crosses were interbred. As a result by 1949 there were a large number of early-maturing animals with a higher beef and milk production than the improved local cattle. They differed from the Shorthorn in conformation and productivity and were therefore recognized as a separate breed - the Kurgan. In 1949 the National Herdbook of the Kurgan breed was opened.

Kurgan cattle are currently bred in Kurgan, Chelyabinsk, Omsk, Tyumen and Orenburg regions and in the Bashkir ASSR. The total population of the breed in 1980 was 322 000.

The dominant colours of the Kurgan animals are red, red-and-white, and roan. The cattle are noted for their harmonious conformation.

The head is of medium size; the neck has well-developed muscles.

The dewlap is well developed and clearly pronounced. The chest is deep and wide. The back and loin are level and wide. The

hindquarters are deep and full. The measurements of the mature

cows and bulls recorded in Volumes 1 and 2 of the National

Herdbook indicate that Kurgan cattle have a good conformation, balanced and symmetrical with the parts of the body proportionally

developed. The basic measurements of the cows are (in cm):

withers height 130.1, chest depth 70.3, chest width 44.1, oblique

body length 155.3, heart girth 189.7, cannon bone girth 19.2.

The average live weight of mature cows is 520-550 kg, that of the

bulls 800-900 kg, up to 1100 kg. The Kurgan cattle have good beef

qualities. When grazing and fattening the steers gain 800-900 g

daily. The dressing percentage of fat animals is 62-65.

The milk yield of the cows recorded in the herdbooks is 3200-3700

kg. The record holder of the breed is cow Zenitsa 71; in 300 days of

the first lactation she produced 7265 kg of milk. Kurgan cows are

noted for the high butterfat content in their milk - 3.8-3.9%. In the

pedigree herds the majority of cows have over 4%. Cow Zmeika had

the highest butterfat content, namely 5.3%. The milk yield of cows

with a cup-shaped udder is higher than that of cows with a spherical

udder. At older ages the udder becomes spherical. The udder index

is 41-44%.

The best herds of the Kurgan cattle belong to the breeding centres

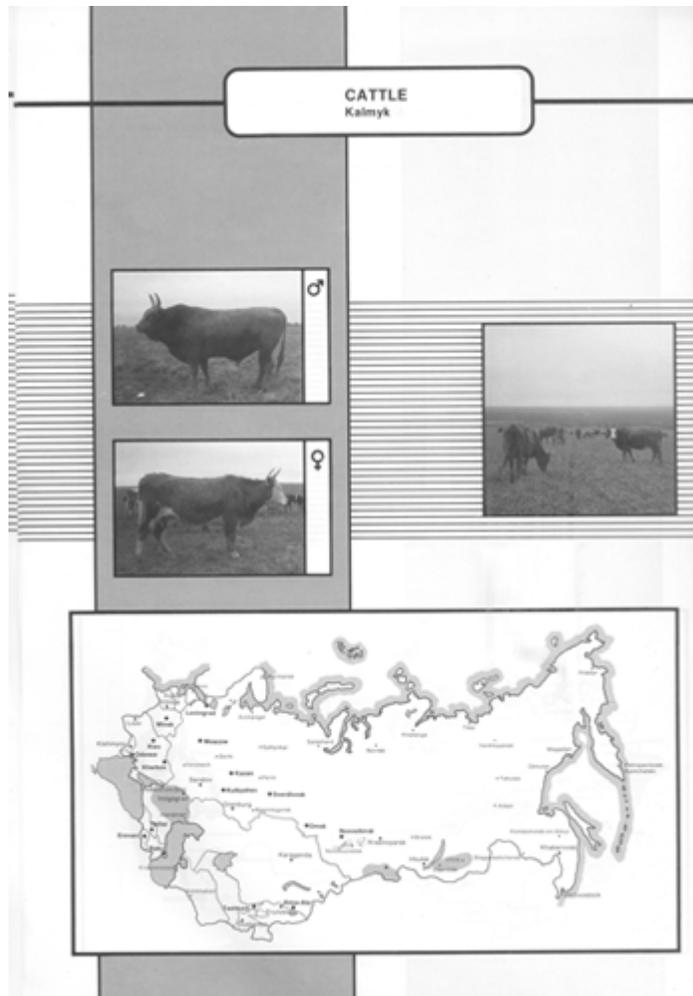
of Kurgan region, namely: Kurganski, Taktashinski and

Vargashinski. Breeding is directed to the development of dairy and

beef production and to the improvement of constitution. To realize

the programme it is planned to use intensively the internal breed

resources and to introduce blood of the American Milking Shorthorn.



BEEF BREEDS KALMYK (Kalmytskaya)

There is no single view of the origin of Kalmyk cattle. P.N. Kuleshov claimed that Kalmyk cattle differ considerably from the European breeds and originate from Indian cattle. Most experts assume that this breed derives from the Asian Bos primigenius which seems likely.

The breed was formed more than 300 years ago on the mountain and steppe grazing lands in the northwest of China (Jungaria), west Mongolia, and southern Altai. In the southeast of Russia the Kalmyk cattle appeared in the first quarter of the 17th century, when the Kalmyk tribes moved from Jungaria to the Lower Volga area. The Kalmyk breed was formed under conditions of migratory husbandry, with year-round grazing. Iced pastures and snowstorms, frequent in the steppe area, as well as epizootics, resulted in the death of a great number of animals. Only the most strong, hardy and healthy animals were able to survive the hard winters. As a result of this

selection Kalmyk cattle acquired the distinctive features that differentiate them from other breeds.

Late in the last and early in this century on some farms of Rostov region and the lower Volga area Kalmyk cattle were crossed with the Simmental to obtain larger animals and with the Shorthorn to improve their beef qualities. Nevertheless the infusion of blood of these breeds did not much affect the basic population of Kalmyk cattle.

The specific biological features of Kalmyk cattle are as follows: high viability, adaptation to the harsh continental climate, ability to graze on poor vegetation. The body temperature of Kalmyk cattle is stable (with only minor fluctuations) under the icy north wind or in the hot burning sun. In winter the epidermis thickens at the expense of the dermis. As compared with other breeds, the skin has more sebaceous and sweat glands. At present, over 90% of the total number of Kalmyk cattle populate the area of dry steppe, semi-arid and arid areas of the country. No other breed can compete with the Kalmyk in that area.

Kalmyk cattle are adapted to exploiting dry sagebrush pastures, where the major vegetation is *Artemisia*, feather grass, and sheep's fescue. The breed is distributed in the Lower Volga (Kalmyk ASSR, Volgograd, Astrakhan and Rostov regions), the Stavropol territory, the Chita region, the Tuva ASSR, the Buryat ASSR, Kazakhstan, Uzbekistan, and Turkmenia. The number of the breed in 1980 was 381 000 head.

Kalmyk animals are of medium size and with a compact conformation. The breed includes two types: early-maturing beef, and late-maturing beef. The animals of the first type are somewhat smaller in size and with lower live weight; they mature faster, have a lighter skeleton, thinner skin and a higher dressing percentage (by 2-4%) than the late maturing animals. They also differ in the B-system blood antigens.

The colour of the animals is red, of various shades, with white markings on the head, abdomen and legs; the muzzle is pale. The conformation is characteristic of a beef and draught type. The head is small, forehead short, horns short, face long. The withers, back and loin are usually straight and wide; the chest is deep, wide enough with well-developed dewlap. The rump is occasionally raised. The legs are strong, correctly set. The musculature is well developed. The skin is medium thick. In winter the animals have long thick hair cover. The udder is small. The skeleton is light and strong. The measurements (in cm) are as follows: withers height 126-128, chest depth 68-70, oblique body length 155-160, heart girth 186-188, cannon bone girth 17-18.

Newborn calves weigh 22-25 kg. The live weight of the cows is 420-500 kg; some animals weigh 675 kg. Bulls weigh 750-850 kg; some bulls reach 1020 kg. Kalmyk cattle have good fattening properties. With intensive fattening the young stock reach 400-450 kg by 16-18 months of age. During fattening, the 1.5-year-old steers gain 800-900 g daily. The dressing percentage varies from 55 to 60; that of the fattened bullocks is 68.

The display of beef breeds at the USSR Exhibition of Economic Achievements in 1984 showed that 5-year-old Kalmyk bulls reach a live weight of 860 kg. Fattened steers at 20 months old weigh 505 kg, their daily gain averaging 876 g. Obilny state farm in Priozerny district of the Kalmyk ASSR displayed 6 steers at the age of 17.5 months. Their average live weight was 527 kg; average daily gain was 918 g.

The milk production of the cows is low. The lactation is very short - 180-240 days. Average milk yields are 1000-1200 kg with 4.1-4.5% fat. Some cows produce milk with 5.9-6.5% fat and with the high protein content of 4.2-4.8%. The record milk yield for the Kalmyk breed was achieved by cow Ulan-Alyk on State Farm No. 383 of the Kalmyk ASSR; she produced 4926 kg of milk with 4.7% fat. The low milk yield of Kalmyk cows is compensated for by a high dry matter content. Few other beef breeds can boast that rich and high-protein milk. The highly nutritious milk of Kalmyk cows ensures the normal growth and development of suckling calves.

The breed includes 4 regional types - in North Caucasus, Lower Volga, Kazakhstan and Siberia - which differ in weight.

Study of the blood group antigens showed a high degree of heterogeneity. These cattle differ considerably from other breeds in the frequency of the antigen factors in the A, B and C systems.

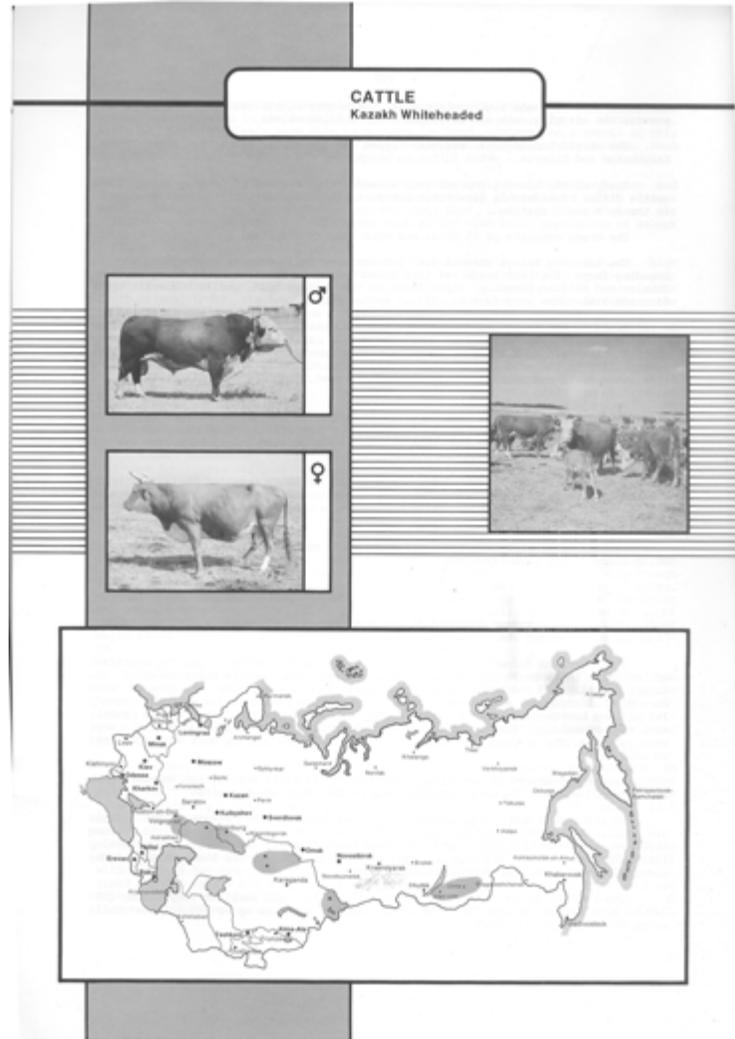
The breed consists of 15 lines and more than 40 families.

The breeding Kalmyk animals are concentrated in 3 pedigree stock farms and 20 breeding farms. The best herds of this breed belong to Sukhotinski breeding centre, Chkalov and Kalinin breeding state farms in the Kalmyk ASSR, and to Dubovski state farm and Zimovnikov stud farm No. 163 in Rostov region.

Breeding of these cattle is currently directed to raising of large early-maturing animals with good beef qualities, while at the same time preserving the special characters of the breed, namely: strong constitution, good walking ability, adaptability to the arid continental climate, resistance to diseases, long breeding life, good taste and nourishing quality of the meat, high dry matter content of the milk. The milk production of the cows can be increased to 1200-1500 kg by means of selection and by better feeding and management. This will allow maintenance of the optimum balance between beef and milk production by getting calves to a live weight of 250 kg or more prior to weaning.

The evaluation of Kalmyk steers by their productivity revealed their ability to maintain a high daily gain (1200-1500 g) after weaning with the low feed consumption of 5-6 feed units per kg weight gain. Such animals reached the weight of 400 kg or more as yearlings.

To preserve this breed, the habitat is being extended and the number of head is being increased by pure breeding.



KAZAKH WHITEHEADED (Kazakhskaya belogolovaya)

The breed was formed in the territory of the Kazakh Republic and the southeast of the RSFSR in a harsh continental climate. Since 1930 on the state farms of the Kazakh republic and the Lower Volga area Kazakh and Kalmyk cattle were crossed with Herefords in order to establish a basis for the beef industry. The crosses, mainly 1st and 2nd backcrosses, which combined the good beef qualities of Hereford cattle with the undemanding feed requirements and adaptability of the local cattle, were bred inter se. The aim was the formation of a beef breed and the work was completed in 1950. Valuable features of the Kazakh Whiteheaded are their ability to tolerate both hot and cold weather, to fatten rapidly and to have high weight gains.

In its colour and conformation this breed resembles the Hereford. The cattle are small, of compact conformation, with a deep and wide chest, a light strong skeleton, wide rounded body, and well-developed muscles. In winter they develop thick, long hair cover.

The colour is red of various shades; the head, dewlap, lower abdomen, lower legs, and the switch are white.

The live weight of calves at birth is 27-30 kg; when suckling they reach 220-240 kg by 8 months of age. The cows weigh 500-560 kg, some up to 700 kg; the bulls weigh 800-850, 1000 kg maximum.

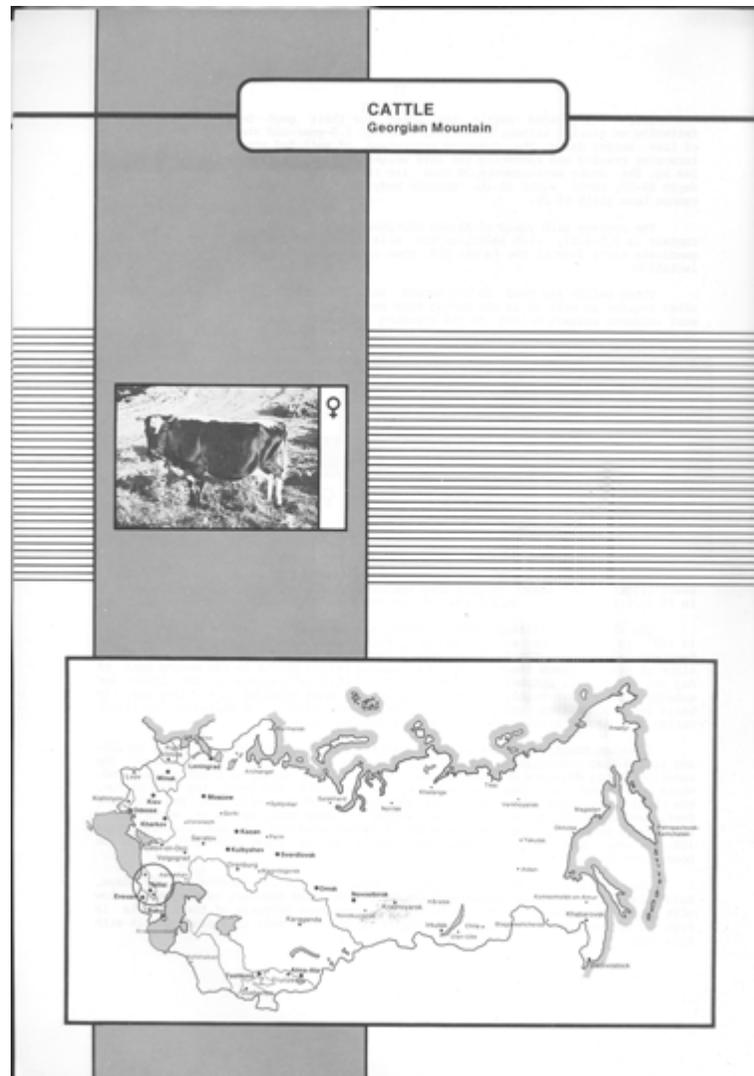
Kazakh Whiteheaded cattle are noted for their good beef qualities. When fattening on grazing without additional feeding, 1.5-year-old steers gained 800-900 g of live weight daily. The dressing percentage of well-fed steers is 63-67%. With intensive grazing and fattening the live weight of steers at the age of 18 months was 540 kg. The basic measurements of cows are (in cm): withers height 123-145, chest depth 68-70, chest width 42-45, oblique body length 152-156, heart girth 187-190, cannon bone girth 18-20.

The average milk yield of Kazakh Whiteheaded cows is 1200-1500 kg, and the fat content is 3.8-4.0%; with selection for milk production at some farms, e.g. Kara-gandinsky state farm of the Kazakh SSR, some cows produced up to 6000 kg of milk per lactation.

These cattle are bred in the Kazakh SSR, Orenburg, Volgograd, Chita and some other regions as well as in the Buryat ASSR and the Mongolian People's Republic. The most valuable animals belong to the breeding centres Chapaevski in Ural region and Balkashinski of Tselinograd region, as well as to the breeding state farms Bagrationovski of East Kazakh region and Alabotinski of Kokchetav region (National Herdbook, vol. 10, 1981). Further improvement of beef productivity will be effected by use of animals of the six leading related groups of sires.

Kazakh Whiteheaded bulls are used to improve the local cattle in some areas of Siberia and the Far East, as well as for crossing with other breeds.

At 1 January 1980, the total population stood at 1 570 000 head.



LOCAL BREEDS

GEORGIAN MOUNTAIN (Gruzinskii gornyi skot)

These are a variety of the ancient high mountain Georgian cattle but their exact origin is not known. In 1980 they numbered 80 000 head and they are distributed in 15 districts in the west and east of the Republic.

The climatic conditions of the habitat are severe: the minimum air temperature is -25 to -30 C. The average annual precipitation amounts to 900-1500 mm. The heaviest falls are in May-June, the lowest in January. Snow lies for 5-7 months. The slope of grazing lands reaches 45°. The grazing period starts in the second half of May and lasts till October. The pastures with difficult access in the alpine and subalpine zones have highly nourishing grass and good drinking water. They are the basis for the maximum productivity of animals. The calves are raised by suckling. During a two-month suckling period they get 120-200 kg of milk.

Georgian Mountain cattle are very small: the live weight of mature cows is 220-280 kg and that of bulls is 270-370 kg; the beef qualities are unsatisfactory. The constitution is delicate and conformation compact. Coat colour is black, black-and-white or red-and-white. The head is light, the neck thin and short, the back narrow, the chest deep, the udder small and glandular, and the skin thin and elastic. Conformational defects are as follows: humped or sway back, narrow or wedge-shaped rump, knock knees. The basic measurements of mature cows (in cm) are: withers height 100-108, chest depth 53-56, diagonal body length 120-126, chest girth 139-142, cannon bone girth 13-14.

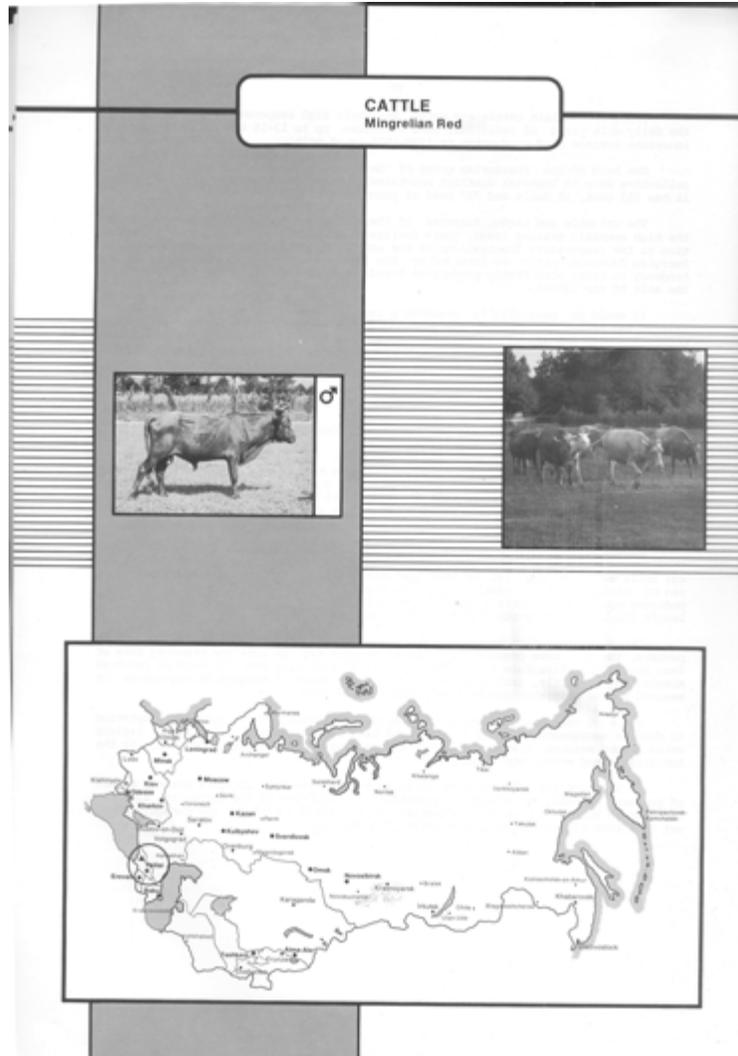
The average lactation period is 230 days, and calving interval is 380 days. Naturally, under extensive management conditions Georgian Mountain cattle have a low milk yield: it varies from 650 to 800 kg. The important property of these cattle is high fat percentage. The average fat content is 4-5%; the best cows produce milk with 6.2% fat.

Georgian Mountain cattle are noted for their high response to better feeding: the daily milk yield of individual cows increases up to 12-16 kg. Adequate feeding increases average herd production to 1700-1900 kg of milk.

The herd of the Khevsurian group of Georgian Mountain cattle at Magoros Kary collective farm in Dushetsk district maintains relatively stable numbers; at present it has 553 cows, 10 bulls and 727 head of young stock.

The valuable and useful features of the cattle are their unique adaptation to the high mountain grazing lands, their resistance to infectious diseases and adaptation to the temperature fluctuations of the southern climate. Further improvement of Georgian Mountain cattle is retarded by the poor selection programme and a strong tendency to cross with highly productive breeds in order to raise the fat content in the milk of the latter.

It would be desirable to preserve a certain number of animals as a genetic reserve for selection; to study the genealogical structure of the active part of the population with the aim of identifying the most valuable genotypes; to characterize the immunogenetic properties of the pedigree stock; and to set up a bank of frozen semen of the best sires.



MINGRELIAN RED (Krasnyi megrelskii skot)

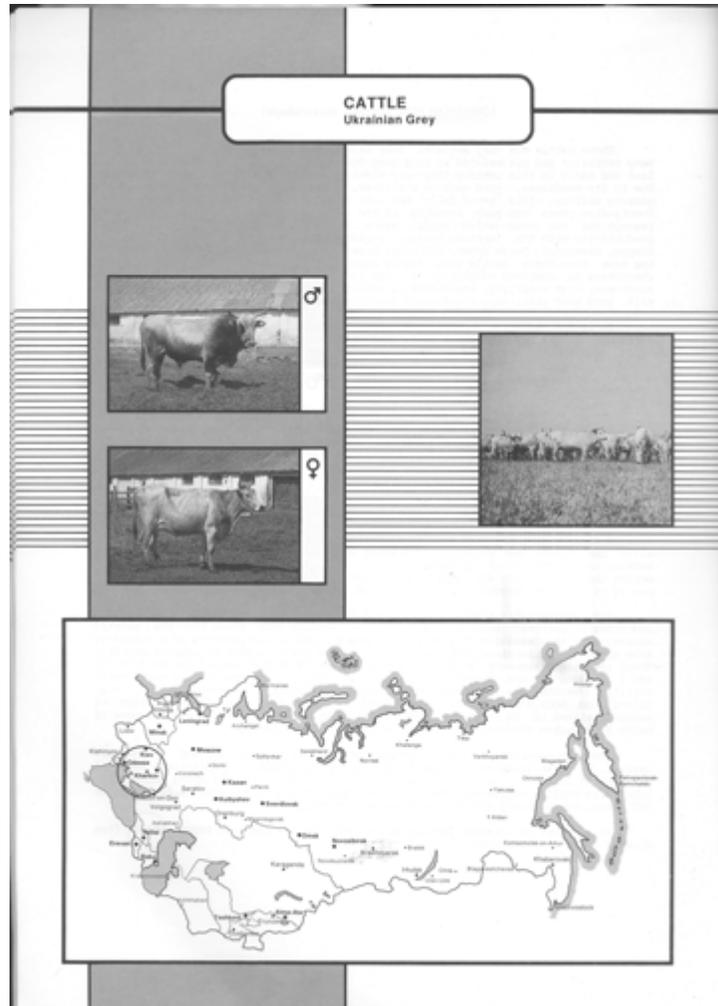
Like the Georgian Mountain these cattle are an ancient local variety of the Caucasian cattle, representing the Lesser Caucasus group. In 1980 the population was 11 000. It is distributed in the west of Georgia in the foothills and valleys of the Lesser Caucasus. As an approved breed these cattle are bred in 11 districts of the Republic. Mingrelian Red cattle have a strong constitution and a compact conformation; they are larger than the Georgian Mountain. The live weight of mature cows is 280-320 kg; bulls weigh 450-480 kg. The beef qualities are not satisfactory. The colour is red of various shades: rust, brown and grey. The basic measurements of mature pedigree cows are (in cm): withers height 110-115, chest depth 58-60, oblique body length 133-135, chest girth 165-167, cannon bone girth 17-18.

The milk yield on breeding farms is 1800-2000 kg with 4.4% fat and 3,7% protein. The best cows produce milk with 6% or more fat. In 1984 the breeding farm of Zemo Aketi collective farm in Lanchkhut

district of Georgia had 459 head of purebred Mingrelian Red cattle, including 198 cows. Conservation of Mingrelian Red cattle is assured by the comprehensive breeding plan at this farm.

The most valuable features of Mingrelian Red cattle are as follows: adaptation to outdoor management, ability to withstand long-distance travel, ability to exploit water-logged meadows in winter and poor alpine pastures in summer, adaptation to the hot climate and resistance to disease.

To increase the efficiency of breeding it is planned to obtain a greater number of purebred animals, to study the genealogical structure of the herds, to identify the animals with a high genetic potential, especially for high fat percentage, and to set up a bank of frozen semen from outstanding sires.



UKRAINIAN GREY (Seraya ukrainskaya)

These cattle are very ancient; they were formed as a result of selection over many centuries and are related to many Grey Steppe breeds of southern Europe. In the last and early in this century they were widely distributed over most of the Ukraine. Due to its hardiness, good working abilities, modest nutritional requirements, and grazing ability, this breed fully met the requirements of small peasant farms. Twenty-five years ago pure breeding of the Grey Ukrainian cattle was terminated (except for two conservation herds). Since the local breed could not compete in productivity with the improved breeds, replacement crossing with bulls of the Red Steppe, Simmental, Swiss Brown and other breeds was practised on a large scale. At the same time these cattle were highly appraised by many investigators for such characters as complete adaptation to the local environment, strong constitution, hardiness, high viability, resistance to various diseases, high butterfat content of milk, good beef qualities, first-grade quality of hide.

In recent years the population of the Ukrainian Grey has fallen to a minimum: in 1980 the total head was about 1000. Small groups of these cattle are preserved at Polivanovka experimental farm in Dnepropetrovsk region and in Askania Nova natural reserve in Kherson region of Ukraine. Most important is the Polivanovka herd, where 372 head are kept, including 13 sires, 159 cows, 88 steers of all ages and 112 heifers.

The animals in the herd have a strong constitution and specific hide and hair characteristics. The colour is grey or light-grey and bulls have a darker neck, chest and legs. The horn tips are black. The skin is dense. The animals are tall, rather leggy and long-bodied.

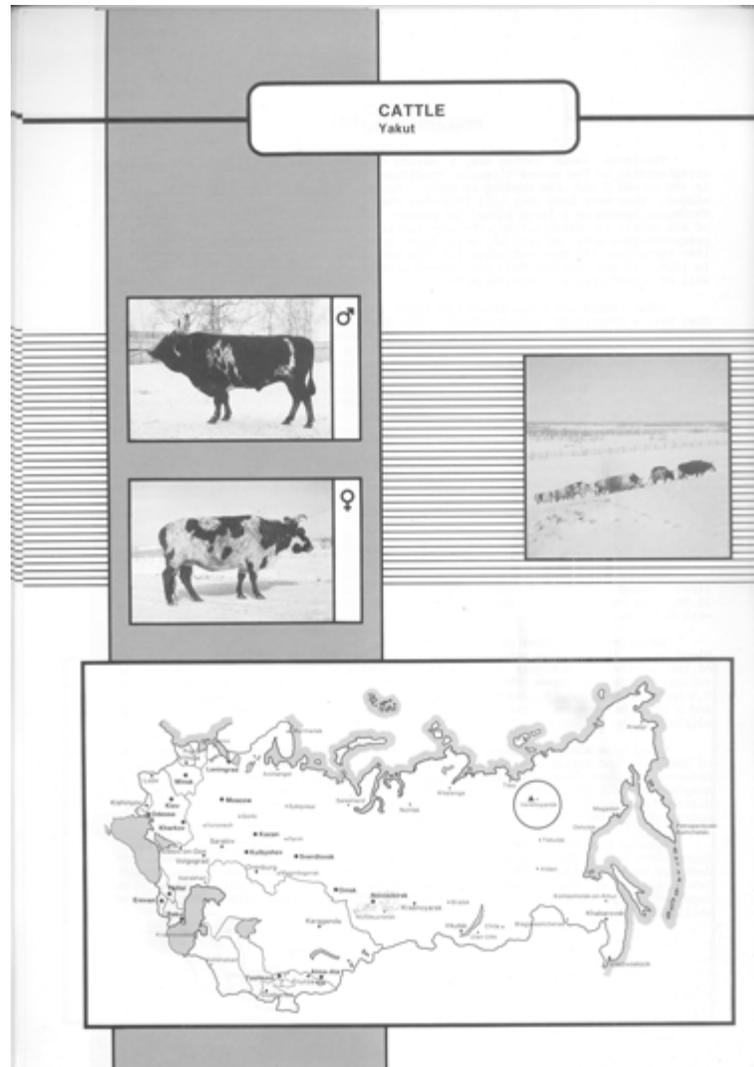
The withers are prominent. The muscles are well developed.

The animals in the present-day population are large. The record cow live weight is 750 kg; that of bulls is 1100 kg. The cattle are noted for the small size of the newborn calves: birth weight is 27-29 kg. The highest daily gain in weight is observed at the age of 9-12 months, namely 766-822 g. The milk yield with hand milking is 2457-2921 kg, with 4.23-4.26% fat. The record milk yield was obtained in 1971; cow Iriska 5180 produced 5365 kg of milk with 5.02% fat. When calves are suckled their live weight at weaning varies from 198 to 215 kg. By the age of 16 months the steers reach 439 kg live weight with a food consumption of 7.8 feed units per kg of gain. The dressing percentage is 58.7%.

The immunogenetic status of the breed has been studied by using blood groups and other polymorphic systems as markers. The studies have shown that the genetic structure of the Ukrainian Grey breed is characterized by the presence of a considerable number of antigenic factors, which result in a great number of complex alleles. There is a high frequency of the V antigen in the FV-system, and of the B, G, O, Q and T antigens in the B-system. The Ukrainian Grey cattle have fairly high variability. Nevertheless, a number of alleles are specific for these cattle, e.g. QA'D'G' and BGQY₂B'D'E'G'J'O'). The blood groups BJ₁TJ' are characteristic of animals related to the intensively used sire Tabun. The use of only a small number of bulls is reducing the variability seen in blood group antigens.

The herd comprises 5 related groups that vary in productivity and polymorphic systems. To preserve genetic variability, intra-group selection is practised for 2-3 generations followed by an inter-group cross, i.e. rotation of bull among groups. The inbreeding coefficient is increasing by 0.12% per year. A large bank of frozen semen (22 sires, representing all 5 related groups) is available.

At a number of leading institutes in this country adequate frozen semen from diverse bulls is now stored.



YAKUT (Yakutskii skot)

The local Yakut cattle are a branch of the Siberian. These cattle are irreplaceable in the severe climatic conditions where the air temperature in winter is -50 to -60°C and the feeding is poor; during the short summer they suffer from midges. They were bred pure till 1929 when they were crossed with the Simmental and Kholmogor breeds on a large scale. At present the local cattle account for only 0.3% of all cattle in Yakutia. In the vast territory of the Yakut ASSR they have been preserved pure only at Leninski state farm in Verkhoyansk district. On 1 January 1980 there were 653 head including 329 cows and 11 bulls. This population originated in 1820. It was isolated and not crossed with other breeds. In the near future it will be turned into a conservation herd.

Yakut cattle are characterized by small size, deep barrel, and short firm legs. They have a relatively wide forehead. The shape and direction of the horns vary; there are no polled animals. The head is

short, wide, not heavy; the neck is short and thick; the withers are low and wide; the chest is deep, rather narrow, with a well-developed dewlap. The back, loin and rump are level; the hindquarters are slightly sagging and roof-shaped, somewhat narrow in the hips; the leg stand is correct, occasionally knock-kneed or bowed. The abdomen is capacious. The udder is small and firm; udder and teats are covered with thick hair which protects them from frost and from midges. The hair cover is thick with a great number of guard hairs that help to withstand the cold climate. The colour varies from black or red to leopard-like with white markings on the head and lower barrel; the backline of most animals is white. The constitution is strong, characteristic of dual-purpose animals. The live weight of cows ranges from 350 to 400 kg; that of bulls is 500-550 kg.

In 1980 the average milk yield in the herd was 1 015 kg with 5.13% fat.

The beef and fattening qualities of Yakut cattle are good enough; they are no worse than those of the best national breeds (Kalmyk and Kazakh Whiteheaded).

When properly fed and managed Yakut cows are noted for their long productive life: among the cows studied by Romanov in 1963 the 12-year-olds accounted for 25.9%. The better cows in the conservation herd have a milk yield of 2100-2350 kg with 6.1-7.3% fat.

Immunogenetic studies of the Yakut cattle have shown the elimination of rare blood groups in the three subpopulations of this isolated cattle group. The spectrum of the erythrocyte antigens of 458 Yakut animals at Leninski state farm was as follows: in the A-system the blood group A_~ was found to have a frequency of over 0.5 as had O₂, O, and Y., in the B-system, C, X₂, 1/ and E in the C-System and U₂ and H in the S-system. The Yakut cattle have the smallest allele fund (about 2S alleles in the B-locus).

Blood type analysis showed the common origin of the subpopulations in the areas of Sakkyryr and Kustur in Verkhoyansk district. The assessment of the genetic distance of these subpopulations confirmed the stability of the indicators by the 9 simple loci for two consecutive generations. Based on the B-system the genetic distance decreased from 0.13 to 0.09 over generations as a result of increased migration of animals between subpopulations.

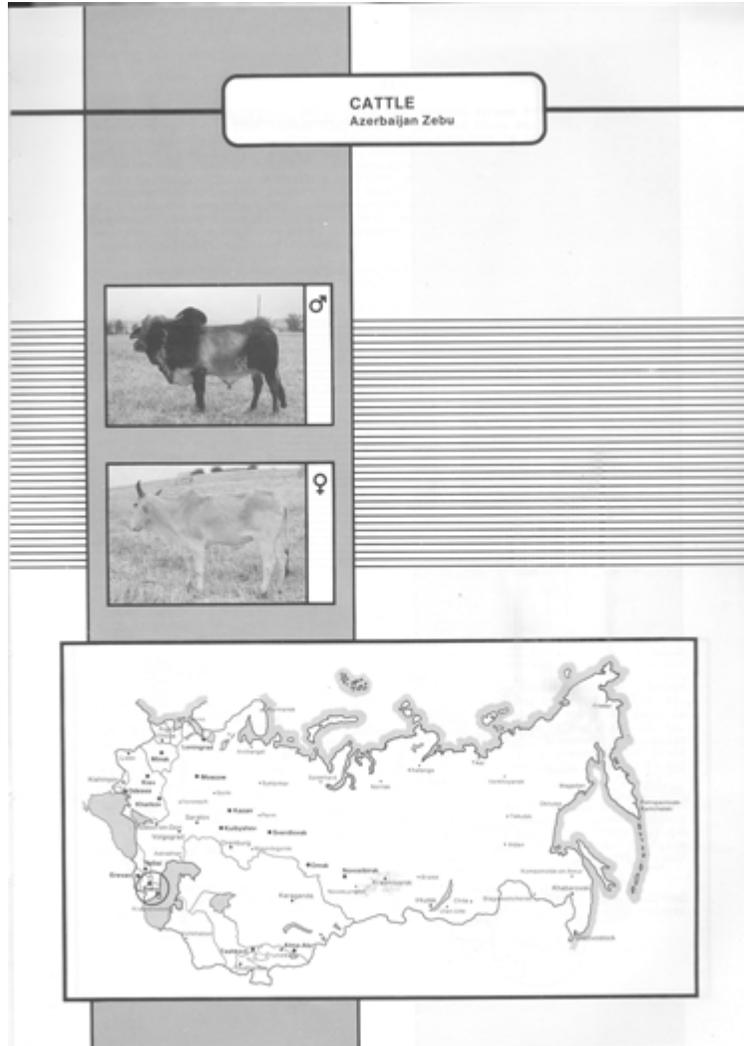
Because the local Yakut cattle exhibit resistance to tuberculosis, leucosis, brucellosis and to the cold northern climate and poor feeding, local bulls should be used for back crossing in the crossbred herds in order to increase the number of pure Yakut cattle. It may be expedient to use Yakut bulls for commercial crossing with imported breeds (Kholmogory and Simmental) to obtain animals with good adaptive abilities.

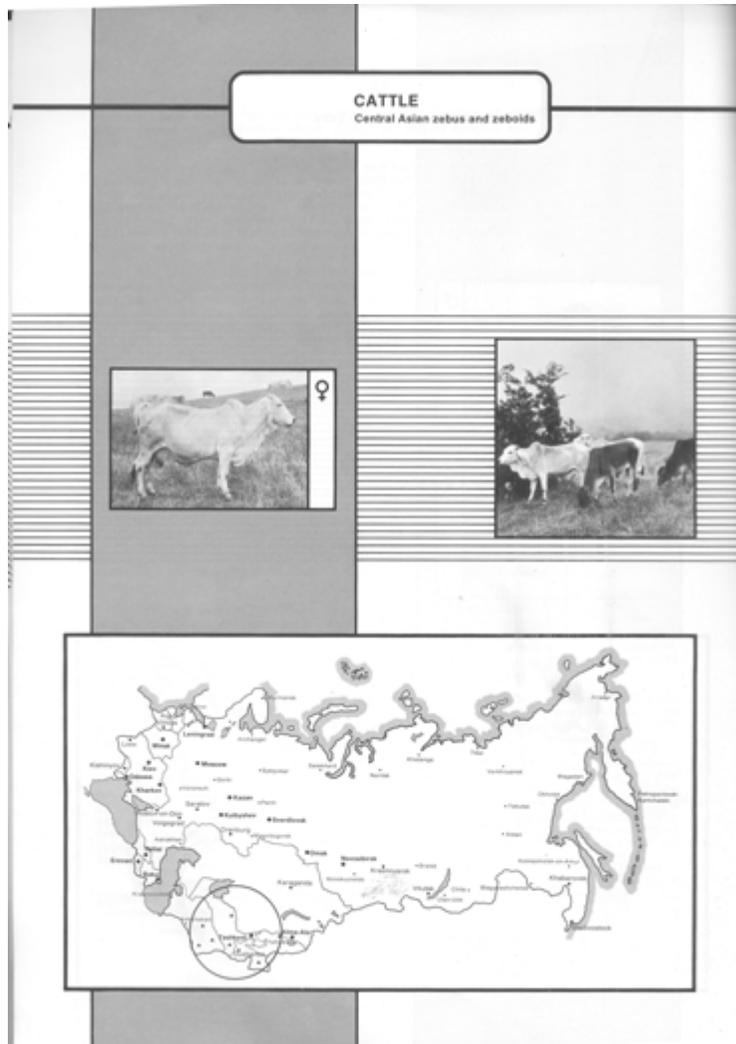
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2. ZEBUS AND ZEBOIDS

Z.K. Verdiev





There are two varieties of zebu in the Soviet Union, a true (typical) zebu with well-pronounced zebu traits, and nearly humpless zebu-like cattle or zeboids. True zebu are currently raised in the southeast of the Azerbaijan SSR. In Central Asia there are both zebus and zeboids.

There are grounds for believing that zebus were raised on the territory of the present-day Azerbaijan 4000-4500 years ago. During the excavations of a stone burial ground in the vicinity of the city of Lenkoran the French archaeologist Jacques De Morgan unearthed and described a unique round seal of black and grey agate depicting a humped zebu bull covered with dense hair. This he dated to 2500-2000 B.C. The excavations carried out by personnel of the Institute of History (Academy of Sciences of the Azerbaijan SSR) at Eddi Tepe (or Seven Hills) in the Feazulin district have produced numerous finds, including two bronze figures of a humped zebu. Another rare find unearthed at Eddi Tepe is an elegant ring made of some precious metal, with a fine drawing depicting a zebu. It is currently exhibited in the Museum of Ancient Culture of Azerbaijan. These finds, which are believed to date to the middle of the first millennium A.D., confirm that zebu with various types of humps were widely spread in the past on the territory of the present-day Azerbaijan SSR.

A particularly important role in determining the time when zebu first appeared in Central Asia is assigned to the archaeological excavations at Kaunchip (Uzbekistan). V.I. Gromova (1940) writes: "Noteworthy is the presence of zebu, which is confirmed by the finding of the bifid spinous process of a thoracic vertebra of a young animal; no other ungulate animal except zebu has such a bifid spinous process". This find permits us to assume that the true zebu appeared in Central Asia during 3000 to 2500 years B.C. It also confirms the view once expressed by Frederiks who believed that zebu had appeared in Turkestan before they came to Mesopotamia or at least they spread into the two regions at the same time. Numerous present-day studies suggest that a wild variety of zebu did not exist - at least no one has yet described it. Extensive studies of the morphological and other traits of humped and humpless cattle, which have been performed by scientists from different countries, confirm the correctness of the theory advanced by W. Durst that the zebu's ancestor was the aurochs.

Some scientists believe that the zebu's ancestor was Bos namadicus, others point to Bos primigenius. However, Bos namadicus is a geographical race or subspecies of Bos primigenius. Therefore, the two views are not in contradiction. While discussing the theory of the origin and domestication of animals, Herre (1958) concluded that the zebu did not inherit its adaptability to tropical and subtropical climates from its wild ancestor but rather acquired this characteristic in the process of evolution after domestication.

The ecological conditions of the regions where zebu and zeboid cattle are raised are very specific. As has already been mentioned, zebu are chiefly raised in the Lenkoran natural region of the Azerbaijan SSR. A great variety of plants grow in the Lenkoran natural pastures. The lowlands and foothills in the north are occupied by steppe and semi-desert covered with mugwort (Artemisia) and various grasses. The coastal area is characterized by swamp meadows rich with Persian clover which is cut for hay. There are various groups of aquatic plants and moorland vegetation. The southern areas are covered here and there by dense high reed thickets; sedge and cat-tail swamps and alder groves are common. These areas border on a solonchak strip covered by Puccinellia. The higher mountain treeless formation is typical of mountain areas with a dry and severe climate. Two types of plants are distinguished here: mountain xerophytes, whose flora is highly endemic and unique, and meadow plants.

The prevailing climate is humid and subtropical. The northern lowlands and the upper mountain zone (more than 1000 metres above sea level) excluded, the Lenkoran natural area is characterized by high precipitation; the weather is warm at all seasons with occasional light frosts. The grazing and confinement periods last for 210 and 150 (December-April) days respectively. Basic fodder during the confinement period includes meadow and forest hay, sainfoin, processed straw, grain, and some acorns from the forests.

The Central Asia zebus and zeboids are raised in Uzbekistan, Tajikistan, and Turkmenistan. The ecological conditions of these areas are characterized in general by a hot dry climate, low precipitation and a xerophytic flora.

The Azerbaijan zebu and Central Asian zeboids are independent populations. The Azerbaijan population has existed for 3000-4500 years. It

represents a true zebu fully comparable with zebu in other countries. The Central Asian (or Turkestan) zeboid is, in fact, a crossbred nearly humpless population that carries the blood of local cattle in the Turkmen, Uzbek, and Tajik republics. The male has a small hump and the female is humpless. It was obtained by crossing local cattle with the Iranian zebu as early as the 7th or 8th century A.D. The influence of the Iranian zebu on local cattle continued until the 17th century or even later. At the same time, in some regions of the Turkmen SSR adjacent to Iran, there are some animals with external characteristics which are typical of zebu. These animals have all the traits and qualities of the species and are known as the Khorosan and Seistan zebu breeds. Today the most typical Turkmen zebu is raised in Kerki district.

In recent years the distribution and use of zebras and zeboids have considerably expanded. They have spread to the Ukraine, Georgia, the Altai and Krasnodar territories, Dagestan, Kazakhstan and the non-blackearth zone of the Russian Federation. In 1954 native zebras and zeboids numbered some 2 million head. On the basis of this stock large numbers of the Schwyz-zeboid and Red-zeboid have been obtained, the latter by crossing zebras with the Red Steppe breed. In 1983 purebred zebu numbered 6000 head. Another 1000 head of zebu have been imported from Cuba.

In conformation zebu are rather light and elegant animals. Their most important special characteristic is the hump which is composed of muscular tissue permeated with fat deposits. The hump weighs 5-8 kg and accounts for 2-3% of the total weight of the animal. It is particularly large in males and is somewhat smaller in females although some cows have a pronounced hump. In the Azerbaijan zebu the hump is usually cervico-thoracic, while in the Turkmen zebu it is, thoracic.

The head of Russian zebu is light, with a short forehead. Zebu and zeboids have horns directed upwards. The horn core is 4.8 to 8.9 cm long and 2.9 to 4.3 cm in diameter. Both the Central Asian zeboids and Azerbaijan zebu have slim, upright ears.

Most zebu breeds have a large wrinkled dewlap. Compared with typical humped cattle, Central Asian zeboids have a small dewlap, while in Azerbaijan cattle the dewlap is much larger. The neck is short and deep, with a lot of skin wrinkles; the chest is relatively narrow; the limbs are lean and thin, with well-shaped joints and tendons; the hoofs are high, with solid keratin; the line of the back and loin is even; the rump is elevated; the skin is loose, wrinkled, thick, and intensely pigmented; the hair covering is thick, sparse and glossy; the tail is long and thin.

The zebu skin is hard and tough with a thinner dermal layer and thick epidermis. These traits are characteristic of a tough, rather than thick, hide. Subcutaneous muscles are well developed.

The colour of Central Asian zebu and zeboids ranges from black through red and brown to grey. Some animals are black or red with white markings. The back line may occasionally be white. The Azerbaijani zebu also vary in colour. The prevailing colours are red, black, red-and-white, black-and-white. Less frequent colours are brownish red, reddish, reddish or a brownish with white markings, grey and grey with white markings. Cattle with white markings usually have them on the forehead, limbs, in the groin, and along the back. The switch is also white. Extensive observations show

that the entire progeny of white-backed zebu cows mated to solid colour bulls of improved cattle breeds, inherit their mother's colour. When heterozygous white-backed zebu bulls are mated to purebred cows with solid colour, the white back appears in 54-82% of the offspring.

The udder is poorly developed, rounded in shape and densely covered with hair; the teats are short, thin, and cylindrical.

At maturity, zebu bulls weigh 400-500 kg, cows 230-280 kg, and newborn calves 12-15 kg. The live weight of some breeding bulls at the Snegiri Experimental Farm of the Main Botanical Gardens of the USSR Academy of Sciences, exceeds 550 kg. This figure shows the possibility of increasing the live weight of zebu when proper management and feeding are provided.

Poor feeding leaves zebu almost unaffected: they lose only 8.4% of their usual live weight while other cattle breeds may lose up to 20-25%. During fattening the average daily weight gain ranges from 700 to 900 g.

Zebus and zeboids are not free of conformational defects: they are short-bodied and narrow-chested; the rump is roof-like in shape, sloping and pointed.

Table 2.1 DIMENSIONS OF MATURE ZEBU AND ZEBOID COWS
(centimetres)

	Azerbaijan SSR	Uzbek SSR	Tajik SSR	Turkmen SSR
Height at withers	107.3	114.9	109.6	112.3
Chest depth	54.5	56.5	57.5	57.1
Chest width	28.4	30.3	-	32.7
Body length	119.5	127.1	121.0	121.3
Chest girth	150.0	158.7	147.5	152.1
Cannon bone girth	14.3	15.2	13.3	14.4

Zeboids are small in size and mature late. In the Turkmen SSR the average live weight of cows at maturity is 274.4 kg, with variations from 147 to 404 kg. Adult bulls weigh 277-450 kg. In the Tajik SSR the live weight of local cows is 180-260 kg, and that of breeding bulls is 365-400 kg. Newborn calves weigh 15 kg, and three- and six-month-old calves weigh 43 and 60 kg respectively. Central Asian zeboids, like many other zebu breeds, are not specialized. The average milk yield under the primitive management conditions is 802 kg with a variation from 742 to 882 kg.

The Khorosan variety is very variable. Perhaps, that is why it has survived throughout its 1000-year-long history. The smaller size of animals of this variety is the result of the unsatisfactory rearing of the young. Better feeding and management conditions and a higher level of zootechnical work on state and collective farms have contributed to the improvement of zebu-like cattle, enhancing their development, conformation, and productivity.

The reproductive abilities of zebu are good. Research studies have confirmed that the semen of the Azerbaijan zebu has a high fertilizing ability. In the extreme environmental conditions the fertility rate in zebu herds exceeds 75%. Zebu cows are sexually active for 10-12 years, and bulls are used for 5-6 years.

The Azerbaijan zebu is tolerant not only to heat but cold as well. Its cold tolerance has been proved by the fact that purebred Azerbaijan zebu have long been raised in a cold climate on the Snegiri farm in the Moscow region.

One-eighth of zebu blood is enough to ensure cold tolerance in hybrid animals. For example, zebu-like hybrid cattle, which were obtained by mating Azerbaijan zebu bulls to Black Pied cows, are successfully raised in the Altai area. Their good cold resistance is due to a thick hair covering in winter. It is formed by long thick hair and down, which is similar in terms of fineness to Merino wool. Moreover, in winter zebu develop numerous skin wrinkles that arrest the loss of internal heat.

The Azerbaijan zebu and Central Asian zeboids, like other zebus, have developed a natural immunity to various infectious and blood diseases caused by parasites; they are also tick resistant. Zebu and their hybrids in Azerbaijan have shown high resistance to experimental and natural brucellosis. In terms of numbers infected by brucellosis cattle of improved breeds ranked first, followed by buffalo, zebu hybrids, and, finally, by zebu. Zebu are slow eaters; it takes them almost an hour to consume the forage which other cattle eat in ten minutes. At the Azerbaijan Animal Husbandry and Agricultural Research Institutes it has been shown that zebu and their crosses have a higher digestibility of fibre in high roughage diets than other cattle breeds.

The milk yield of zebu cows is not high - 800-1000 kg per lactation. At the same time zebu are quite responsive to any improvements in feeding and management. The conditions at the Experimental Farm of the Azerbaijan Livestock Breeding Research Institute permit a yield of 1500 kg of milk per head. Zebu milk has a high butterfat content. On average it contains 5.0% of fat and 4.3% of protein. Astara, a champion cow, produced 2053 kg of milk in a 395-day lactation, the fat content being 4.9%.

It should be noted that despite their low milk production zebu provide a useful genetic material for producing hybrids or new breeds. This possible use of zebu is due to their valuable biological potential: they are tolerant to heat and cold, resistant to various diseases, and capable of consuming bulky rations of fibrous plants, cotton waste, etc.

Although zebus and zeboids, particularly the young, have a relatively low live weight, they possess good gaining and fattening abilities and have a high dressing yield and meat/bone ratio. The dressing yield ranges from 55.8 to 62.0%, and the proportion of bone is 15-16%. The daily live weight gain of steers is 900 g, and over 90 days of range fattening they gain 55-60 kg in weight.

Experiments with one- and two-year-old zebu heifers have shown that they utilize nutrients much better than young cattle, though worse than buffalos. To achieve 1 kg of live-weight gain, yearling zebu calves required 6.01 fodder units and 519 g of digestible protein or 0.26 fodder units and 26 g of digestible protein less than cattle calves. Two-year-old zebu heifers correspondingly required 8.91 fodder units and 912 g of digestible protein per kg of weight gain, or 0.94 fodder units and 104 g of digestible protein less than cattle heifers.

Table 2.2 THE COEFFICIENTS OF DIGESTIBILITY OF NUTRIENTS IN YOUNG AND ADULT ZEBUS (%)

Age group	Dry matter	Ash	Protein	Fat	Fibre	Nitrogen-free extract
Yearlings	59.49	37.71	61.44	71.13	60.62	60.32
2-year-olds	63.32	37.61	51.36	85.09	63.32	65.20
Cows	65.46	39.98	59.56	80.53	60.93	72.67

In this country zebu are either purebred (on a limited scale) or crossed with the best foreign breeds, in particular with the Cuban zebu. The aim of such crossing is to increase live weight, improve conformation and earliness of maturity. Purebreeding is widely used in the Azerbaijan SSR where there are stocks of true zebu. The Azerbaijan zebu is bred pure with the aim of obtaining a better conformation, higher live weight and milk production and at the same time maintaining or increasing the butterfat content. The task of purebreeding of the Azerbaijan zebu is to preserve the gene pool of the animals with the following average production figures: milk yield for the third lactation - not less than 1600 kg, butterfat content - 5%, minimum live weight of females - 330-360 kg and of sires - 520-550 kg. Herds of purebred Azerbaijan zebu have been established on Socialist Cuba state farm and on Karl Marx and Aslanov collective farms of Lerik district. Komsomol state farm breeds an intermediate type using Azerbaijan females and Cuban sires. The crossbreds obtained have a high live weight and lack conformation defects.

Hybridization today is aimed at producing specialized types and milk and meat breeds with a high degree of adaptability. Hybridization is carried out in all areas where zebus and zeboids are raised: in the Azerbaijan, Turkmen and Uzbek Republics and in the non-blackearth zone.

The feasibility and prospects of hybridization between the zeboid and improved breeds of cattle like the Swiss Brown is confirmed by the outcome of work which has been carried out in the Uzbek and Turkmen and particularly, in the Tajik Republics. The Schwyz-zeboid hybrids have inherited from the zeboid adaptation to the ecological conditions of the subtropical climate and resistance to infectious and parasitic blood diseases, and from the Swiss Brown, their high productivity.

The animals have an elongated body and a well-developed chest.

Noteworthy is the fact that the hybrid animals inherit the characteristics of the local zeboids: less-developed muscles and a deep chest. The prevailing colour is brown, from light reddish-brown to dark brown.

Under conditions of complete ration feeding the Schwyz-zeboid youngsters mature early. The live weight of new born bull calves is 29.1 kg and that of heifers is 27.5 kg, at six months it is 180.1 and 172.2 kg, and at twelve months 262.2 and 229.1 kg, respectively. The live weight of cows is 455-470 kg and that of bulls 805 kg.

The milk yield of hybrid cows of the desired type noticeably exceeds the standard figures for the Swiss Brown breed raised in the Central Asian republics (Table 2.3). Of particular interest are the figures pertaining to the productivity of hybrid cows of different generations obtained in the process of creating the herds of the Schwyz-zeboid (Table 2.4).

Table 2.3 MILK YIELD OF SCHWYZ-ZEBOID COWS (KG)
(according to data compiled by N.G. Stepanova)

Lactation	Average milk yield (kg)	Range	Swiss Brown standard
First	2595	1875-4210	1950
Second	3114	2263-5049	2400
Third	3760	2512-7200	2700

Table 2.4 MILK PRODUCTION OF VARIOUS HYBRIDS OF SWISS BROWN X ZEBOID
(according to the data of the Tajik Livestock Breeding Institute)

	Crossbred generation				2nd and 3rd crossbred generations bred inter se
	I	II	III	IV	
Milk yield, 2nd lactation, kg	1775	2772	2832	2335	2883
Fat content (%)	3.83	3.93	4.07	3.92	4.06
Live weight, kg	287.9	420.9	455.5	399.9	464.4
Milk yield per 100 kg live weight	590	648	633	572	631

The figures in Table 2.4 show that reproductive crossing is advantageous provided the animals of the second and third crossbred generations (i.e. the 3/4-breds and 7/8-breds) are bred inter se. The reduction of zebu blood to one-sixteenth results in decline in adaptability, lower live weight and poor productivity. One of the characteristics of Schwyz-zeboid cows with a milk yield above 4000 kg is a slower rate of decline in yield during the lactation. Hybrids also have high fertility - more than 90 calves dropped per hundred cows. The interval between calvings averages 358 days. Valuable stocks of the Schwyz-zeboid are raised on the Lenin Collective Farm of the Kumsangir district. Mature cows produce 3310 kg of milk per head, and the milk yield from first-calf heifers is 2613 kg. The milk of hybrid cows has a high content of protein (3.42%) and fat (4% or more).

Two- and three-way crosses of the zebu on other beef breeds have gained recognition as excellent beef cattle. Two-way crosses were obtained on the Kovlyarskoe Experimental Farm of the Azerbaijan Agricultural Institute by crossing the zebu with the Aberdeen-Angus breed. Three-way commercial crosses were obtained on Shaumyan State Farm by crossing the zebu with the Aberdeen-Angus and mating the crosses with the Estonian Black Pied. Calves of Aberdeen-Angus hybrids are small in size which facilitates the calving of zebu females. However they are larger than zebus and weigh 20-22 kg at birth. The live weight of 18-month-old hybrids is 300-390 kg. In conformation hybrids are similar to the Aberdeen-Angus. The head is short and broad in the forehead and without horns. The body is compact and legs are short. The colour is black.

The carcass weight of 18-month-old two-way hybrids is 85 kg more, and that of three-way crosses is 138 kg more, than that of the purebred

Azerbaijani zebu. The difference in the dressing yield is 6.3 and 9.4%, respectively.

Hybridization increases the weight of raw hides, which, from the age of 18 months, fall into the heavy bull category.

The carcasses of 18-month-old first crosses are characterized by higher yields of muscle (72.0%) and lower yields of intermuscular fat (6.5%) and bone (18.3%). Meat quantity is 4.3 kg of meat per kg of bones. The quality of beef is quite satisfactory: the yield of first-grade meat is 65.3%. In terms of its chemical composition the meat of hybrids is better than the meat of the Azerbaijan zebu; it contains more protein and less fat. Unlike zebu meat that of the hybrids is rich, juicy, and tender.

The efforts of scientists and farmers are aimed at ensuring the preservation and improvement of zebras and zeboids and expanding the use of these cattle whose biological and commercial potential is currently underutilized.

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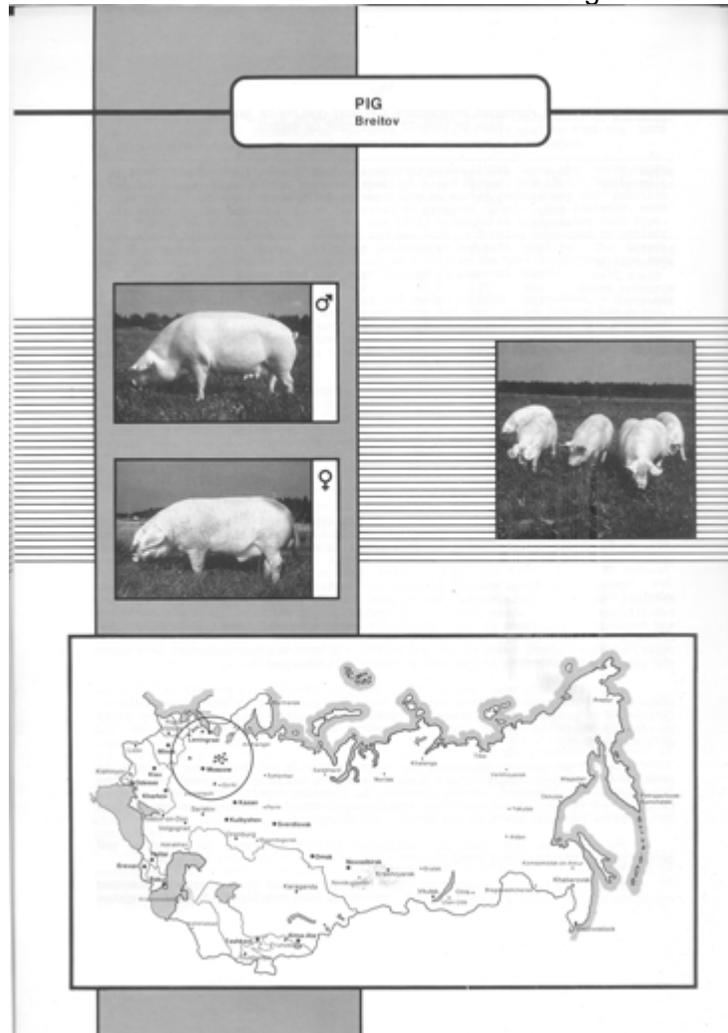
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3. PIGS

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In the USSR there are 32 breeds, breed groups and types of pigs (see Table 3.1). The number includes 22 breeds that have been developed since the beginning of the Soviet era or subjected to continuous acclimatization to become adapted to the conditions in the areas of their breeding. These 22 breeds account for 29 million out of the 73 million in the Soviet Union. The rest are foreign breeds and 2- or 3-breed crosses. Development of such a large number of breeds is justified by the diversity of natural and climatic zones in the country as well as by the need to have several contrasting breeds in each region for commercial crossbreeding.

Table 3.1 PIG NUMBERS ON 1 JANUARY 1980
(in thousands)

Breed or Breed Group	Total	Purebreds
Large White	25 554.3	17 905.9
Lithuanian White	1 055.4	981.6
Ukrainian White Steppe	636.3	524.2
Latvian White	501.5	279.5
Estonian Bacon	198.2	122.8
North Caucasian	195.0	113.6
Mirgorod	186.1	136.8
Urzhum	107.3	39.9
Byelorussian Black Pied	102.1	63.7
Semirechensk	67.0	43.0
Breitov	65.8	24.9
Livny	59.6	27.2
North Siberian	58.7	24.5
Kemerovo	53.2	23.5
Tsivilsk	35.6	35.6
Murom	16.9	12.0
Aksai Black Pied	11.0	5.0
Ukrainian Spotted Steppe	7.1	5.8
Siberian Black Pied	5.3	2.3
Mangalitsa	5.0	0.7
Kakhetian	1.2	0.7
Forest Mountain	0.6	0.6

Formation of breeds began in the second half of the 19th century. It continued on a large scale through the 1930s to the 1950s and is still continuing. The technique employed in developing the country's breeds was based on the following typical method: crossing of native animals distinguished by such assets as fitness, adaptation to the local climate, strong constitution and disease resistance, with highly-productive improved European breeds, and consolidation of the valuable progeny through selection over several generations.

All the national breeds have a "strong constitution". This term covers a number of qualities indicating an animal's good health and high productivity: well-developed bones, strong legs and hoofs, good hair coat, elastic and smooth skin. Strong constitution is closely associated with high productivity (reproductive ability in particular) and is an essential requirement in the improvement of existing breeds of pigs and the formation of new ones. It is in this quality that the USSR pig breeds differ from a number of foreign breeds, Landrace for instance.

According to the instruction manual on evaluation (1976) there are three types of pig breeds, namely, general-purpose, meat (pork and bacon), and lard. The breed's type is decided during its development according to market requirement and position of the breed in the breeding system (maternal or paternal line). For instance, most of the breeds developed in

the 1940s and the 1950s belonged to the extreme lard type. Today, the old breeds are being improved and new ones are being developed to satisfy such economic needs as better fattening performance and meat quality. The breeds used in breeding systems as maternal belong as a rule to the general-purpose type and show excellent prolificacy. The meat type is used in paternal lines.

When a certain level of productivity and number of head is reached, a group of animals becomes established first as a breed group and then as an independent breed. To establish a breed group at least 3000 breeding sows and 300 boars are required with not less than 3 breeding lines and 6 families; for a breed 5000 sows, 500 boars, 6 lines and 12 families are needed. Each line should be composed of at least two branches.

Formation of breeds is a continuous process. The most productive and best adapted to the local conditions replace the inferior breeds whose numbers at first gradually decline and then they disappear altogether. Improvement of progressive breeds on the basis of intra-breed selection and infusion of blood and crossbreeding produces new regional types which may later be transformed into breed groups and breeds. Three new crossbred meat types have recently been recognized - Don (Donskoi), Kemerovo and Poltava. (This Kemerovo type must not be confused with the Kemerovo breed described later).

The following 14 breed groups disappeared during the last two decades: Alabuzin, Chausky, Dnieper, Dobrinka, Pridonskaya, Ilevlev, Kalikin, Krolevets, Meshchevsk, Moldavian Black, Omsk Grey, Podolian, Rossosh, Slutsk Black Spotted. On the one hand this is a legitimate process as it involves the expansion of the breeding area of more productive breeds. On the other hand, preservation of the declining breeds is an important problem, because they possess such assets as natural adaptation, resistance to stress, high quality of meat, low protein requirement and many others which tend to be lost as the productivity of the progressive breeds increases.

Preservation of rare or declining breeds is carried out at special farms and centres for protection of the germ plasm of individual breeds. Deep freezing storage of boar semen in specially built centres will be carried out when techniques are perfected.

Improvement of purebreds is conducted at 93 breeding centres (plemzavods), 150 breeding state farms (plemkhoz) and 1257 breeding farms (plemferma). Plemzavods are the leading breeding establishments. They carry out research into techniques of improvement and formation of new lines. Animal breeding is their main activity and the level of production is higher than in other farms. In the plemkhoz the level of breeding and production is a little lower. Pig breeding is not always the major activity on these farms. Plemfermas are mainly involved in line crossing rather than in pure breeding. Plemkhozes and plemfermas in their breeding programmes are daughter establishments of leading plemkhozes. Plemzavods are controlled by the ministries of agriculture of the Union or of the Republics; plemfermas are controlled by the region.

Progeny and performance tests of all breeding animals are carried out annually according to the central directive on evaluation. The best animals (1200 boars and 12 000-14 000 sows) are entered into state herdbooks by

breeds. The State Test of breeds is conducted once every 10 years (see Table 3.2).

Table 3.2 FATTENING PERFORMANCE AND MEAT QUALITY OF BREEDS.

DATA OF 1976-77 STATE TEST OF BREEDS

Breed or breed group	Days to reach 100 kg body weight	Average daily gain g	Feed/kg gain fodder units	Carcass length cm	Fat thickness at 6-7th rib mm	Eye-muscle area cm ²	Ham kg	Meat in carcass %
Breitov	217	659	4.03	92	38	26.7	10.2	55.2
Byelorussian Black Pied	182	748	3.92	93	37	25.7	10.2	56.1
Estonian Bacon	188	713	3.86	99	26	31.3	10.7	58.8
Kemerovo	193	730	3.90	89	33	28.8	10.3	58.9
Large White	192	725	3.91	94	32	28.2	10.5	57.8
Latvian White	194	656	4.01	94	33	29.0	10.5	55.0
Lithuanian White	190	683	4.04	95	32	30.5	10.5	54.5
Livny	190	785	3.80	92	41	23.9	10.6	52.5
Mirgorod	197	669	4.07	94	32	26.7	10.0	54.9
Murom	204	727	3.92	91	36	26.4	10.4	57.1
North Caucasian	185	678	3.97	92	38	27.5	10.1	55.5
North Siberian	200	716	4.01	90	37	28.3	10.4	53.3
Semirechensk	198	689	4.01	91	34	28.6	10.6	59.8
Tsivilsk	221	697	3.93	93	35	26.9	10.4	54.5
Ukrainian White Steppe	209	655	4.16	92	35	27.5	10.6	53.5
Urzhum	200	679	3.98	92	33	26.9	10.1	57.5

A census of all breeds is conducted at all types of farm every five years. A State Inspection of pig breeding farms is carried out at a similar interval. Breed councils have been established which make decisions on the selection policy for each breed, region and breeding herd. There is an annual central exhibition (located at the Permanent Exhibition of National Economic Achievements in Moscow), as well as Republic and regional exhibitions and shows where champions are declared. In addition there are All-Union and Republic competitions at which prizes are awarded to best farms, institutions and breeders. Prizes and certificates are issued to breeders of new highly-productive types, breeding lines, breed groups and breeds. Selection accomplishments are given the same legal protection as patented products or techniques. About 4500-4800 boars and 15 000-18 000 sows annually are progeny tested at 62 state control and test stations and 117 centres for testing fattening performance. Catalogues of progeny-tested boars are published annually. On the breeding farms backfat thickness of young stock is measured ultrasonically as a part of the performance test. Overall guidance on improving the existing breeds and developing new ones is provided by the State, Republic and Zonal Centres for breeding and

genetics. On the local scene these activities are directed by breeding experts of breeding farms, personnel of the region, district and interregional breeding directorates as well as of the State breeding stations (in Estonia and Georgia).

The research and academic institutes provide guidance on breeding and participate directly in pig breeding.

Much attention is devoted to the rational use of the country's breeding resources in commercial pig production. There has been developed a balanced system in the USSR of vertical integration of breeding and reproduction farms on the pyramid principle depending on the selection goals and breeding level. There have been established 15 Republic, 112 region and territory successful pig breeding systems based on two- and three-breed crossing.

In this monograph the breeds are described in the following order:

GENERAL-PURPOSE BREEDS

Breitov

Byelorussian Black Pied

Kemerovo

Large White

Latvian White

Lithuanian White

Livny

Murom

North Caucasian

North Siberian

Semirechensk

Ukrainian White Steppe

MEAT-TYPE BREEDS

Estonian Bacon

Urzhum

LARD-TYPE BREEDS

Mangalitsa

Mirgorod

Ukrainian Spotted Steppe

BREED GROUPS (general-purpose)

Aksai Black Pied

Forest Mountain

Kakhetian

Siberian Black Pied

Tsivilsk

GENERAL-PURPOSE BREEDS

BREITOV (Breitovskaya)

The breed was developed by crossbreeding in collective farms of the Yaroslavl region under the guidance of V.M. Fedorinov, Director of the Breitov State Breeding Station and G.F. Makhonina, Expert Breeder of the station.

Prior to the 1917 Revolution the local landowners imported the Large White and Middle White from Great Britain and the Danish Landrace from Denmark as well as improved lop-eared pigs from Latvia and Lithuania and Polesian pigs from Byelorussia. Interbreeding of the imported breeds and crossing with the native animals produced a large population of improved crosses.

A great role in the development of the Breitov was played by V.M. Fedorinov's system of dividing the population into 16 unrelated groups. The subsequent crossing of these groups allowed the concentration, within a short time, of inherited qualities without inbreeding.

During the development of the breed the emphasis was on the extensive use of locally available feeds: potatoes, root crops, green-cut clover, clover seed bran and flax chaff, by-products of butter and cheese factories, with only a small amount of fodder grain.

The Breitov was accorded official recognition in 1948. At the outset it was primarily a lard type, but as the consumer demand for lean pork increased the Breitov has been bred for improved meat qualities. At present, the breed is classified as general-purpose.

The total number of head was 216 000 in 1960, 62 000 in 1964 and 48 000 in 1969. As of 1 January 1980 the Breitov numbered 65 800 including 29 400 purebreds of which 1100 were breeding boars, 4500 breeding sows and 2400 on test.

The breed has a medium-sized, wide head with a dished face, large drooping ears, wide and deep chest, wide back and loin, hard and sometimes wrinkled skin and dense bristles. The colour is white; some animals may have coloured spots on the body.

In 1983 evaluation of animals at breeding farms produced the following data: live weight of 36-month-old boars - 297 kg, sow live weight - 236 kg, boar body length - 177 cm, sow body length - 161 cm, litter size - 10.5, weight of one-month-old litter - 51 kg, weight of two-month-old litter - 157 kg. The test results of the breed's fattening performance were as follows: time to reach 100 kg live weight - 208 days, feed/kg gain - 3.98 fodder units, backfat thickness - 31 mm, length of carcass - 93 cm, ham weight - 10.3 kg. In 1983 the breed's champion was the boar Talisman 55 owned by Gorodishche breeding state farm of Pskov region. Its results were as follows: average daily gain - 724 g, feed/kg gain - 3.82 fodder units, length of carcass - 96 cm, backfat thickness - 28 mm.

The Breitov meat is distinguished by bright colour, excellent marbling and high protein quality index (ratio of tryptophan to hydroxyproline). While for all breeds the index averages 8.04, and in the Large White it is 8.06, for the Breitov its value is 8.60.

Sows farrow twice a year and may remain prolific until the age of 5-6 years old.

The renowned assets of the Breitovskaya are its hardiness, good adaptability to the climate in the northwest of the Russian Republic, ability to consume bulky feeds in large quantities and to gain rapidly on low-concentrate feeding as well as excellent dietary qualities and palatability of the meat.

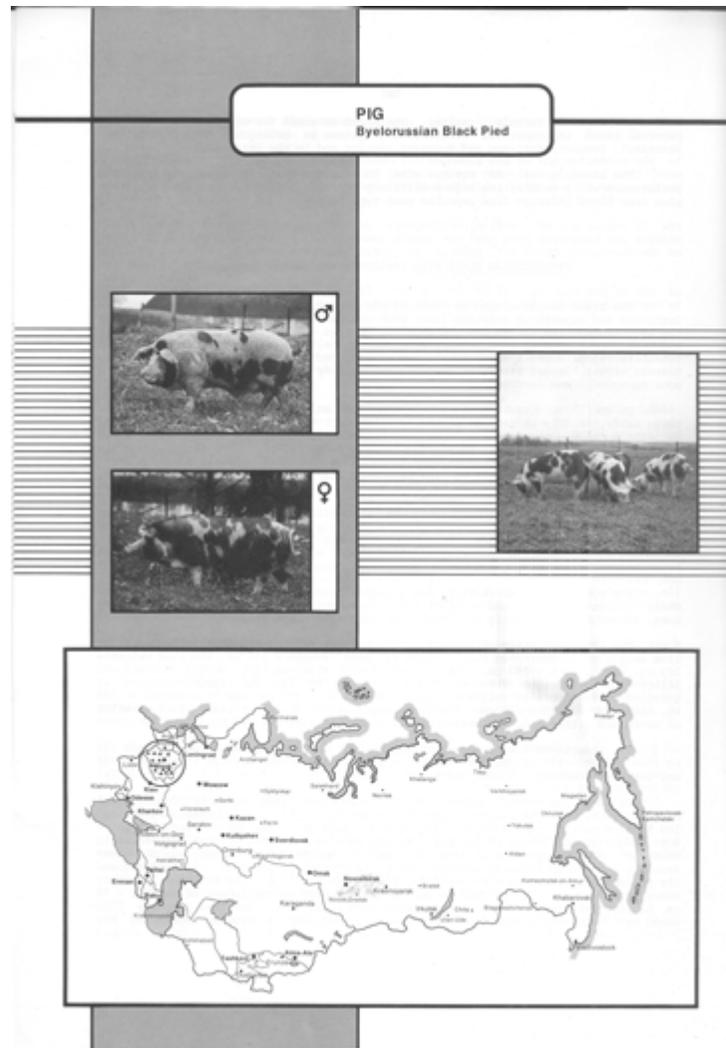
Crossing the Breitov with other breeds produces good results. For example, the offspring of Large White sows and Breitov boars gave the following results: litter size - 12.2, weight of the newborn - 1.48 kg, weight of one-month-old litter - 58 kg, live weight of 60-day-old piglet - 23.3 kg, time to reach 100 kg live weight during the performance test - 173 days, average daily gain - 811 g, feed/kg gain - 3.85 fodder units.

As the Breitov breed cannot compete with the Large White in litter size and the weight of month-old litter nor with the Landrace in meat quality its expansion has slowed down.

The breed consists of 16 boar lines and 24 sow families.

Purebred animals are raised at 3 breeding state farms (Druzhba in Leningrad region, Gorodishche in Pskov region, Drozdovski in Smolensk region) and at 7 breeding collective farms in Yaroslavl region. The breed is zoned for use as a maternal and paternal breed in commercial crossbreeding systems in Leningrad, Pskov, Smolensk, Yaroslavl, Ivanovo, Kostroma and Murmansk regions and in the Tatar ASSR.

The breeding of the Breitov aims to improve meat quality and fattening performance while maintaining high prolificacy and milk production through selection plus some blood infusion from imported meat-type breeds.



BYELORUSSIAN BLACK PIED (Belorusskaya chernopestraya)

The breed was developed by staff of the Byelorussian Animal Breeding Research Institute and experts of breeding farms with the participation of N.M. Zamyatin. In the 19th century the native lop and short-eared pigs were interbred and crossed with imported breeds such as the Yorkshire, Middle White, Tamworth and Large Black. The crossbreeding produced a large population of improved native animals distinguished by greater height, larger litter size, earlier maturity and an ability to thrive with poor management and feeding.

In the 1920s crossbreeding of the improved native Byelorussian breed with the Large White, Middle White and Berkshire continued. The genetic influence of the Estonian Bacon and the (Swedish) Landrace has contributed to the Byelorussian Black Pied.

Selection on the basis of the main economic characteristics, ruggedness of constitution and vitality was intensively carried out in the process of development.

Classified as general-purpose it was recognized as a breed group in 1957 and as a breed in 1976. The number of head has varied as follows: 74 000 in 1964; 46 000 in 1969 and 73 000 in 1974. By the early 1980s the total number reached 102 000

including 63 700 purebred animals, of which 5 800 were breeding boars, 1 000 boars being tested, 7 300 breeding sows and 5 500 sows being tested. The Byelorussian Black Pied has a light head, straight face, and medium lop ears. It has good depth and width of body, straight and wide back, moderately plump hams, straight and correctly set legs. The colour is black pied.

The 1983 evaluation of animals at breeding farms produced the following data; live weight of 36-month-old boars - 298 kg, body length - 176 cm, sow live weight - 243 kg, body length - 163 cm. The average litter size was 10.1, weight of month-old litter - 50 kg, weight of two-month-old litter - 160 kg.

The figures obtained at breeding centres were as follows: boar live weight - 303 kg, sow live weight - 246 kg, boar body length - 176 cm, sow body length - 163 cm, litter size - 10.5, weight of month-old litter - 52 kg, weight of two-month-old litter - 167 kg.

The results of the breed's performance test are as follows: time to reach 100 kg live weight - 194 days, feed/kg gain - 3.64 fodder units, backfat thickness - 31 mm, length of carcass - 95 cm, ham weight - 10.6 kg.

In 1983 the record holder was the boar Maket 1463 owned by Goncharovski breeding centre of Lyakhovichski district in Brest region. Its descendants gained 100 kg live weight in 194 days; the average daily gain was 728 g, feed/kg gain - 3.44 fodder units, length of carcass - 96 cm, backfat thickness at the 5-6th thoracic vertebra - 30 mm, eye-muscle area - 27 cm².

Another record holder was the boar Zarechny I owned by Zhgunski breeding centre of Dobrushski district in Gomel region. Its progeny gave the following results: time to gain 100 kg live weight - 183 days, average daily gain - 718 g, feed/kg gain - 3.58 fodder units, length of carcass - 94 cm, backfat thickness - 30 mm, eye-muscle area - 29 cm². The boar Zarechny 7763 owned by Voronovski state farm of Voronovski district in Grodno region had the following progeny performance: 192 days, 744 g, 3.28 fodder units, 96 cm, 36 mm and 29 cm² respectively.

The Byelorussian Black Pied is distinguished by high resistance to disease and to stress.

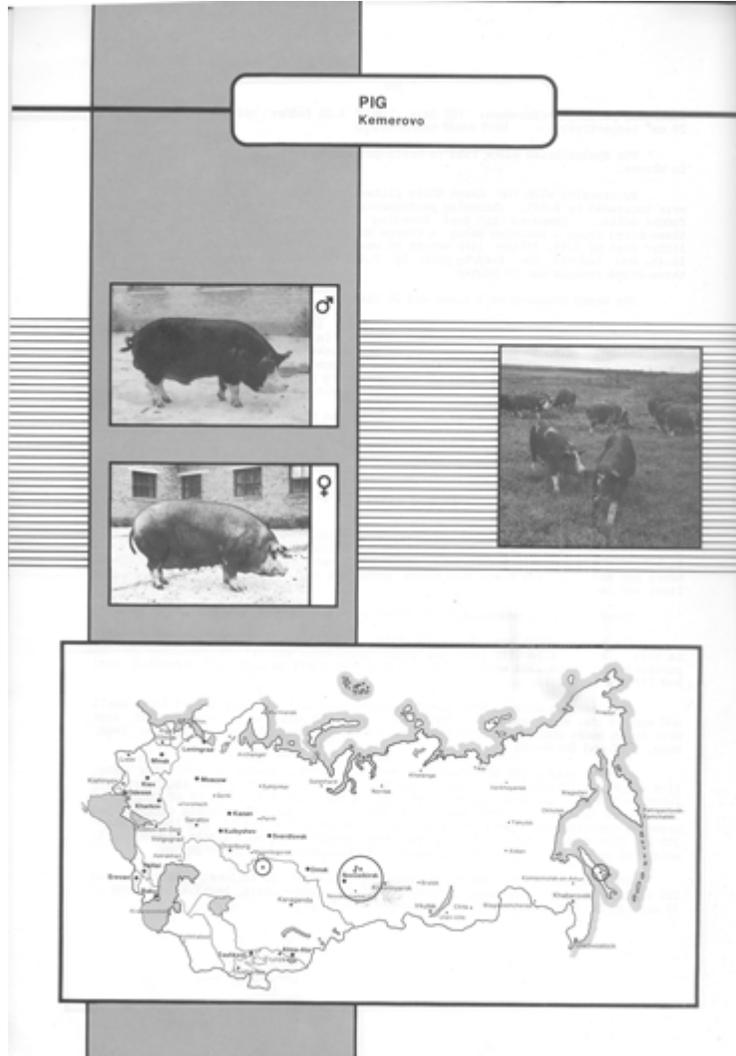
By crossing with the Large White litter size and weight of month-old litter were increased by 8-10%, fattening performance by 2-5% and feed/kg gain by 0.2-0.3 fodder units. Compared to pure breeding of the Byelorussian Black Pied the three-breed cross - Estonian Bacon x (Large White x Byelorussian Pied) - increased litter size by 9.9%, litter live weight at weaning by 17% and average daily gain by 10.4%, and reduced the feed/kg gain by 7.4%. The average meat yield in the three-breed crosses was 2% higher.

The breed consists of 9 lines and 26 families.

At present the Byelorussian Black Pied is improved and bred at 4 breeding centres (Goncharovski in Brest region, Zhgunski in Gomel region, Dzerzhinski in Minsk region, Lenino in Mogilev region), at Voronovski state breeding farm in Grodno region and at 9 breeding farms. The breed is zoned for raising in all parts of Byelorussia and accounts for 0.3% of the

total pig population. In addition it is used as a maternal and paternal breed in crossbreeding systems.

The further improvement of the Byelorussian Black Pied is directed towards increasing litter size, quality of meat and adaptability to the conditions of commercial pig units.



KEMEROVO (Kemerovskaya)

The breed was developed in Kemerovo region under the guidance of A.I. Ovsyannikov and I.I. Gudilina by crossing native Siberian sows with Large White and Berkshire and to a lesser extent with Large Black boars. Blood of the North Siberian

breed and the Siberian Black Pied breed group was later introduced to create some lines and families.

Classified as a general-purpose breed it was officially recognized in 1961. The total number was 133 000 in 1960, 70 000 in 1964, 39 000 in 1969, 58 000 in 1974. As of 1 January 1980 the total population was 53 200 including 23 500 purebreds, of which 2300 were breeding boars, 500 boars on test, 2800 breeding sows and 2700 sows on test.

The Kemerovo animals have a medium-sized head with slightly dished face, small and erect ears, wide and medium-long body, wide and deep chest, correctly-set legs with tough hoofs and dense bristles. The colour is black with small spots on legs, body, tail and forehead.

In 1983 evaluation of animals at breeding farms produced the following data: live weight of 36-month-old boars - 326 kg, sow live weight - 240 kg, boar body length - 176 cm, sow body length - 159 cm, litter size - 9.7, weight of month-old litter - 53 kg, weight of two-month-old litter - 175 kg.

The results obtained at breeding centres were somewhat higher: boar live weight - 338 kg, sow live weight - 255 kg, boar body length - 180 cm, sow body length - 160 cm, litter size - 10.5, weight of month-old litter - 61 kg, weight of two-month-old litter - 205 kg.

The results of the breed's performance test were as follows: time to reach 100 kg live weight - 185 days, feed/kg gain - 4.0 fodder units, backfat thickness - 30 mm, length of carcass - 94 cm, ham weight - 9.7 kg.

In 1983 the breed's champion was the boar Zhemchug 429 owned by Yurginski breeding centre. Its live weight was 352 kg and body length 190 cm. Its progeny gave the following results: time to gain 100 kg live weight - 190 days, average daily gain - 729 g, feed/kg gain - 3.99 fodder units, backfat thickness - 27 mm. In 1984 the breed's champion was the sow Primernaya 590 owned by the same breeding centre. Its results were: litter size 13.0 head, live weight of one-month litter - 63 kg, weight of two-month-litter - 216 kg.

The breed consists of 12 boar lines and 16 sow families.

The Kemerovo breed is improved at Yurginski leading breeding centre, and Chkalov breeding state farm in Kemerovo region, and at breeding farms in Kustanai region and in Sakhalin.

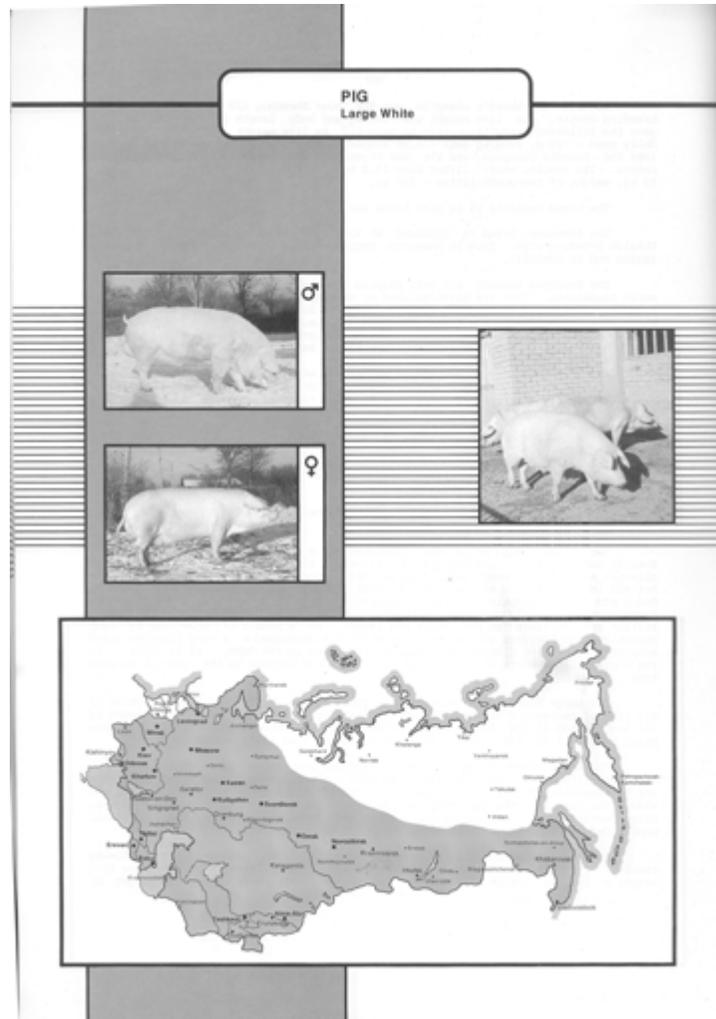
The Kemerovo animals are well adapted to the severe climate of Siberia and north Kazakhstan. They are distinguished by hardiness and remarkable vitality. The breed is widely used in crossing with the standard Siberian breeds such as the Large

White, North Siberian Landrace and the Siberian Black Pied. The breed is zoned for raising in Kemerovo, Omsk, Chita and Sakhalin regions, in Krasnoyarsk territory, in the Tuva ASSR and in Kustanai region of the Kazakh Republic.

Part of the Kemerovo population was mated with the Landrace to improve meat quality. As a result there was developed and accorded official recognition in 1978 a new meat-type of the Kemerovo breed (KM-1). The type is employed in developing a

Siberian regional type of a new meat breed.

The breeding of the Kemerovo is directed at improving prolificacy, meat quality and strength of bone.



LARGE WHITE (Krupnaya belaya)

The Soviet Large white was developed as a result of many years' work by Russian and Soviet breeding experts to acclimatize the English Large White in varying climatic and feeding conditions. Large White pigs were first imported from the Britain in the 1880s. At the time the best pig breeding farms were owned by A.F. Budna and M.M. Shchepkin. Crossbreeding local pigs with the English Large White boars generated highly productive crosses. Later Large White pigs were imported from Britain several times in the 1920s and 1960s. As a result of selection by many scientists and breeders the Soviet Large White was developed - a very flexible breed adaptable to varying climatic and natural conditions in the USSR. It is superior to the English Large White in many respects. The breed belongs to the general-purpose type.

The Large White is the most popular breed in the USSR accounting for 86.5% of all pigs of recognized breeds. During the last two decades its numbers increased by 42% and reached 25 554 000 in 1980, including 370 600 breeding boars, 56 800 boars being tested, 2 382 000 breeding sows and 1 639 000 sows being tested.

The Large White breed has a high productivity; sows are good mothers with high prolificacy, it has a medium-sized head with slightly dished face. The ears are intermediate in size, thin, elastic, tilted forward and erect. Chest is deep and wide. The back is straight and wide. Hams are plump extending down to the hocks. Other features are: well-developed, strong and correctly set legs; hard, elastic non-folded skin; dense but thin bristles. Its colour is white.

In 1983 evaluation of animals on breeding farms produced the following results: live weight of 36-month-old boars - 298 kg, body length - 179 cm; sow live weight - 235 kg, length - 163 cm. The average litter size was 10.3, weight of month-old litter - 53 kg, weight of two-month-old litter - 165 kg. The figures obtained at breeding centres were somewhat higher: boar live weight - 322 kg, sow live weight - 233 kg, boar body length - 183 cm, sow body length - 163 cm, litter size - 11.2, weight of month-old litter - 58 kg, weight of two-month-old litter - 192 kg.

The results of the breed's performance test are as follows: time to reach 100 kg live weight - 205 days, feed/kg gain - 4.03 fodder units, backfat thickness - 30 mm, length of carcass - 95 cm, ham weight - 10.5 kg.

In 1984 the breed's champion was the boar Sulzh 239 owned by Krekshino breeding state farm in Moscow region. It gave the following results: live weight - 364 kg, body length - 196 cm; progeny test: time to gain 100 kg live weight - 189 days, feed/kg gain 3.85 fodder units, backfat thickness - 28 mm, ham weight - 10.7 kg.

In the same year the champion in the reproductive and fattening test was the sow Yasochka 59280 owned by Primalkinski breeding centre in the Kabardino-Balkar Autonomous Republic. It gave the following results: litter size - 13.5, weight of one-month-old litter - 61 kg, weight of two-month-old litter - 216 kg, time to gain 100 kg weight during the fattening performance test - 186 days, feed/kg gain - 3.59 fodder units, backfat thickness - 29 mm, length of carcass - 95 cm.

The Large White surpasses other breeds in such qualities as high and lasting prolificacy and the ability to adapt itself in any climatic conditions. Sows are renowned mothers.

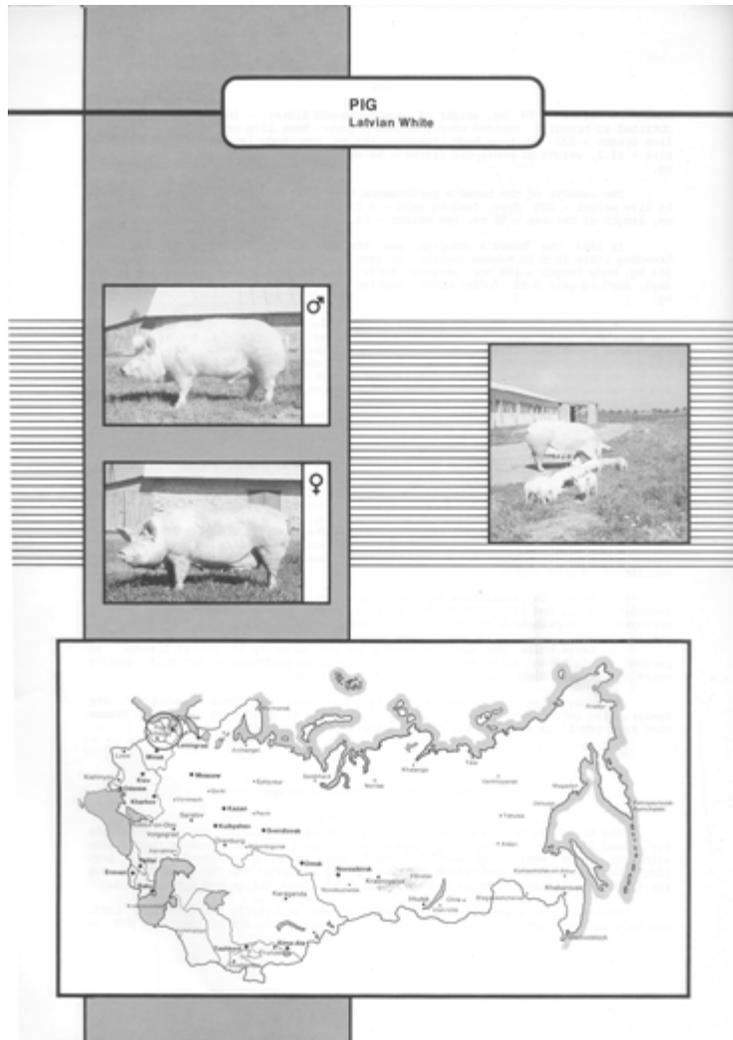
The breed consists of over 100 lines and of a large number of sow families. The breed is divided into 17 separate populations, each bred in a particular group of farms consisting of a leader breeding centre and 3-5 branch farms with a single breeding programme. The Large White is being improved at 55 breeding centres, 72 breeding state farms and 888 breeding farms. The leading farms are Nikonovskoe, Bolshoe Alekseeskoe, Konstantinovo and Achkasovo breeding centres in Moscow region, Ventsy-Zaria in Krasnodar territory, Velikaya Buromka in Cherkassy region and Vasilievka in Sumy region.

The breed is classified for raising in all parts and zones of the USSR excluding Latvia and Lithuania which have their own white breeds (see below). It is employed as the principal maternal line in many breeding systems.

The Large White was used in developing the majority of Soviet breeds. At present it is being selected for improved fattening performance and meat quality while maintaining high prolificacy and good constitution.

Recently three highly productive regional types have been developed. The Byelorussian intra-breed type (BKB-1) was officially recognized in 1975, the

Moscow meat type (MM-1) in 1981 and the Estonian intra-breed type (EKB-1) in 1982.



LATVIAN WHITE (Latviiskaya belaya)

The breed was developed under the direction of the Latvian Research Institute for Animal Breeding and Veterinary Science on the basis of crossbreeding native pigs with the Large White and partially with the German short-eared white pigs (Edelschwein) in Kurzem and Vidzem state breeding stations. As the Large White was the improver, the Latvian White has a similar type, constitution and conformation.

Classified as a general-purpose breed it was officially recognized in 1967. The Latvian White population has increased as follows: 167 000 in 1964, 216 000 in 1969 and 380 000 in 1974. By 1980 the number of head was 501 000 including 279 500 purebred animals of which 4500 were breeding boars, 600 boars on test, 43 500 breeding sows and 41 000 sows on test. In 1983 evaluation of animals at breeding farms gave the following results: live weight of 36-month-old boars - 321 kg, body length - 179 cm; sow live weight - 251 kg, body length 166 cm, average litter size - 10.4, weight of month-old litter - 53 kg, weight of two-month-old litter - 173 kg. The results obtained at breeding centres were as follows: boar live weight - 314 kg,

body length - 190 cm, sow live weight - 253 kg, body length - 166 cm, litter size - 10.6, weight of month-old litter - 54 kg, weight of two-month-old litter - 176 kg.

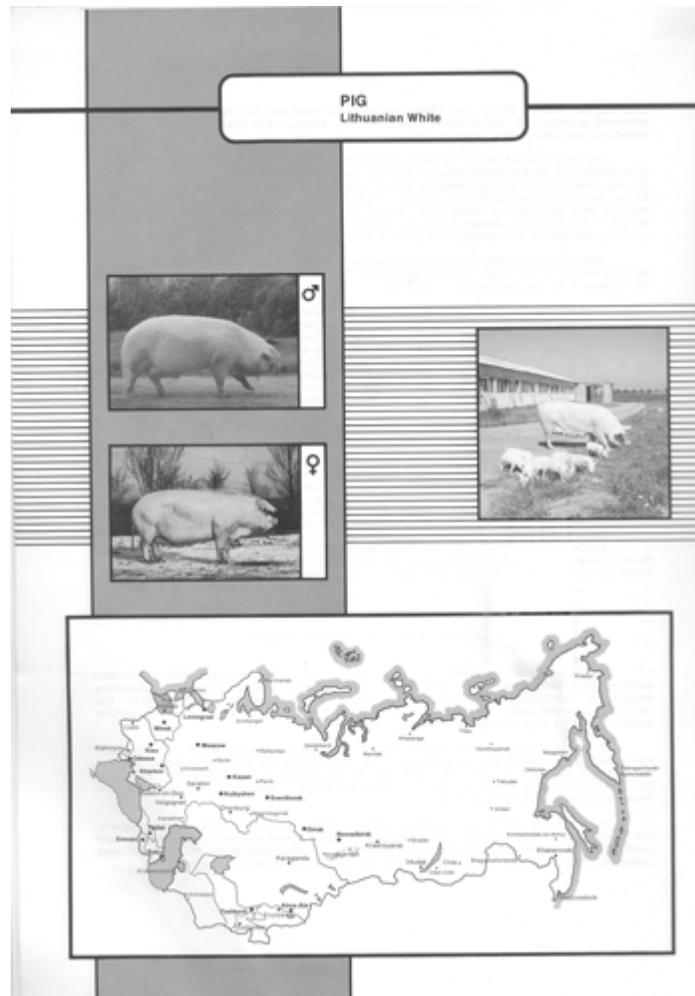
The results of the breed's performance test were as follows: time to gain 100 kg live weight - 192 days, feed/kg gain 3.61 fodder units, fat depth - 28 mm, length of carcass - 96 cm, ham weight - 10.4 kg.

In 1983 the breed's champion was the sow Austra 1650 owned by Kirov collective farm in Latvia which gave outstanding results in growth and prolificacy: live weight - 340 kg, body length - 186 cm, litter size - 13.0 head, weight of one-month-old litter - 57 kg. Another record was made by the sow Garena 2784 bred at Zemgale collective farm in Lithuania. Its results were - live weight - 265 kg, body length - 168 cm, litter size - 12.5 head, weight of one-month-old litter - 54.5 kg, weight of two-month old litter - 221 kg, time for her offspring to gain 100 kg live weight on test - 177 days, average daily gain - 925 g, feed/kg gain - 3.19 fodder units, backfat thickness - 26 mm. The breed consists of 9 basic lines and 16 families.

The Latvian White is being improved at 12 breeding centres, 16 breeding state farms and 6 breeding farms. The leading breeding centres are: Sigulda experimental farm of the Latvian Animal Husbandry and Veterinary Research Institute in Riga

district, Vetsautse experimental and training farm in Dobelski district, Karl Marx collective farm in Ekabpilsski district, Briviba collective farm in Liepaya district and Valle collective farm in Stuchka district, all in Latvia.

Accounting for 95.8% of the total purebred population in Latvia the Latvian White ranks as the main planned breed in the Republic. It is employed as a maternal breed in crossbreeding systems and raised in all parts of Latvia.



LITHUANIAN WHITE (Litovskaya belaya)

The breed was developed by crossing native pigs with Large White, German short-eared (Edelschwein) and German lop-eared (German Landrace) boars by breeding experts of Sheduvski, Ukmergski and Shakyaski State breeding stations with the participation and under the guidance of the scientific personnel of the Lithuanian Animal Breeding Research Institute.

Classified as a general-purpose breed it was recognized in 1967. In numbers the breed is second to the Large White; its population was 377 000 in 1964, 508 000 in 1969 and 946 000 in 1974. By 1980 the total population was 1 055 400 including 981 600 purebreds of which 11 000 were breeding boars, 3300 boars on test, 70 300 breeding sows and 103 800 on test.

As the Large White has greatly influenced the Lithuanian White's development the breed is similar to the Large White in type, constitution, conformation and productivity. However, certain faults occur in individual animals such as weak pasterns, depression behind the shoulders and insufficient hair covering.

The 1983 evaluation of animals gave the following results: live weight of 36-month-old boars - 313 kg, body length - 182 cm, sow live weight - 248 kg, body length - 167 cm, litter size - 10.8, weight of month-old litter - 55 kg, weight of two-month-old litter - 170 kg.

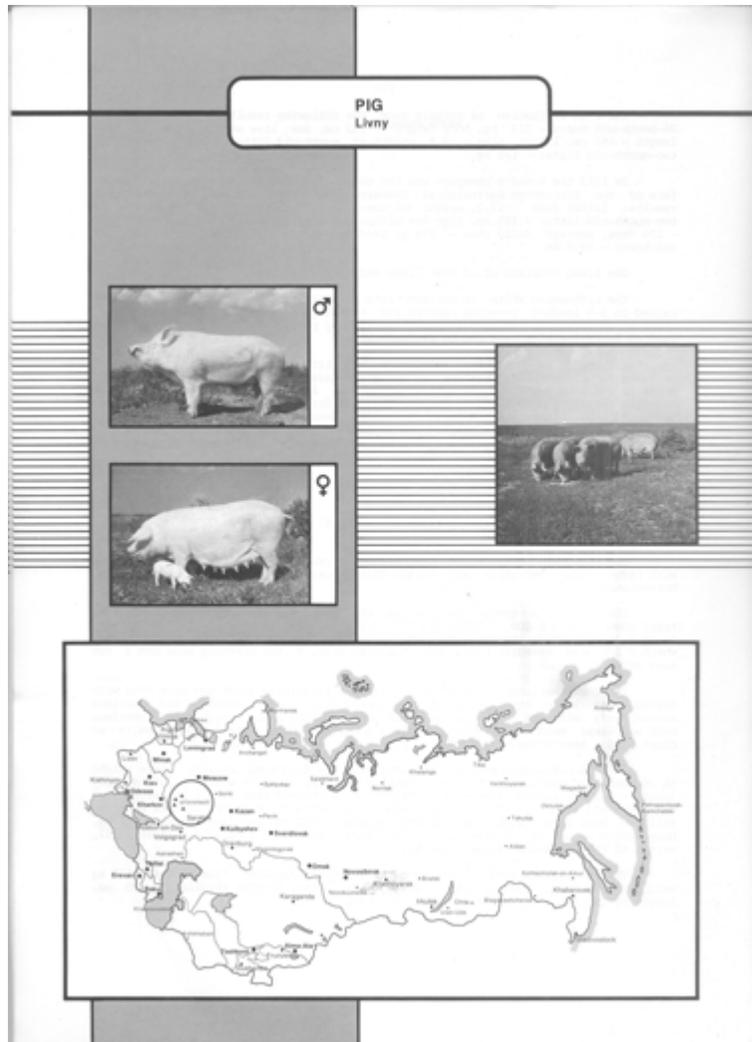
In 1983 the breed's champion was the sow Smilga 3350 owned by the experimental farm of the Lithuanian Agricultural Research institute. It gave the following results: litter size - 12.0, weight of one-month-old litter - 70.4 kg, weight of two-month-old litter - 185 kg, time for offspring to gain 100 kg live weight on test - 174 days, average daily gain - 774 g, feed/kg gain - 3.75 fodder units, backfat thickness - 24.6 mm.

The breed consists of 12 boar lines and 29 sow families.

The Lithuanian White is divided into five separate populations, each being raised in 3-5 leading breeding centres and breeding farms and 12 subsidiary farms. Three of the five populations are being improved by pure breeding, one by infusion of Swedish Yorkshire blood and one by Landrace blood.

The breed is zoned for raising in the Lithuanian Republic. It is also employed in crossbreeding systems in Georgia, Kazakhstan, Turkmenia, Byelorussia, Moldavia and some parts of the Russian Republic.

Improvement is carried out at 30 breeding centres and 88 breeding farms. The main farms include Baisogal experimental farm of the Lithuanian Animal Husbandry Research Institute and Draugas, Chernyakhovski, Grizhuva, Zhemaite and Kapsukas collective farms. Selection is directed towards improved quality of meat and fattening performance, and against faults in the conformation.



LIVNY (Livenskaya)

The breed was developed in Orel region by crossing the native lop-eared pigs with Large White, Berkshire and Poland China boars under the direction of N.N. Korovetskaya.

Classified as a general-purpose type the breed was recognized in 1949. The total number was 476 000 in 1960, 125 000 in 1964, 75 000 in 1969 and 83 000 in 1974. As of 1 January 1980 its total population was 59 600 including 27 200 purebreds, of which 2 200 were breeding boars, 500 boars on test, 5 500 breeding sows and 3 000 sows on test.

Its conformational characteristics are: a relatively short and wide head with dished face; large, thick and slightly drooping ears; wide, straight and sometimes arched back; wide and deep chest; ample bone; strong legs; rough skin sometimes with wrinkles; much hair growing evenly all over the body. The colour is white or black pied; some animals are red-pied or black. In 1983 evaluation at breeding farms gave the following results: live weight of 36-month-old boars - 295 kg, body length - 179 cm, sow live weight - 237

kg, body length - 163 cm, litter size - 10.1, weight of month-old litter - 51 kg, weight of two-month-old litter - 154 kg. The results obtained at breeding centres were as follows: boar live weight - 303 kg, body length - 182 cm, sow live weight - 241 kg, body length - 168 cm, litter size - 10.0 head, weight of month-old litter - 57, weight of two-month-old litter - 164 kg.

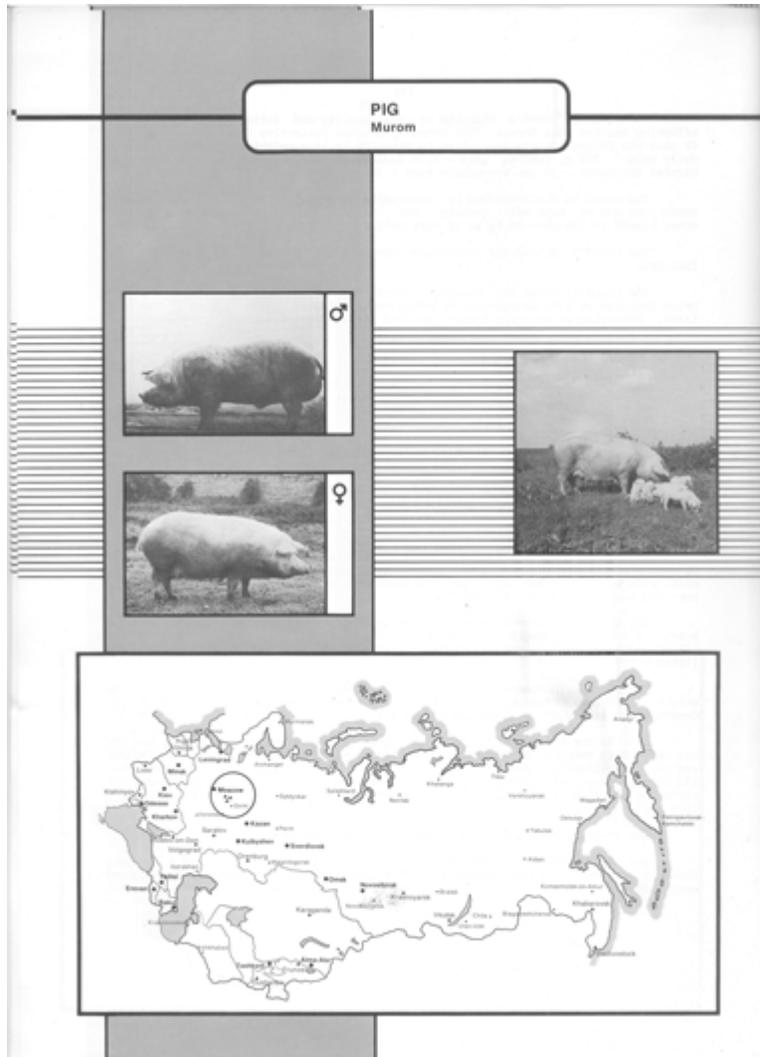
The performance test in 1983 gave the following results: time to reach 100 kg weight - 196 days, feed/kg gain - 4.11 fodder units, backfat thickness - 35 mm, length of carcass - 93 cm, ham weight - 11.0 kg.

In 1983 the breed's champion in meat quality and fattening performance of offspring was the boar Borets 7981 owned by Druzhba collective farm of Orel region. It gave the following results: time to gain 100 kg live weight - 191 days, average daily gain - 736 g, feed/kg gain - 3.75 fodder units, length of carcass - 93 cm, backfat thickness - 34 cm, eye-muscle area - 32 cm², ham weight 11.1 kg.

The breed is distinguished by remarkable adaptability to weather and feeding conditions and by high meat quality. For instance, the Livny is superior to all other breeds in the USSR in terms of meat colour.

The breed's genealogic structure consists of 18 boar lines and 46 sow families.

The breed is zoned for raising in Orel, Lipetsk and Voronezh regions. It is being improved at A.S. Georgievski breeding centre of Orel region and at 11 breeding farms. Selection is directed toward improved litter size, fattening performance and meat quality.



MUROM (Muromskaya)

The breed was developed in Vladimir region by crossing native pigs with the Lithuanian White and the Large White under the direction of A.P. Redkin and I.A. Savich.

The breed was recognized in 1957. The number of head was 56 000 in 1960, 27 000 in 1964, 26 000 in 1969 and 24 000 in 1974. In January 1980 its total population was 16 900 including 12 000 purebreds, of which 264 were breeding boars, 72 boars on test, 2 434 breeding sows and 1 141 sows on test.

The Murom is similar to the Large White in its constitution and conformation. It has a light head with slightly dished face, moderately large forward drooping ears, wide and deep chest, level and wide back and dense bristles growing evenly all over the body. The colour is white.

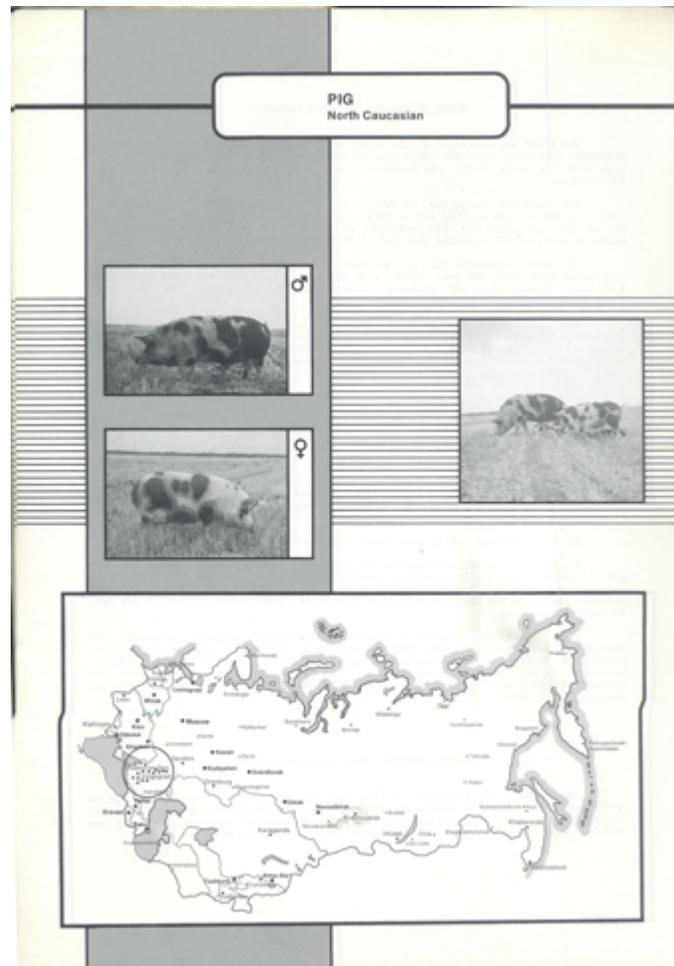
The 1983 evaluation gave the following results: live weight of 36-month-old boars - 314 kg, body length - 182 cm, sow live weight - 257 kg, body length - 167 cm, litter size - 10.7, weight of month-old litter - 55 kg, weight of two-month-old litter - 157 kg.

The 1983 performance test results were as follows: time to reach 100 kg live weight - 200 days, feed/kg gain - 3.95 fodder units, backfat thickness - 27 mm, length of carcass - 99 cm, ham weight - 10.8 kg.

In 1983 the breed's champion in meat quality and fattening performance was the boar Klyk 1249 owned by Obyedinenie state breeding farm of Murom district in Vladimir region. Its offspring gave the following results: time to gain 100 kg body weight - 192 days, average daily gain - 729 g, feed/kg gain - 3.78 fodder units, length of carcass - 98 cm, backfat thickness - 26 mm, eye-muscle area - 29 cm², ham weight - 10.9 kg.

The breed consists of 9 boar lines and 22 sow families.

The breed is being improved at Obyedinenie breeding state farm and 6 breeding farms in Vladimir region. Selection is for increased size of litter and improved meat quality.



NORTH CAUCASIAN (Severokavkazskaya)

The breed was developed at the state and collective farms of Rostov region and Krasnodar territory under the direction of P.E. Ladan by crossing the native Kuban pigs with the Large White, the Berkshire and the White Short-eared breed (German Edelschwein).

The breed was recognized in 1955. It numbered 133 000 in 1960, 141 000 in 1964, 126 000 in 1969 and 182 000 in 1974. As of 1 January 1980 the total population was 195 000 including 113 600 purebreds, of which 7000 were breeding boars, 1600 boars on test, 14 800 breeding sows and 13 300 sows on test.

The North Caucasian has a wide head with slightly dished face, erect or semi-erect ears, wide and deep chest, wide and medium-long back and loin, plump and full hams, strong legs and pasterns, dense and soft bristles. The colour is black-pied.

The 1983 evaluation produced the following results: live weight of 36-month-old boars - 279 kg, body length - 171 cm, sow live weight 228 kg, body length - 159 cm, litter size - 9.8, weight of month-old litter - 49 kg, total weight of two-month-old litter - 160 kg. The results obtained at breeding centres are much higher: live weight of 36-month-old boars - 309 kg, body length - 179 cm, sow live weight - 236 kg, body length - 161 cm, litter size -

10.1, weight of month-old litter - 48 kg, weight of two-month-old litter - 170 kg.

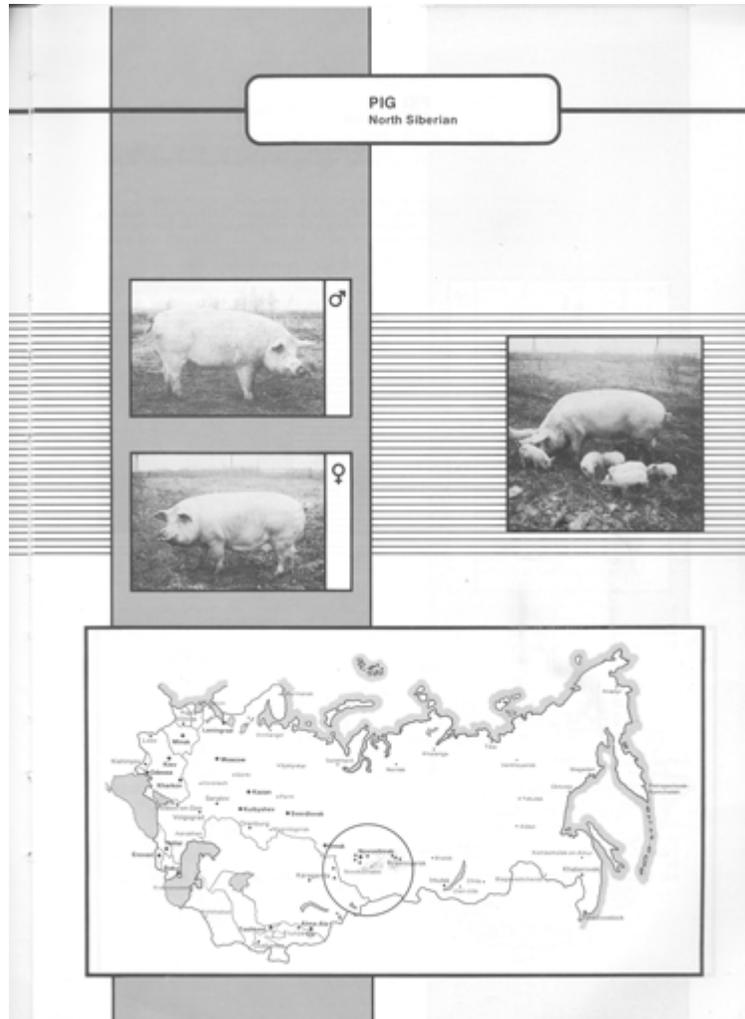
The results of the 1983 performance test were as follows: time to reach 100 kg body weight - 198 days, feed/kg gain - 4.45 fodder units, backfat thickness - 34 mm, length of carcass - 91 cm, ham weight - 11.1 kg.

In 1983 the breed's champion in meat quality and fattening performance was the boar Vostok 377 owned by Vtoraya Pyatiletka state farm in Krasnodar territory. Its progeny test results: time to gain 100 kg body weight - 209 days, feed/kg gain - 4.01 fodder units, length of carcass - 91 cm, eye-muscle area - 33 cm², ham weight - 11 kg, daily gain - 747 g.

The breed consists of 14 boar lines and 36 sow families.

The breed is raised and improved at 2 breeding centres, 2 breeding state farms and 14 breeding farms. The best are Gornyak breeding centre, Pobeda breeding farm and Donskoe training farm in Rostov region, Krasny Vodopad breeding centre in Tashkent region in the Uzbek Republic and Alekseevski state breeding farm in the Mari Autonomous Republic.

It is zoned for raising, in Rostov and Volgograd regions, Krasnodar and Stavropol territories, the Mari ASSR as well as in individual regions of Ukraine, Uzbekistan, Turkemenia, Kazakhstan, Georgia, Azerbaijan, Tajikistan and Armenia. Selection is for improved meat quality and fattening performance. The new highly-productive Don (Donskoi) meat-type (DM-1) was developed and accorded official recognition in 1978.



NORTH SIBERIAN (Sibirskaya severnaya)

The breed was developed in Novosibirsk region by crossing the native short-eared Siberian pigs with Large White boars under the direction of M.O. Simon. During the phase of inter se breeding of crossbreds positive assortative mating was widely used. Various degrees of inbreeding and rigid culling were practised.

The North Siberian was recognized in 1942.

The total number was 78 000 in 1960, 24 000 in 1964, 17 000 in 1969 and 52 000 in 1974. As of January 1980 its population was 58 700 including 24 500 purebreds, of which 1400 were breeding boars, 200 boars on test, 2900 breeding sow and 3000 sows on test.

The North Siberian animals have a harmonious conformation. They are medium sized with slightly dished face, erect ears, straight and wide back, and strong and short legs; the skin is unwrinkled, hard and rather coarse; bristles are long and flexible and there is often an undercoat. The colour is white.

The 1983 evaluation of the North Siberian gave the following results: live weight of 36-month-old boars - 312 kg, body length - 178 cm, sow live

weight - 238 kg, body length - 163 cm, litter size 10.7, weight of month-old litter 54 kg, weight of two-month-old litter - 182 kg.

In the performance and meat quality tests the breed had the following results: time to reach 100 kg body weight - 196 days, feed/kg gain - 3.87 fodder units, backfat thickness - 32 mm, length of carcass - 94 cm, ham weight - 10.4 kg.

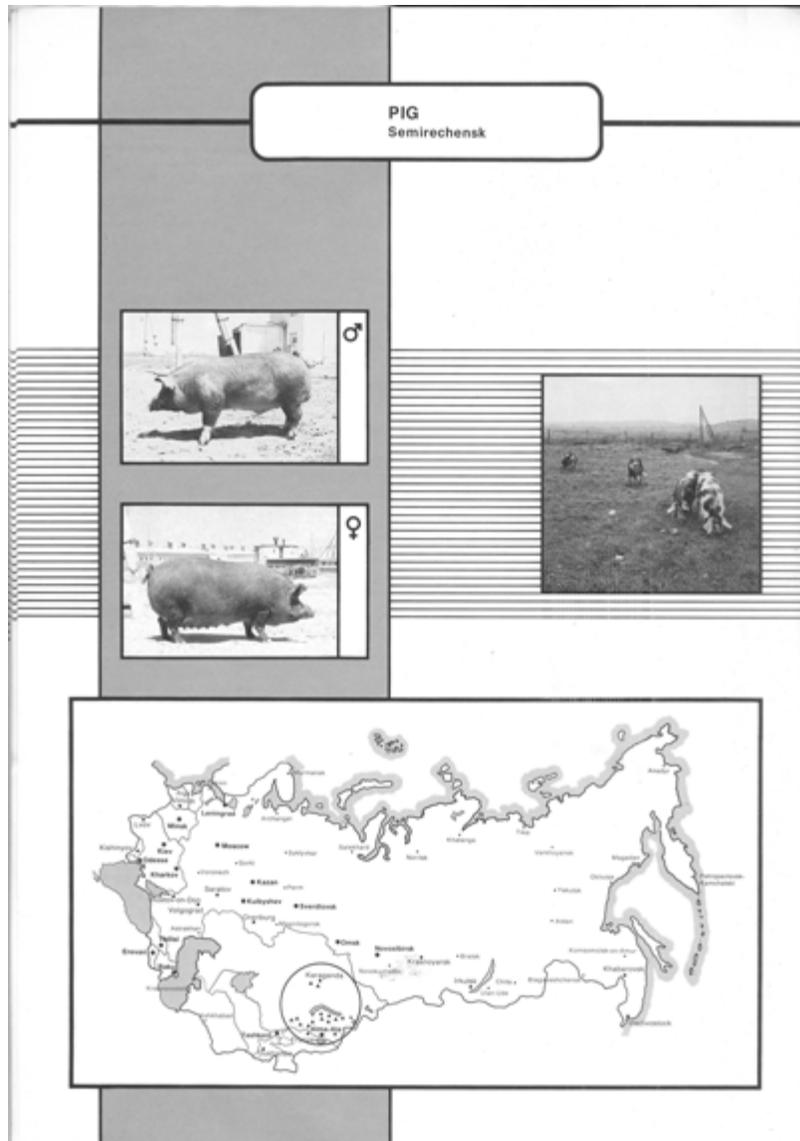
In 1983 the breed's champion in meat quality and fattening performance was the boar Kedr 8203 owned by Oyashinski state breeding farm in Novosibirsk region, which had the following progeny performance: time to gain 100 kg body weight - 192 days, average daily gain - 788 g, feed/kg gain - 3.52 fodder units, length of carcass - 95 cm, backfat thickness - 33 mm.

The North Siberian has as good economic characteristics as the Large White but is much superior to the latter in hardiness and adaptability to the harsh climate of North Siberia. Dense bristle covering and undercoat provide effective protection against low temperatures in winter and against mosquitoes and gnats which severely trouble the Large White in summer.

The breed consists of 8 boar lines and 12 sow families.

The breed is raised and improved in Oyashinski state breeding centre, Borovskoe experimental farm of the Siberian Animal Husbandry Research and Technological Institute and Krasny Oktyabr breeding farm in Krasnoyarsk territory.

The breed is zoned for raising and use in crossbreeding systems in the Novosibirsk region, Krasnoyarsk territory, the Buryat ASSR and Kazakhstan. Selection is for improved meat quality and fattening performance. The improvement programme includes an immunogenetic test to control the authenticity of pedigrees, intense selection pressure and maintenance of genetic similarity within lines.



SEMIRECHENSK (Semirechenskaya)

The breed was developed specially for raising in the climate of southeast Kazakhstan where summer temperatures may go as high as 48° C; night and day temperatures fluctuate from 48° to 5° ; winter temperatures drop to almost -50° and the snowfall is minimal.

It was generated as a result of mating crosses (Large White x wild boar) with the Kemerovo breed and subsequent inter se breeding of the best specimens having 3/4, 7/8 or 15/16 of Large White blood, and continued interbreeding during 4-5 generations. The breed was developed under the direction of the Institute of Experimental Biology of the Kazakhstan Academy of Sciences. It was first called the Kazakh Hybrid.

The Semirechensk was recognized in 1978. It numbered 4000 in 1969, 27 000 in 1974 and 67 000 in 1980 including 43 000 purebreds, of which 1200 were breeding boars, 5900 breeding sows and 4300 sows on test.

The Semirechensk animals have a head with straight face, small erect ears, moderately long body, deep chest, straight and wide back and strong legs. The colour is white; however reddish, dark brown and black-pied offspring may sometimes occur.

The 1983 evaluation produced the following results: live weight of 36-month-old boars - 275 kg, body length - 169 cm, sow live weight - 222 kg, body length - 155 cm, litter size - 10.5, weight of month-old litter - 48 kg, weight of two-month-old litter - 159 kg.

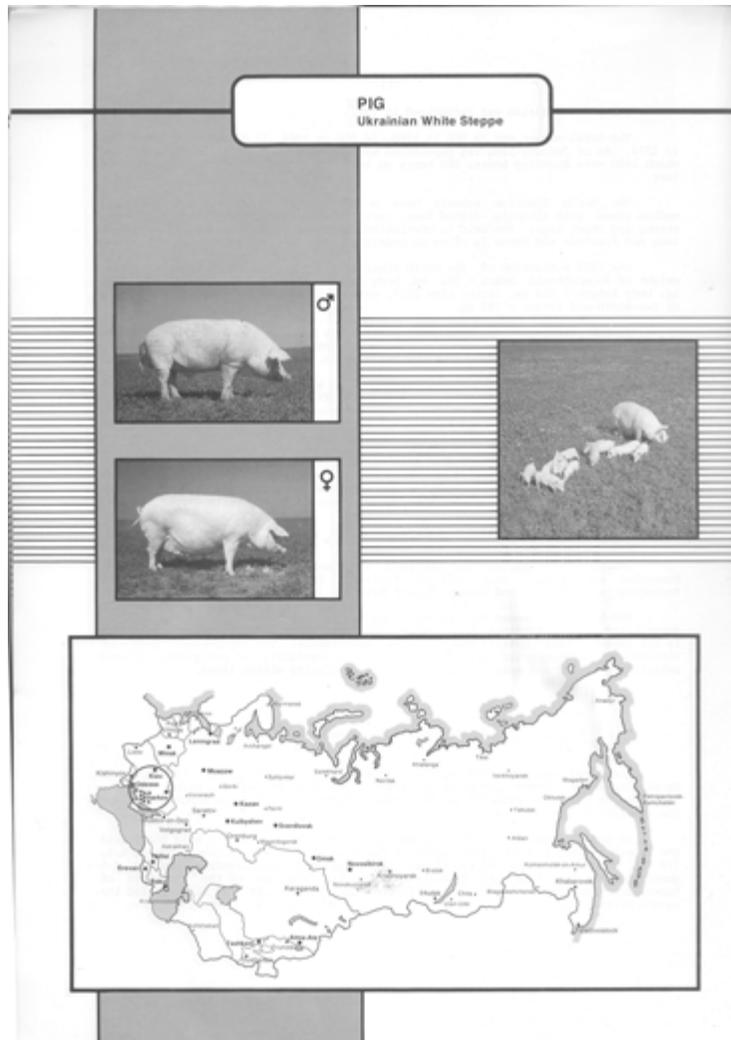
In 1983 the breed's champion was the sow Gornaya 64 owned by Buruldaiski state breeding farm in Chimkent region of Kazakhstan. It gave the following results: live weight at 28 months - 260 kg, body length - 160 cm, litter size - 12.3, weight of one-month-old litter - 62 kg. Its offspring gave the following results in the performance test: average daily gain - 681 g, feed/kg gain - 4.0 fodder units, backfat thickness - 33.

The Semirechensk animals combine the high productivity of the improved breed with the strong constitution of the wild boar. They are well adapted to the extreme climatic conditions of southeast Kazakhstan and do not suffer from overheating despite their white colour.

The Semirechensk has better resistance to a number of diseases than many other breeds. The incidence of respiratory troubles in piglets is 3-5 times less than in the young stock of the Large White and the Kemerovo. The animals are less susceptible to pathogenic protozoa. In industrial complexes the Semirechensk pigs are as productive as the Large White but exceed it in piglet viability and sow hardiness. Under these conditions the culling rate for the Semirechensk sows is 26% less than of the Large White sows.

The breed consists of 9 boar lines and 20 sow families.

The breed is raised in 30 farms of Alma-Ata, Taldy-Kurgan, Jambul, Chimkent and Karaganda regions in Kazakhstan. Its improvement is carried out at 4 breeding state farms - Illiiski and Kaskelenski in Alma-Ata region, Buruldaiski and XXII Party Congress in Chimkent region, and at two breeding farms - Razvilnenski in Taldy-Kurgan region and Rosa Luxemburg in Jambul region.



UKRAINIAN WHITE STEPPE (Ukrainskaya stepnaya belaya) ,

The breed was developed by M.F. Ivanov on Askania Nova farm by crossing improved pigs native to southern Ukraine with Large White boars. It was the first Soviet experience in developing a new breed and the method used has become the classic breeding technology which was subsequently employed in developing many Soviet breeds. The Ukrainian White Steppe was also the first breed developed with the specific purpose of combining the high productivity of improved breeds with the hardiness and local adaptation of native pigs. To consolidate the inherited qualities of the best crosses during the breed's development a high degree of inbreeding was practised combined with rigid culling on the basis of such desirable qualities as ruggedness of constitution.

The breed was recognized in 1932. It ranks third in numbers in the USSR. Its population was 812 000 in 1964, 487 000 in 1969 and 738 000 in 1974. As of 1 January 1980 its total population stood at 636 300 including 524 200 purebreds, of which 12 500 were breeding boars, 800 boars on test, 88 400 breeding sows and 52 300 sows on test.

The Ukrainian White Steppe differs a little from the Large White in conformation. It has medium-sized head with slightly dished face, large ears slightly drooping over the eyes, denser bone, deeper and wider body, strong legs, compact skin and dense bristles. The colour is white.

The 1983 evaluation gave the following results: live weight of 36-month-old boars - 322 kg, body length - 183 cm, sow live weight - 238 kg, body length - 164 cm, litter size - 10.8, weight of month-old litter - 48 kg, weight of two-month-old litter - 148 kg. The results obtained at breeding centres were somewhat higher: live weight of 36-month-old boars - 338 kg, body length - 186 cm, sow live weight - 243 kg, body length - 165 cm, litter size - 11.2, weight of month-old litter - 50 kg, weight of two-month-old litter - 158 kg.

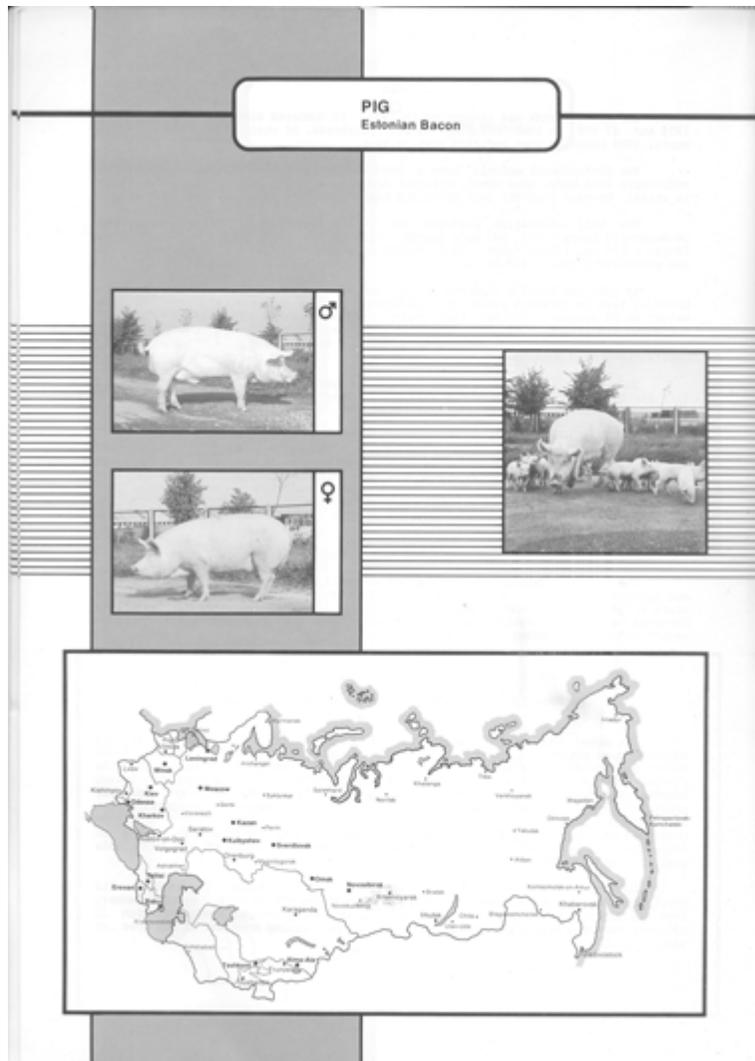
The performance test produced the following results: time to reach 100 kg body weight - 186 days, feed/kg gain - 3.76 fodder units, backfat thickness - 28 cm, length of carcass - 97 cm, ham weight - 10.5 kg.

In 1984 the breed's champion was the boar Askaniets 4497 owned by the Askania Nova experimental farm in Kherson reion, which gave the following figures: live weight at 32 months - 403 kg, body length - 185 cm. Its offspring gave the following results in the fattening performance test: time to gain 100 kg body weight - 177 days, feed/kg gain - 3.8 fodder units, backfat thickness - 28 mm, ham weight - 12.2 kg. The 14 sows sired by him produced litters with an average size of 12.2 and weight at one-month-old of 63 kg.

The Ukrainian Steppe White is better adapted to the continental climate of the south Ukraine than the Large White. It has a more solid but more rugged conformation.

The breed consists of 15 boar lines and 55 sow families.

The breed is zoned for raising in Kherson, Zaporozhye, Odessa and Nikolaev regions of the Ukraine as well as in some regions of Azerbaijan, Armenia, Turkmenia and Moldavia. Continued improvement of the Ukrainian White Steppe is conducted at 3 breeding centres, 2 breeding state farms and 32 breeding farms under the direction of the Ukrainian Research Institute for Animal Husbandry in the Steppe Regions. The main breeding centres are Askania Nova and Sivash in Kherson region, and Zarya collective farm in Zaporozhye region. Selection is for improved fattening performance and meat quality. Initial infusion of Landrace blood is practised in the development of certain new lines.



MEAT-TYPE BREEDS
ESTONIAN BACON (Estonskaya bekonnaya)

The breed was developed in Estonia by crossing the native long-eared pigs with Large White, German, improved Finnish and Danish Landrace boars. The greatest influence was that of the Danish Landrace.

The breed was recognized in 1961. It numbered 102 000 in 1964, 81 000 in 1969, and 140 000 in 1974. As of 1 January 1980 the total population was 198 200 including 122 800 purebreds, of which 9 800 were breeding boars, 14 000 boars on test, 15 500 breeding sows and 11 000 sows on test

The Estonian Bacon breed has a medium-sized head with straight or slightly dished face, large drooping ears tilted forward, long body, wide and deep chest, long and wide back and full hams. The colour is white with pink skin, sometimes with small coloured spots.

The 1983 evaluation gave the following results: live weight of 36-month-old boars - 323 kg, body length - 186 cm, sow live weight - 244 kg, body length

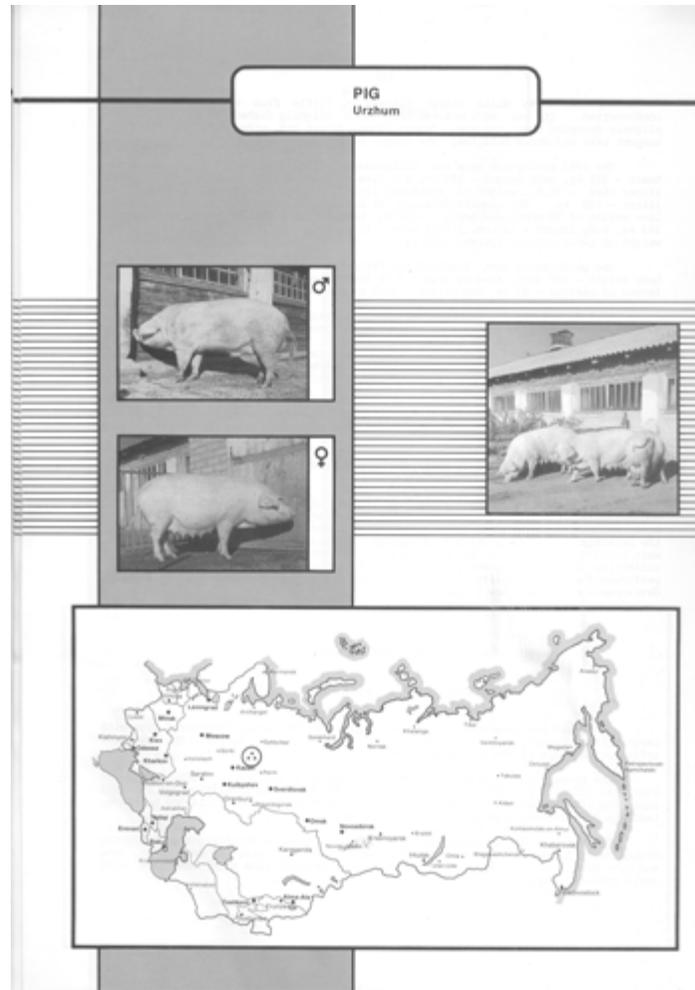
- 170 cm, litter size - 11.1, weight of month-old litter - 56 kg, weight of two-month-old litter - 176 kg.

In 1983 the breed's champion was the sow Kryyt 3516 owned by Suigu collective farm in Estonia which gave the following results: litter size - 13.0 head, weight of one-month-old litter - 57.3 kg, weight of two-month-old litter - 245 kg. Its offspring produced the following results in the fattening performance test: time to gain 100 kg body weight - 171 days, average daily gain - 828 g, feed/kg gain - 3.4 fodder units, backfat thickness - 29.4 mm. In appearance the breed is similar to the Landrace although it is superior in many respects. According to the results of the 1976-77 State evaluation of breeds the Estonian Bacon took 6 days less to gain 100 kg live weight than the Landrace. Its average daily gain was 16 g more and feed/kg gain 0.19 fodder units less. Its carcass length was 5 cm more, backfat thickness 8 mm less, and weight of bacon carcass 29.5% higher. Its meat has a higher protein quality index (ratio of tryptophan to hydroxyproline) being 6.32 against 4.97 in the Landrace.

The breed consists of 14 boar lines and over 30 sow families.

The Estonian Bacon animals are raised and improved at Novy Dvor breeding centre in Grodno region in Byelorussia, at one state breeding farm and 48 breeding farms of which 34 are found in Estonia and the rest in Gorki, Tambov, Kaliningrad, Lipetsk, Pskov, Vologda, Ivanovo and Tomsk regions, in Primorski territory and in Kazakhstan and Moldavia.

The Estonian Bacon is extensively used in crossbreeding systems as a paternal line. In Estonia it is also used as a maternal breed. Selection is for improved meat quality and fattening performance



URZHUM (Urzhumskaya)

The breed was developed in Kirov region by crossing native pigs with Large White boars. It was recognized in 1957. It numbered 106 000 in 1960, 79 000 in 1964, and 100 000 in 1969. As of 1 January 1980 the breed's total population was 107 300 including 39 900 purebreds of which 3 400 were breeding boars, 500 boars on test, 7 300 breeding sows and 2 600 sows on test.

The Urzhum is similar to the Large White in its conformation. It has a clean head with long snout; heavy ears slightly tilted forward; long, deep but not wide body; strong legs; massive and coarse bone; dense bristles. Its colour is white.

The 1983 evaluation gave the following results: live weight of 36-month-old boars - 291 kg, body length - 179 cm, sow live weight - 245 kg, body length - 163 cm, litter size - 10.5, weight of month-old litter - 51 kg, weight of two-month-old litter - 161 kg. The results obtained at breeding centres were somewhat higher; body weight of 36-month-old boars - 322 kg, body length - 183 cm, sow live weight - 267 kg, body length - 169 cm, litter size - 11.5, weight of month-old litter - 59 kg, weight of two-month-old litter - 191 kg.

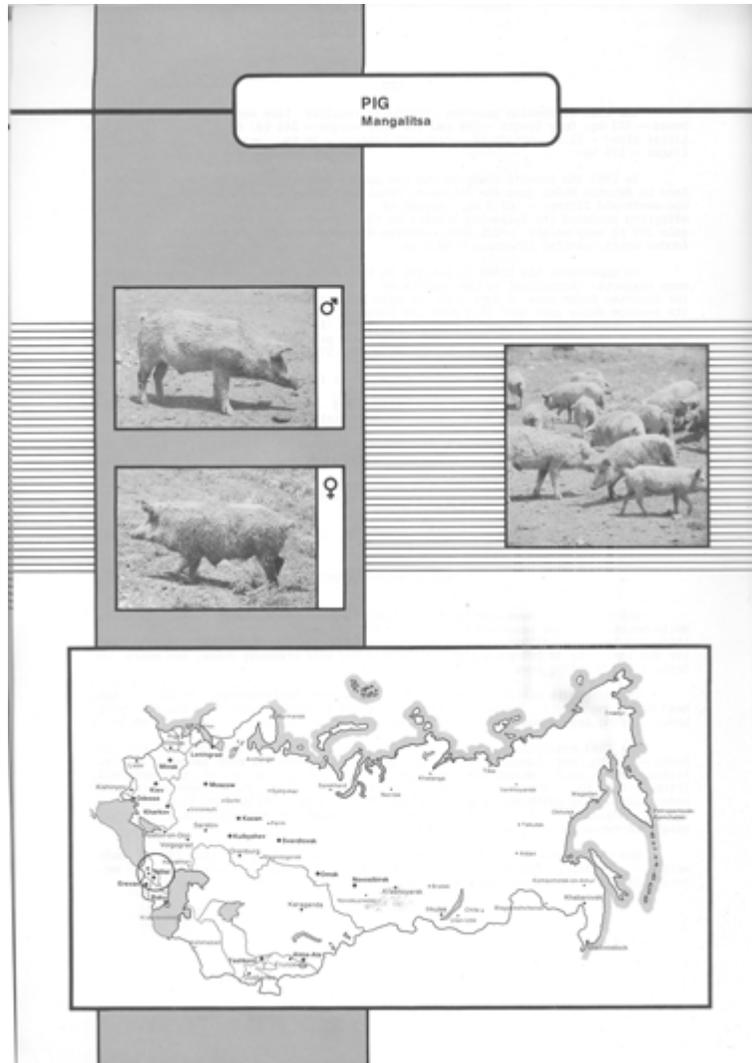
The performance test gave the following results: time to gain 100 kg body weight - 206 days, feed/kg gain - 4.29 fodder units, backfat thickness - 31 mm, length of carcass - 96 kg, ham weight - 11 kg.

In 1983 the breed's champion was the sow Mushka 6444 owned by Mukhinski breeding centre in Kirov region, which gave the following figures: litter size -13.3, weight of one-month-old litter - 70 kg, average daily gain of its offspring during the fattening performance test - 726 g, feed/kg gain - 3.56 fodder units, backfat thickness - 28 mm.

Urzhum animals are well adapted to local conditions as well as to the consumption of bulky succulent feeds. The Urzhum ranks second after the Landrace among 19 breeds in terms of digestibility of dry matter and protein. Its figure for digestibility of dry matter is 75.84%, protein - 80.16%; the Large White figure is 74.98% and 79.9% respectively.

The breed consists of 15 boar lines and 15 sow families.

The Urzhum breed is raised and improved at 2 breeding centres and at 7 breeding farms. The breed is classified for raising and use in crossbreeding systems in Kirovsk, Kostroma and Moscow regions and in the Mari, Udmurt and Tatar ASSRs. Selection is for increased rate of growth and improved meat quality.



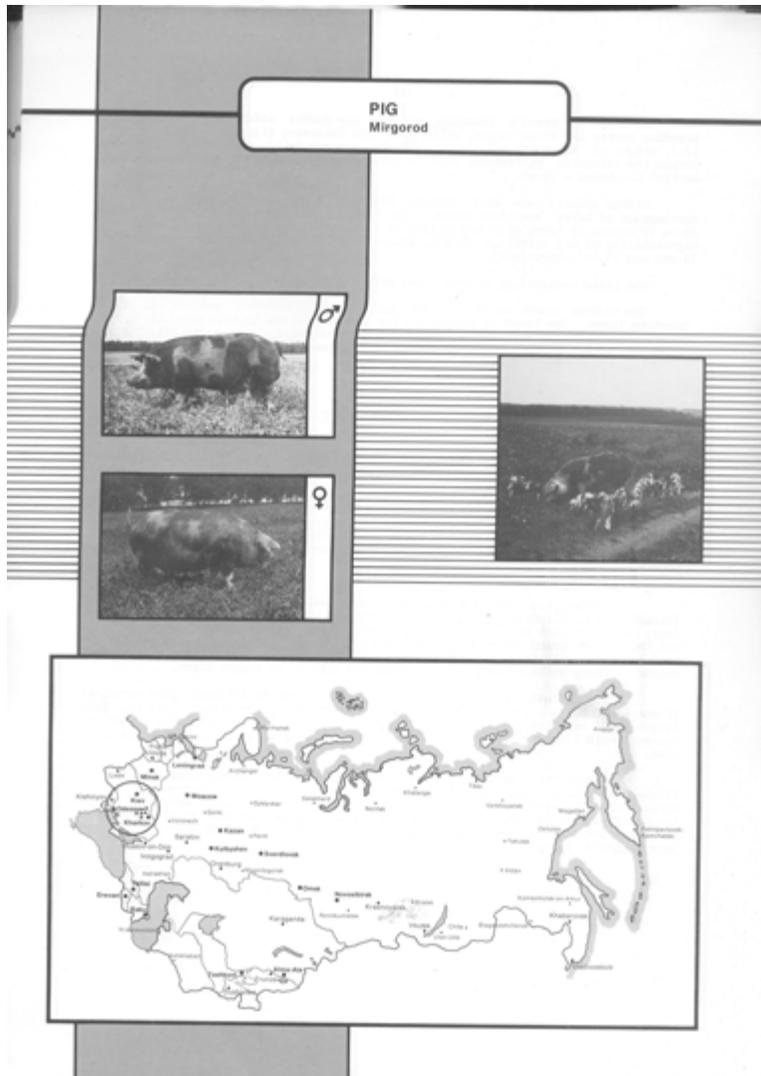
LARD-TYPE BREEDS MANGALITSA (Mangalitskaya)

The breed was developed by crossing pigs native to the Balkan Peninsula with improved Chinese animals. The Mangalitsa animals were imported into the USSR from Hungary and Romania. They are classified as fat producers. The breed's population in the USSR has been steadily declining. The number of head was 10 000 in 1964, 12 000 in 1969 and 6000 in 1974. As of 1 January 1980 the total Mangalitsa population was 5000 including 670 purebreds (38 breeding boars and 166 breeding sows).

The Mangalitsa has a medium-sized head with straight face, ears tipping forward; wide, slightly arched, back; deep and wide chest; straight and strong legs; black compact skin, free from wrinkles. Black colour of snout, eyelids, teats and hoofs is a breed character. The body is covered with soft curly hair and the head and legs with straight short dense hair closely clinging to the skin. Hair colour is dingy white or dark tan; on head and legs it is almost black.

During 1977-81 the average evaluation results were as follows: live weight of 36-month-old boars - 149 kg, body length - 143 cm, sow live weight - 113 kg, body length - 121 cm, litter size - 7.0, weight of month-old litter - 29.7 kg, weight of two-month-old litter 56.2 kg. Individual sows may farrow up to 10-12 piglets at a time.

The Mangalitsa animals have a small litter size, early formation of fat tissues, admirable hardiness and adaptability to pasture feeding in mountain forest conditions. Compared with other breeds the Mangalitsa shows greater endurance at low temperatures. It is raised in mountain parts of Georgia and used in crossing with the Kakhetian breed group. The litter size in crosses is 20-25% more than in the pure Kakhetian animals.



MIRGOROD (Mirgorodskaya)

The breed was developed in collective and state farms of Poltava region by experts of the Mirgorod State Breeding station under the direction of A.F. Bondarenko and the personnel of the Poltava Pig Breeding Research Institute. It was formed by crossing the Ukrainian native short-eared spotted pigs with Berkshire, Large White, Middle White and to some extent, with Tamworth boars.

Classified as lard type the breed was recognized in 1940. The total number of head was 744 000 in 1960, 372 000 in 1964, 227 000 in 1969 and 222 000 in 1974. In 1980 its total population was 186 000 including 136 800 purebreds, of which 6200 were breeding boars, 200 boars on test, 26 900 breeding sows and 7800 sows on test.

The breed has a medium-sized head with slightly dished face; small erect ears with forward pitch but occasionally slightly drooping; wide chest; straight wide back; strong medium-long legs which are shorter than in the Large White; hard elastic unwrinkled skin; dense bristles growing evenly all

over the body. The colour is predominantly black-pied, but black, black-and-tan, and tan animals sometimes occur.

The 1983 evaluation produced the following results: live weight of 36-month-old boars - 275 kg, body length - 170 cm, sow live weight - 217 kg, body length - 153 cm, litter size - 9.5, weight of month-old litter - 48 kg, weight of two-month-old litter - 142 kg. The results obtained at breeding centres were somewhat higher: boar live weight - 296 kg, body length - 179 cm, sow live weight - 238 kg, body length - 162 cm, litter size - 10.8, weight of month-old litter - 59 kg, weight of two-month-old litter - 172 kg.

The 1983 performance test gave the following results: time to reach 100 kg live weight - 220 days, feed/kg gain - 4.03 fodder units, backfat thickness - 28 mm, length of carcass - 94 cm, ham weight - 10.1 kg.

In 1983 the breed's champion was the sow Yagoda 276 owned by Dekabrist breeding centre in Poltava region. Its results were as follows: live weight at 51 months - 315 kg, body length - 175 cm, litter size - 12.6, weight of one-month-old litter - 66 kg, average daily gain by its offspring during the fattening performance test - 719 g, feed/kg gain - 3.84 fodder units, backfat thickness - 24 mm.

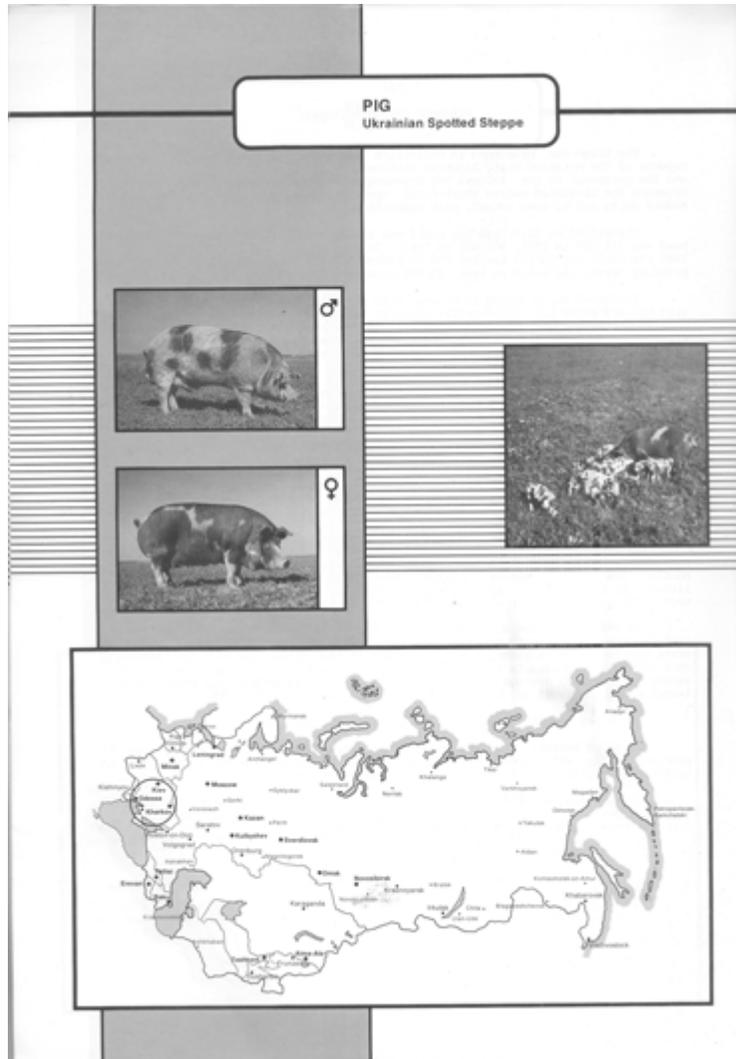
In 1983 the breed's champion in the meat quality and fattening performance test was the boar Dnepr 91 owned by 60th Anniversary of the Great October Revolution state breeding farm in Yarmolinetski district of Khmel'nitski region. Its offspring gave the following results in the fattening performance test: time to gain 100 live weight - 197 days, average daily gain - 824 g, feed/kg gain - 3.7 fodder units, length of carcass - 95 cm, backfat thickness - 37 mm, ham weight - 10.3 kg.

The breed consists of 11 boar lines and 34 sow families.

Mirgorod animals are well adapted to the Ukrainian forest steppe and to pasture feeding. The breed is zoned for raising in the Ukraine and widely used in crossbreeding systems as a maternal and paternal breed.

It is being improved at 2 breeding centres and 24 breeding farms, the chief of which are Peremoga and Dekabrist breeding centres in Poltava region.

Selection is directed towards increased body length and meat yield.



UKRAINIAN SPOTTED STEPPE (Ukrainskaya stepnaya ryabaya)

The breed was developed by crossing selected spotted pigs of the Ukrainian White Steppe breed with Berkshire and Mangalitsa boars. During the subsequent inter se breeding close inbreeding was practised and rigid culling on the basis of constitution and productivity. The programme was carried out at the Askania Nova experimental farm of the Ukrainian Research Institute for Animal Husbandry in Steppe Regions under the guidance of L.K. Greben.

The breed was recognized in 1961. It numbered 28 000 in 1960, 18 000 in 1964, 8000 in 1969 and 7000 in 1974. As of 1 January 1980 its total population was 7000 including 5800 purebreds, of which 316 were breeding boars, 65 boars on test, 799 breeding sows and 491 sows on test.

In type the breed stands close to the Ukrainian White Steppe. The colour is spotted black-and-white or black-and-tan and sometimes black.

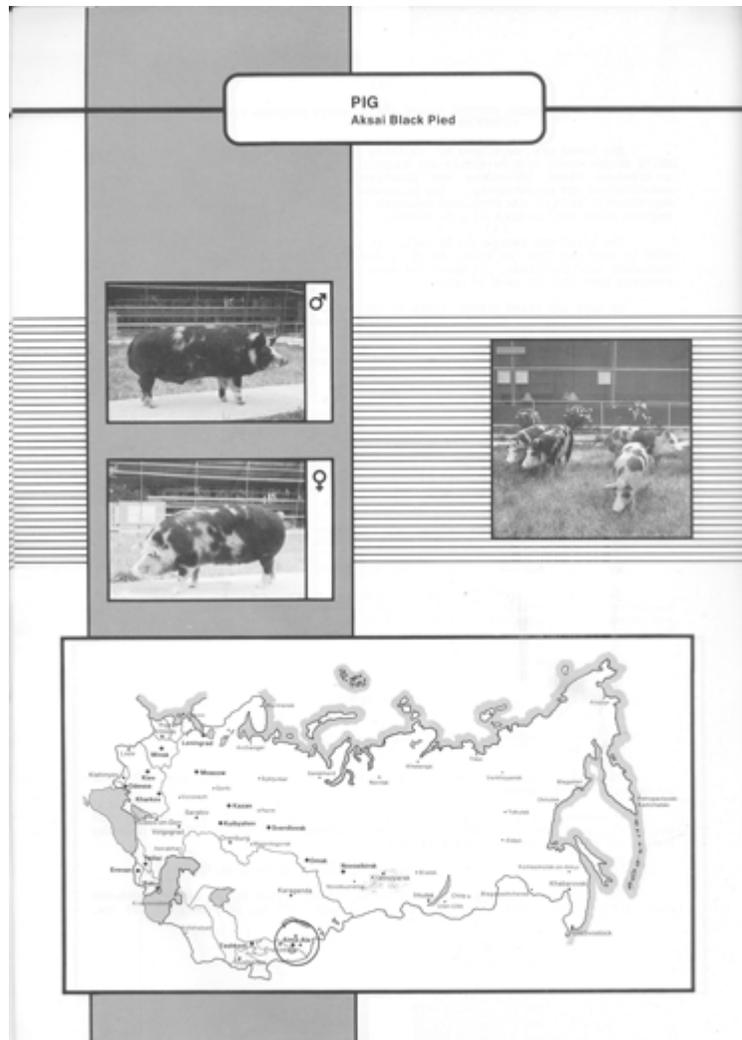
The 1983 evaluation gave the following results: live weight of 36-month-old boars - 322 kg, body length - 183 cm, sow live weight - 238 kg, body length - 164 cm, litter size - 10.8, weight of month-old litter - 48 kg, weight of two-month-old litter - 148 kg. The results at breeding centres were as follows: live weight of 36-month-old boars - 338 kg, body length - 186 cm, sow live weight - 243 kg, body length - 165 cm, litter size - 11.2, weight of month-old litter - 50 kg, weight of two-month-old litter - 158 kg.

The performance test gave the following results: time to reach 100 kg body weight - 186 days, feed/kg gain - 3.76 fodder units, backfat thickness - 28 mm, length of carcass - 97 cm, ham weight - 10.5 kg.

In 1983 the breed's champion was the boar Real 429 owned by Askania Nova experimental farm, which gave the following results: time for its offspring to gain 100 kg body weight during the fattening performance test - 187 days, average daily gain - 811 g, feed/kg gain - 3.58 fodder units, backfat thickness - 30 mm.

The breed consists of 9 boar lines and 18 sow families.

The Ukrainian Spotted Steppe is superior to the Ukrainian White Steppe in hardiness and adaptability to the hot climate in the southern Ukraine. It is raised and improved at Askania Nova breeding centre and at 4 breeding farms in Kherson and Nikolaev regions.



BREED GROUPS

AKSAI BLACK PIED (Aksaiskaya cherno-pestraya)

The breed group was developed on the basis of crossing native pigs with the Large White and the Berkshire.

It numbered 3000 in 1964, 4000 in 1969 and 9000 in 1974. As of 1 January 1980 the total population was 11 000 including 5000 purebreds, of which 173 were breeding boars, 342 breeding sows and 444 sows on test.

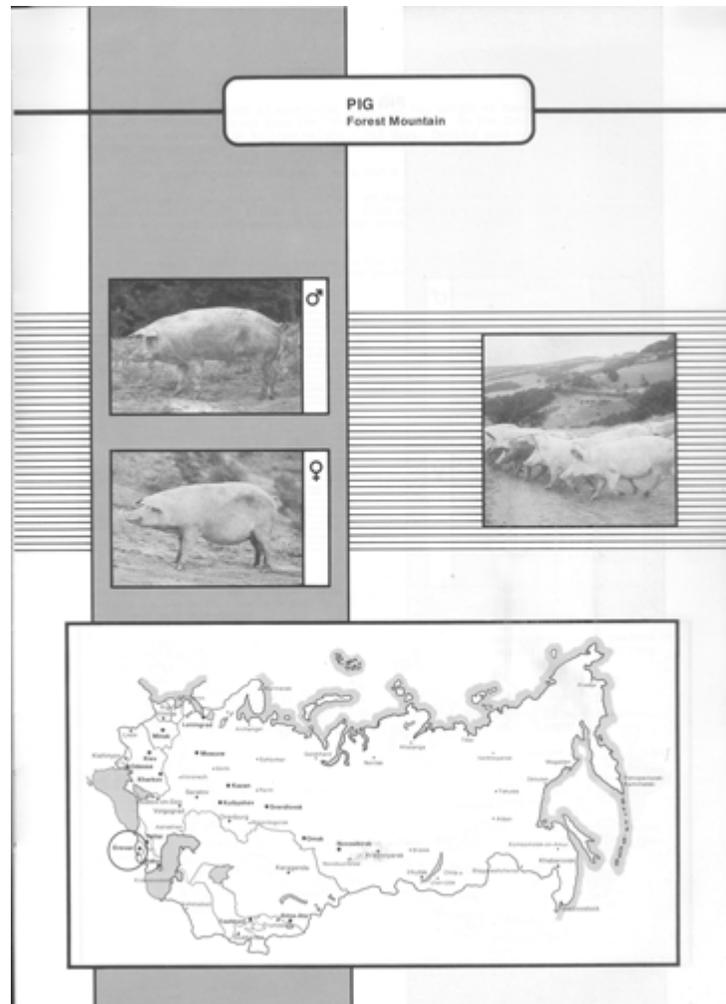
It has a harmonious conformation. Its colour is black-pied.

The 1983 evaluation gave the following results: live weight of 36-month-old boars 317 kg, body length - 182 cm, sow live weight - 245 kg, body length - 167 cm, litter size - 9.7, weight of month-old litter 51 kg, weight of two-month-old litter -174 kg. The breed group gave the following results in the fattening performance test: time to reach 100 kg body weight - 212 days, feed/kg gain - 4.27 fodder units, backfat fat thickness - 30 mm, length of carcass - 96 cm, ham weight - 11.2 kg.

The group consists of 3 boar lines and 6 sow families.

The group is raised and improved at Kaskelenski breeding state farm and at Aksai experimental and training farm of Alma-Ata region in Kazakhstan. The Aksai animals are used in commercial crossing with North Caucasian, Large White and Landrace boars.

The group is zoned for raising in the Alma-Ata region. It is being improved in litter size, meat quality and fattening performance by infusion of Large White and Estonian Bacon blood.



FOREST MOUNTAIN (Lesogornaya)

The breed group was developed by crossing pigs native to the north and east of Armenia with the Large White and the Mangalitsa.

It numbered 7000 in 1964, 14 000 in 1969 and 2000 in 1974. As of 1 January 1980 there were 579 purebred animals, of which 16 were breeding boars, 75 breeding sows and 30 sows on test.

Forest Mountain pigs have a deep and wide chest, long body, high legs with strong hoofs, good bristle covering with undercoat. The colour is white, but black may occur.

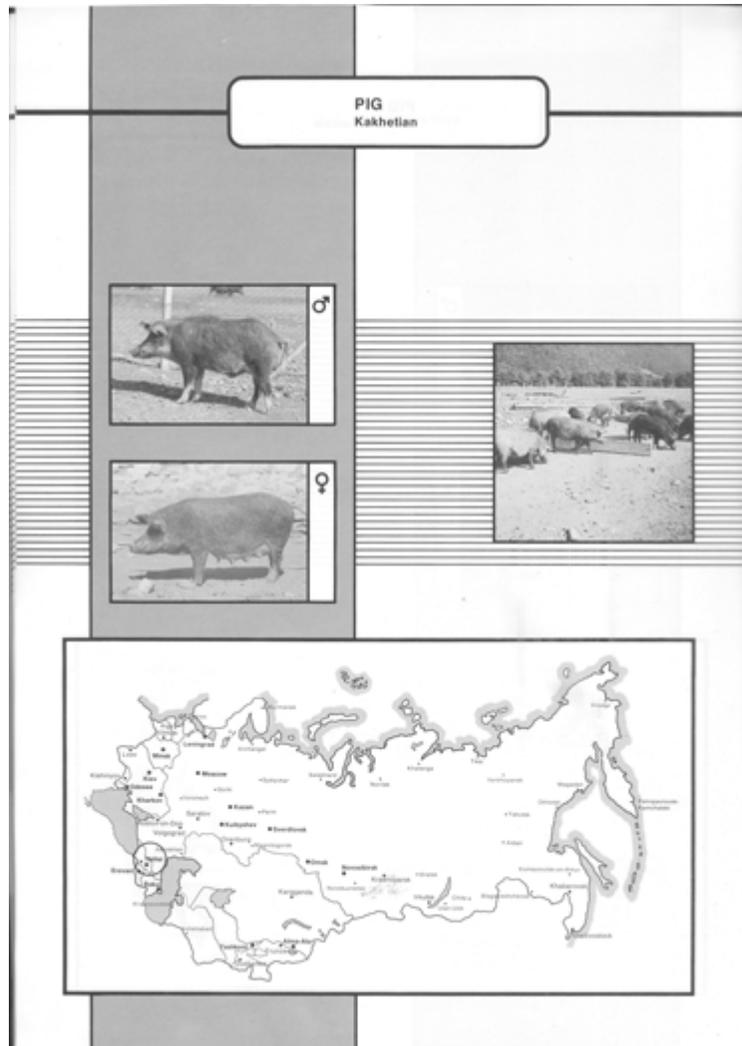
Live weight of mature boars is 260 kg, sow live weight - 165-167 kg, litter size - 7-10, weight of month-old litter - 40-45 kg, weight of two-month-old litter - 130-140 kg.

Hardiness and adaptability to maintenance on pasture are the major assets of the breed group. The carcasses have a higher fat content (9.9%), lower moisture content in the meat, and a higher intensity of meat colour compared with the Large White and meat breeds.

Forest Mountain pigs are well adapted to both confinement and pasture management i.e. they are kept on pasture until they are 6-8 months old and then they are fattened for 60-80 days.

The group consists of 4 boar lines.

The breed group is zoned for raising in forest and mountain zones of Armenia. Fattening performance is being improved by infusion of Large White blood.



KAKHETIAN (Kakhetinskaya)

The Kakhétian breed group is a primitive type which is close to the wild boar as shown by the position of lower molars, the long slim lacrimal bones and the striped pattern of piglets.

In the past the Kakhétian pigs were found in all parts of Georgia. Now the purebred animals are present mainly in Akhmeta, Telavi, Kvareli, Gurjaani and Dusheti regions.

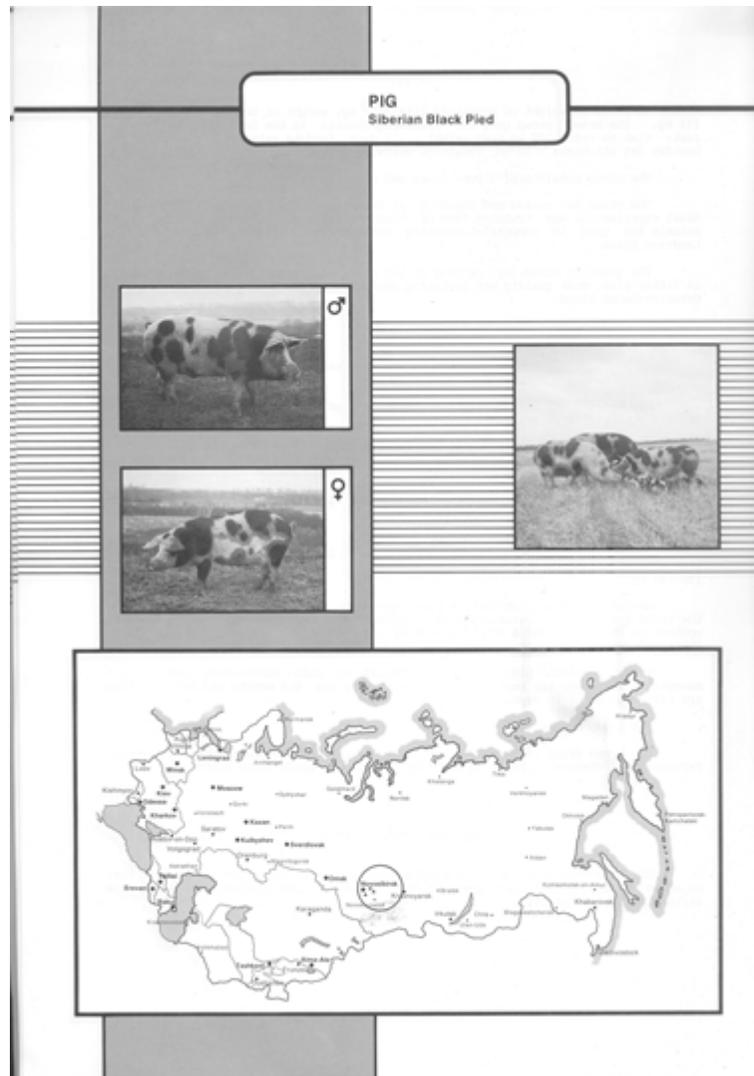
The Kakhétian animals have a relatively small head with straight face and erect ears, rather short body, wide and deep chest, straight wide back and strong, correctly-set legs with tough hoofs. The body is covered with hard, long and straight bristles.

The Kakhétian breed group population is rather limited. It numbered 6000 in 1969, and 2000 in 1974. As of 1 January 1980 the number was only 1200 including 745 purebreds, of which 2 were breeding boars and 103 breeding sows.

The animals have a slow rate of development and small litter size and are late maturing. The 1982 evaluation gave the following results: live weight of

6-month-old boars - 85 kg, body length - 89 cm, sow live weight - 62 kg, body length - 95 cm, litter size - 5.0, weight of month-old litter - 20.3 kg, weight of two-month-old litter - 28 kg.

Although the Kakhetian cannot compete directly with improved breeds steps are being taken to protect them and to organize their pure breeding in order to infuse their blood into improved breeds to improve constitution and disease resistance.



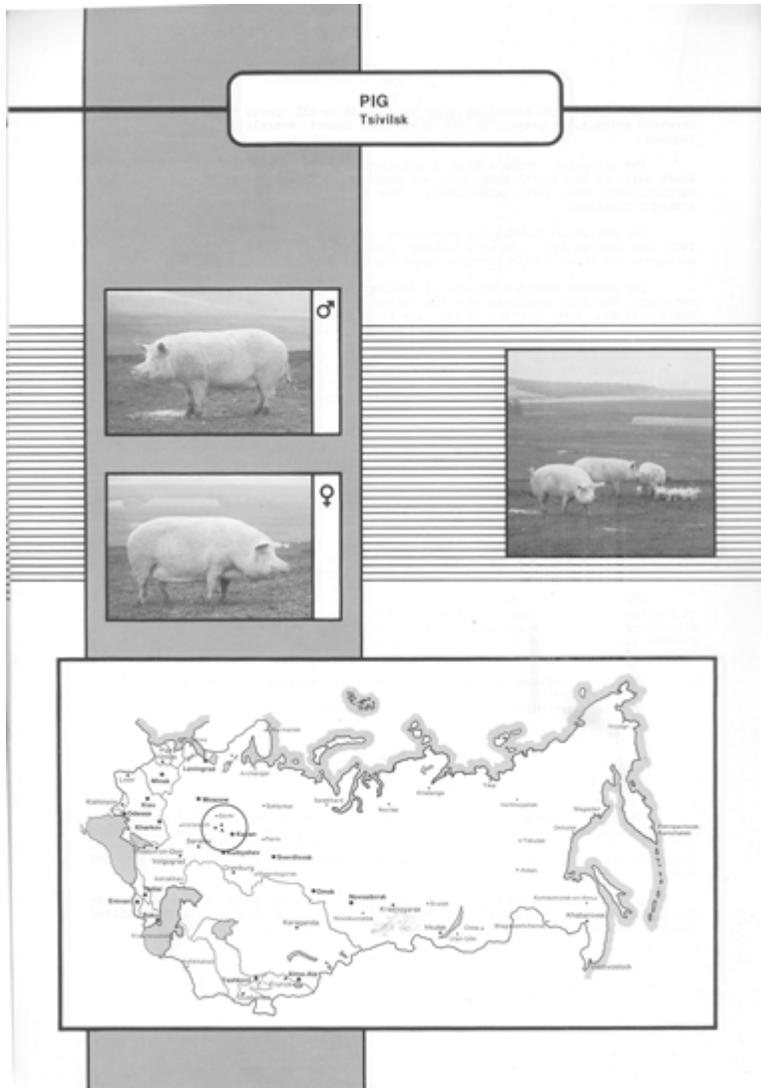
SIBERIAN BLACK PIED (Sibirskaya cherno-pestraya)

The breed group was developed from the coloured animals discarded in the process of breeding the North Siberian white pigs.

It numbered 4000 in 1964, 7000 in 1969 and 12 000 in 1974. As of 1 January 1980 its population was 5300 head including 2300 purebreds, of which 258 were breeding boars, 166 breeding sows and 183 sows on test. The Black Pied breed group is similar to the North Siberian breed although it is superior in adaptation to the local conditions and particularly to heat. The Siberian Pied pigs have rough skin, free from wrinkles on head and legs; the body is covered with soft dense bristles and underhair. It has full hams. The colour is black-pied.

The group consists of 4 boar lines and 4 sow families.

The breed group is zoned for raising in Novosibirsk region.



TSIVILSK (Tsivilskaya)

The breed group was developed by crossing native Chuvash pigs with Large White boars. Numbers were 28 000 in 1960, 41 000 in 1964, 21 000 in 1969 and 24 000 in 1974. As of 1 January 1980 the total population of purebred animals was 35 600, including 616 breeding boars, 35 boars on test, 3700 breeding sows and 2300 sows on test.

In Tsivilsk pigs the head is heavier than in the Large White, with wide forehead and slightly dished face, rather long snout and medium-size ears tilted forward. The back is straight and even. The colour is white.

The 1983 evaluation gave the following results; live weight of 36-month-old boars - 299 kg, body length - 177 cm, sow live weight - 229 kg, body length - 160 cm, litter size - 10.5, weight of month-old litter - 47 kg, weight of two-month-old litter - 136 kg.

The 1983 performance test gave the following results: time to reach 100 kg body weight - 196 days, feed/kg gain - 3.90 fodder units, backfat thickness - 30 mm, length of carcass - 96 cm, ham weight - 10.3 kg.

The breed group's champion in 1984 was the sow Ula 374 owned by the Chuvash agricultural experimental station in the Chuvash Autonomous Republic, which gave the following results at the age of 56 months: body weight - 265 kg, body length - 166 cm, litter size - 14, weight of one-month-old litter - 82 kg, weight of two-month-old litter - 187 kg. During the fattening performance test its offspring gave the following results: time to gain 100 kg body weight - 187 days, feed/kg gain - 3.83 fodder units, backfat thickness - 28 mm, length of carcass - 97 cm, ham weight - 10.6 kg.

The breed group consists of 11 boar lines and 21 sow families.

The group is raised and improved at the Chuvash agricultural experiment station and at 4 pig breeding units on collective farms in the Chuvash ASSR.

The Tsivilsk breed group is used in crossing with the Large White in the Chuvash Republic breeding system. The breeding is directed toward improving maternal quality and fattening performance.

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4. SHEEP

S.I. Semyonov and I.I. Selkin

Domesticated sheep are raised in all agricultural areas of the USSR, the major sheep raising regions being the Ukraine and south European Russia, Central Asia, and southern Siberia. On a smaller scale sheep are raised in central and northwest European Russia; they are practically nonexistent in northern Siberia and the Far East.

The wide geographical distribution of sheep and the variety of the environmental conditions where they were kept in the past have resulted in the emergence of a multitude of sheep breeds adapted to these conditions. There are more than 60 breeds and breed groups in the USSR today, which differ in morphological and productive characteristics. All of them (except the Oparino, the Tsigai and the coarsewooled breeds) were developed during the Soviet era.

The work of developing new breeds was carried out on the basis of local coarsewooled sheep by crossing them with or grading them to improved finewooled and semifinewooled breeds. As a result such breeds as the Voloshian, Mikhnov, Bozakh, Karabakh, Shirvan and Darvaz have almost disappeared. The Mikhnov and Shirvan merit conservation. The following breeds are also reduced to small numbers and need to be preserved in conservation flocks: Georgian Fat-tailed Finewool, Georgian Semifinewool Fat-tailed and Kuchugury.

The number of sheep in recent years has varied from 142 to 146 million. On 1 January 1980 it was 141.6 m including 116 m publicly owned and 25.6 m privately owned. The public establishments had 85.9 m purebreds and 30.1 m grades. The monograph describes the 52 chief breeds totalling 76.2 m. It does not include native breeds present in small numbers and breeds under formation (8 breeds totalling 4.5 m sheep) and 7 imported breeds (5.2 m).

The most popular classification of breeds in the USSR is the one suggested by M.F. Ivanov, which takes into account the major production characteristics, i.e. the quality of wool and the relation of meat production to that of wool (see Table 4.1). In terms of numbers and productivity the finewooled sheep rank first, followed by semifinewooled, coarsewooled, and semicoarsewooled breeds.

Table 4.1 CLASSIFICATION AND NUMBERS OF BREEDS

	Numbers at 1 January 1980 Total	(in thousands) Purebreds
I. FINEWOOLED BREEDS		
1. Wool breeds:		
Grozny	2343	2323
Salsk	109	109
Stavropol	3735	3341
2. Wool-mutton type:		
Altai	4500	3328
Askanian	1783	1614
Caucasian	5058	3703
Kirgiz Finewool	5441	5383

Krasnoyarsk Finewool	2170	1729
North Kazakh Merino	1006	568
South Kazakh Merino	2563	2508
Soviet Merino	7875	5435
Trans-Baikal Finewool	4361	3498
3. <u>Mutton-wool type:</u>		
Georgian Fat-tailed Finewool	2	2
Kazakh Arkhar-Merino	618	522
Kazakh Finewool	3476	3181
Volgograd	614	429
II. SEMIFINEWOOLED BREEDS		
1. <u>Wool-mutton type:</u>		
Tsigai	4150	2959
Georgian Semifinewool Fat-tailed	2	2
2. <u>Mutton-wool type:</u>		
a. Longwool type:		
Kuibyshev	255	132
Russian Longwool	216	178
b. Shortwool type:		
Degeres Mutton-wool	124	-
Estonian Whiteheaded	1.5	1.5
Gorki	60	53
Latvian Darkheaded	386	250
Oparino	8	8
c. Corriedale type:		
North Caucasus Mutton-wool	1783	382
Soviet Mutton-Wool	610	-
Tyan Shan	447	129
III. SEMICOARSEWOOLED BREEDS		
Alai	48	48
Armenian Semicoursewool	43	43
Kargalin Fat-rumped	110	110
Sary-Ja	808	550
Tajik	126	93
IV. CQARSEWOOLED BREEDS		
1. <u>Pelt type:</u>		
Romanov	523	462
2. Fur type:		

Karakul	12 432	11 968
Sokolki	190	168
3. <u>Mutton-fat type:</u>		
Edilbaev	5256	2419
Hissar	478	444
Jaidara	876	846
4. <u>Mutton-wool type:</u>		
Kuchugury	8	8
Mikhnov *	-	-
Voloshian	-	-
5. <u>Mutton-wool-milk type:</u>		
Andi	17	16
Balbas	355	337
Bozakh *	-	-
Darvaz *	-	-
Imeretian	0.8	-
Karabakh *	-	-
Karachai	55	52
Lezgian	238	76
Shirvan *	-	-
Tushin	928	704

The figures in Table 4.1 refer only to purebred and grade animals on state and collective farms and other state institutions; they omit sheep on private holdings (breeds marked with an asterisk) as well as scrub and castrated animals.

Breeding work depends on a farm's specialization. Breeding farms produce replacement stock for pedigree and commercial flocks. Commercial farms produce wool and mutton.

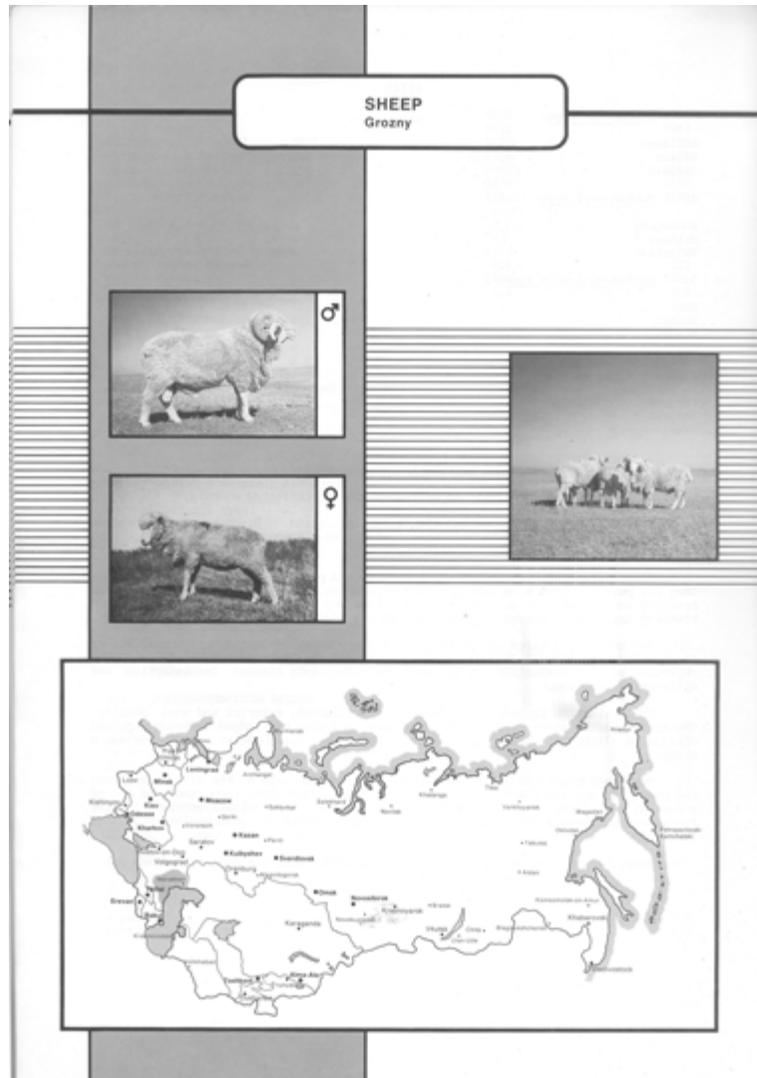
Breeding centres outline breeding targets and policies for a particular breed. They use pure breeding with selection and inbreeding. Commercial farms use both pure breeding and crossbreeding. There are 1500 breeding stations, breeding sovkhoses and breeding farms of kolkhoses and sovkhoses in the country.

The category decides the percentage of sheep to be evaluated. It is 45-50% at the breeding centres, 35-40% on breeding farms and 25-30% on commercial farms. The objective of the evaluation is to sort the sheep into classes for selection and differential feeding.

The evaluation includes development, constitution, exterior and wool quality. The most valuable stock such as breeding rams and ewes are judged individually and classed as elite, 1st class, 2nd class, 3rd class or cull. Others are judged as a group.

The State Flockbook lists only purebred rams and ewes of the elite class and two years old and older which are by a sire of the elite class (top stud) and out of a dam of the first class or above (single stud). The animals entered in the Flockbook must have a good conformation, strong constitution, good health, and high fertility.

About 80% of ewes are artificially inseminated. Rams are progeny tested.



I. FINEWOOLED BREEDS

1. Wool Type

GROZNY (Groznenskaya)

The Grozny is a most valuable breed developed during 1929-50 at Chervlennye Buruny breeding centre in the Dagestan ASSR which is located in an extremely arid part of the Nogai steppe.

According to the breed regionalization plan, the Grozny is raised in steppe areas of the Dagestan, Kalmyk and Checheno-Ingush ASSRs and in Stavropol territory and Astrakhan region of the Russian Federation.

The breed is based on purebred Australian Merinos imported in 1929. In addition, ewes of the Novocaucasian and Mazaev Merino breeds were repeatedly crossed with Australian rams until crosses were obtained which met the desired standards and these were used in the same way as the Australian Merino.

The breed was developed in order to obtain animals of the wool type but stronger, with a greater live weight and wool clip, and well adapted to semi-

desert conditions. The animals which did not meet the desired standards were mated with the Australian Merino or with Australian Merino high grades.

Breed numbers have remained steady since 1964. In 1980 the breed totalled 2 343 055 (99% purebred) including 8572 breeding rams, 43 634 other rams, and 1 686 058 ewes and yearling ewes.

In appearance Grozny sheep are similar to the Australian Merino but somewhat larger in size. They are medium-sized, have a compact body and satisfactory conformation (but hindlegs are often cow-hocked); the constitution is lean and strong and the frame is light and firm. Rams are usually horned; ewes are hornless. Most sheep (80-90%) are moderately wrinkled; rams have three large neck folds and ewes usually have one or two and also a well-developed skin fold and numerous small wrinkles over the body.

Withers height of ewes is 59-62 cm, oblique body length 63-65 cm and chest girth 90-100 cm. The average live weight of ewes ranges from 45 to 52 kg and reaches 55 kg with high feeding; the live weight of rams is 80-95 kg. The growth of ewes stops at the age of 3-3.5 years. Meat productivity is low. Carcasses of adult ewes barely reach 20 kg; the ratio of meat to bone is 2-3:1.

The wool is white, of very good quality, soft and silky. The fleece has a closed blocky staple. The outer part of the fleece is dense and staples are oblong or square in cross-section. The basal part is cylindrical in cross-section. The crimp is semicircular, even and pronounced with 6 or 7 crimps per centimetre. The wool is of 64s (70-80%) and 70s (20-25%) quality in ewes, and chiefly 60s-64s in rams, or 58s in some animals. The predominant staple length is 8.0-8.5 cm, with a range from 7.5 to 13 cm. The distribution of fibres within the staple is very even. The yolk is white, sometimes light cream of good quality. It is moderately soluble in cold water, so the outer section of the fleece is only slightly contaminated. Wool covers the head as far as the eyes and the limbs down to the hocks and knees. The covering of the belly is good; the wool there is sufficiently long and dense.

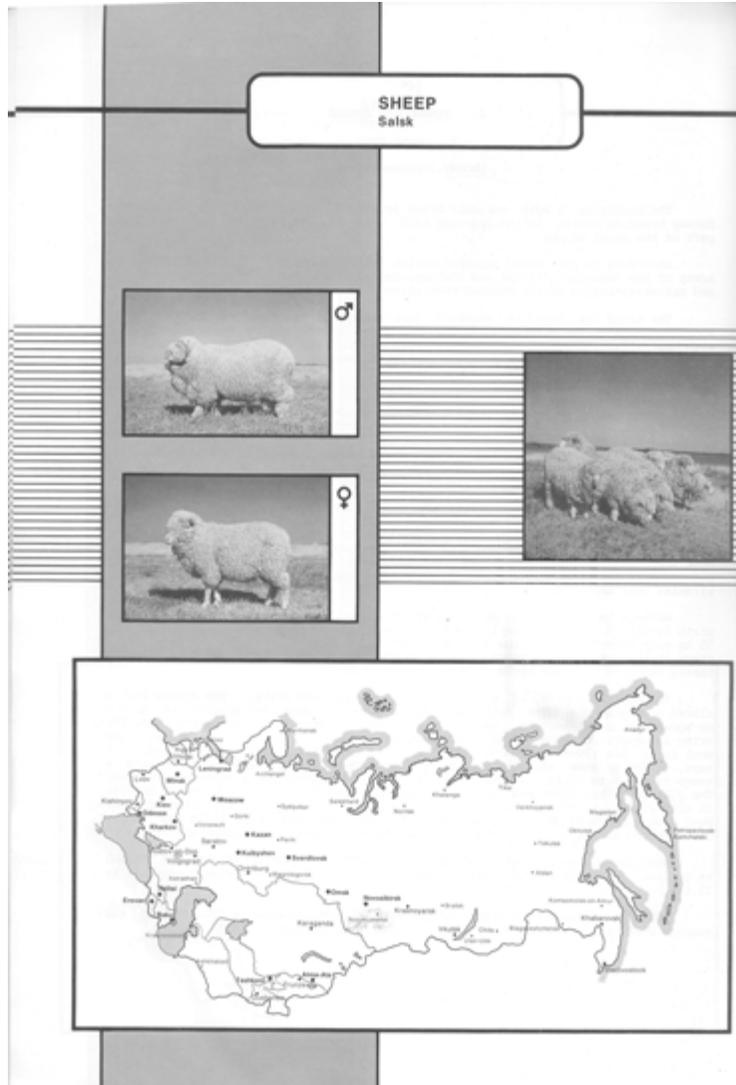
Wool production is high. Fleece weight reaches 6.5-8.0 kg in ewes and 16-18.0 kg in rams. The clean wool yield is some 45% (range 40-50%). The yolk content is 19.1%.

The average number of lambs dropped per 100 ewes lambing is 120-140, and the average milk yield is some 100 kg in 4.5 months of lactation.

The most productive and typical Grozny flocks are raised in large numbers on Chervlenny Buruny breeding farm in the Dagestan Autonomous Republic, Shelkovski breeding farm in the Checheno-Ingush Autonomous Republic and the breeding farm named for the 60th Anniversary of the Soviet Union in the Kalmyk Autonomous Republic. The flocks include major commercial types of the breed, and the breeders work with 5 or 6 strains each with its own typical characteristics.

Due to their high breeding merits and ability to increase wool production, Grozny sheep are widely used in nearly all areas where finewooled breeds are raised. Breeding and selection are currently under way, aimed at further enhancing the ability of sheep to transmit specific traits of the wool covering and at differentiating more clearly the intra-breed commercial types.

The State Flockbook lists 3408 ewes and 133 rams.



SALSK (Salskaya)

The Salsk breed was developed between 1922 and 1950 at Budenny stud farm in Rostov region which lies in the extremely arid Salsk steppe. Sheep there subsisted mainly on the pasture of the virgin lands and harvested hay. Pastures were utilized both in summer and in winter; when there was a little snow the sheep ate fescue (*Festuca sulcata*) and wormwood (*Artemisia*). At the same time sheep were given hay and small quantities of concentrates. Lately, supplements have increased in popularity at the expense of range forage.

The breed was created by crossing American Rambouillet rams onto the local Novocaucasian and Mazaev Merino ewes for three successive years. The sheep used for crossing were typical specimens of their respective breeds, with all their shortcomings. The aim of crossing was to improve constitution and conformation and to obtain larger animals of the wool type, well adapted to the local conditions and producing large clips of fine and long wool. From the stock of local animals ewes were chosen which were

close to the preferred type. Crossbreds which did not meet the established criteria were rejected. The best halfbred rams were widely mated to ewes regardless of breed. Management and feeding were improved.

Its numbers have declined from 357 548 (46% purebreds) in 1964 to 108 694 (all purebreds) in 1980 including 1123 breeding rams, 1672 other rams and 78 569 ewes and yearlings.

In constitution (wiry and strong) and productivity Salsk sheep are similar to the Soviet Merino of the wool-mutton type; they are large in size, have few wrinkles and a satisfactory conformation. Spare skin takes the form of an apron on the lower part of the neck and, rarely, of annular wrinkles.

The live weight of ewes is 50-56 kg and that of rams is 95-110 kg. The average carcass weight of adult finished wethers is 33.5 kg and of ewes 27.2 kg. The 6.5-month-old wethers weigh 14.3 kg.

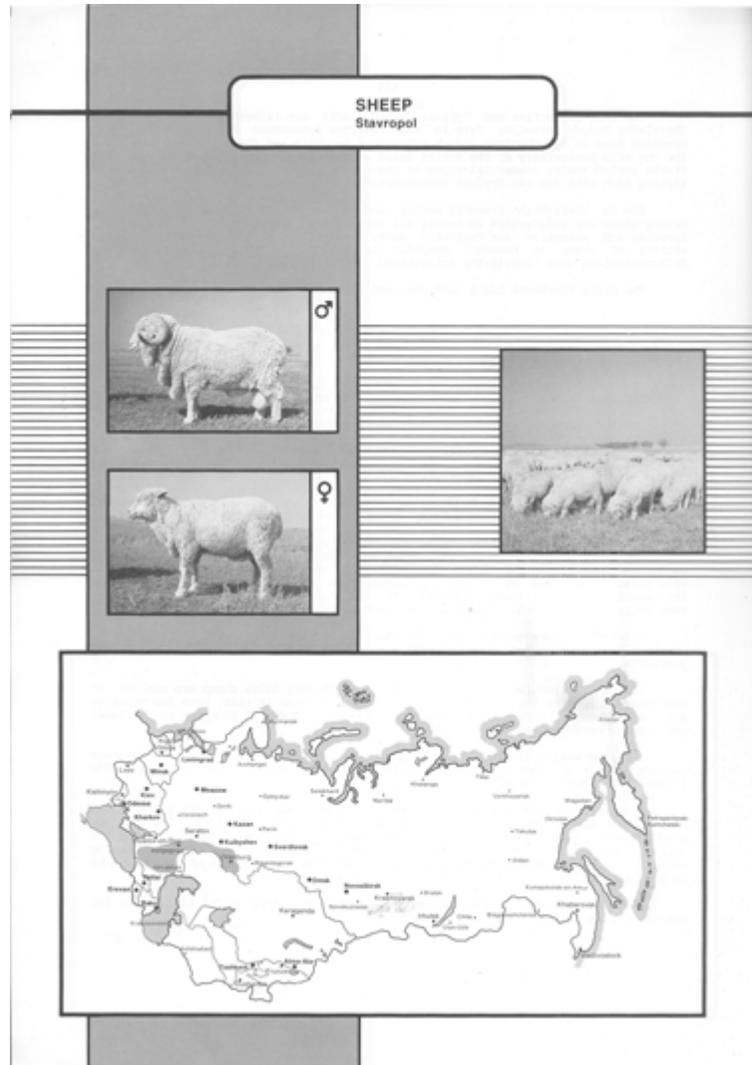
Wool is white and uniform. The fleece is closed and has a blocky staple.

The staple is mainly cylindrical in cross-section. The crimp is distinct. The wool is predominantly of 64s quality but partly 70s in ewes and 60s-64s in rams. The wool is strong. Staple length is 8.0-8.7 cm in ewes and 8.5-9.0 cm in rams. Yolk is usually white or light-coloured, and easily washed out by water. Fleece weight is 7.5-8.5 kg in ewes and 16-17 kg in rams. Clean wool yield is 40-42%.

The average number of lambs dropped per 100 ewes lambing is 115-130, and in the best flocks up to 140.

The best flock of the Salsk breed is kept at Budenny stud in Rostov region. According to the breed regionalization plan, the breed is raised on farms of Rostov region. Breeding is aimed at further improvement in breed type, fleece structure and wool quality, and increasing meat production.

The State Flockbook lists 347 ewes and 8 rams.



STAVROPOL (Stavropolskaya)

The Stavropol breed was developed between 1923 and 1950 at Sovetskoe Runo breeding centre in Stavropol territory.

According to the breed regionalization plan this breed is raised in the North Caucasus, the Middle and Lower Volga and in Orenburg region of the Russian Federation.

The breed is based on the Novocaucasian and Mazaev Merinos. They had long, strong, and uniform wool with a high yolk content. At the same time their live weight was low, the conformation was poor, and wool was not dense enough. Therefore, it was decided that along with inter se breeding the local Merino should be crossed with the American Rambouillet. The crosses obtained had a larger size and better conformation but wool quality declined - it became shorter and less even. To improve wool quality the aforementioned crossbreds were mated to Australian Merino rams which were brought from the Chervlennye Buruny breeding centre. Such crossing, together with strict culling, improved the quality of wool and maintained good size and conformation. Selection of long-wooled animals and

assortative mating with improved feeding made long wool a permanent feature. Lambs were given creep feed from the second week and by the age of 3 or 4 months they were receiving 0.3-0.4 kg of concentrates daily. Ewes were mated for the first time at the age of 2.5 years.

In 1950 the breed was recognized and given the name Stavropol. The total number of Stavropol sheep increased from 2 613 812 (37% of them purebreds) in 1964 to 3 734 825 (89% of them purebreds) in 1980 including 27 843 breeding rams, 46 778 other rams and 2 683 946 ewes and yearling ewes.

Stavropol sheep are medium-sized and have a strong constitution and a harmonious conformation. Rams are horned and ewes are usually hornless. The chest is deep and sufficiently wide. The back is level, of medium length; the rump is wide, and somewhat sloping. The legs are wiry and strong, correctly set. The skin is tight and thin. Both ewes and rams have 1 or 2 well-developed skin wrinkles on the neck.

The live weight of ewes is 50-56 kg, the maximum being 102 kg; the live weight of rams is 100-110 kg (maximum 146 kg).

Sheep of this breed have a high wool production. Wool is white, uniform in fleece and staple. The fleece has a blocky staple; the density (both by feel and by measurement) is medium to good. The upper layer is oblong or square in cross-section; the inner layer is chiefly cylindrical in cross-section. The crimp is distinct. The wool is predominantly 64s-70s quality but up to 40% of animals have wool of 70s or higher quality. The wool is strong, elastic, soft and gentle to the touch; it has good spinning qualities. The average staple length is 8.9 cm in ewes and 11.6 cm in rams; maximum figures are 13 and 16 cm respectively. The yolk is white or light cream. Fleece weight is 6.5-7.0 (maximum 13.0) kg in ewes and 14.0-19.0 (maximum 25.0) kg in rams.

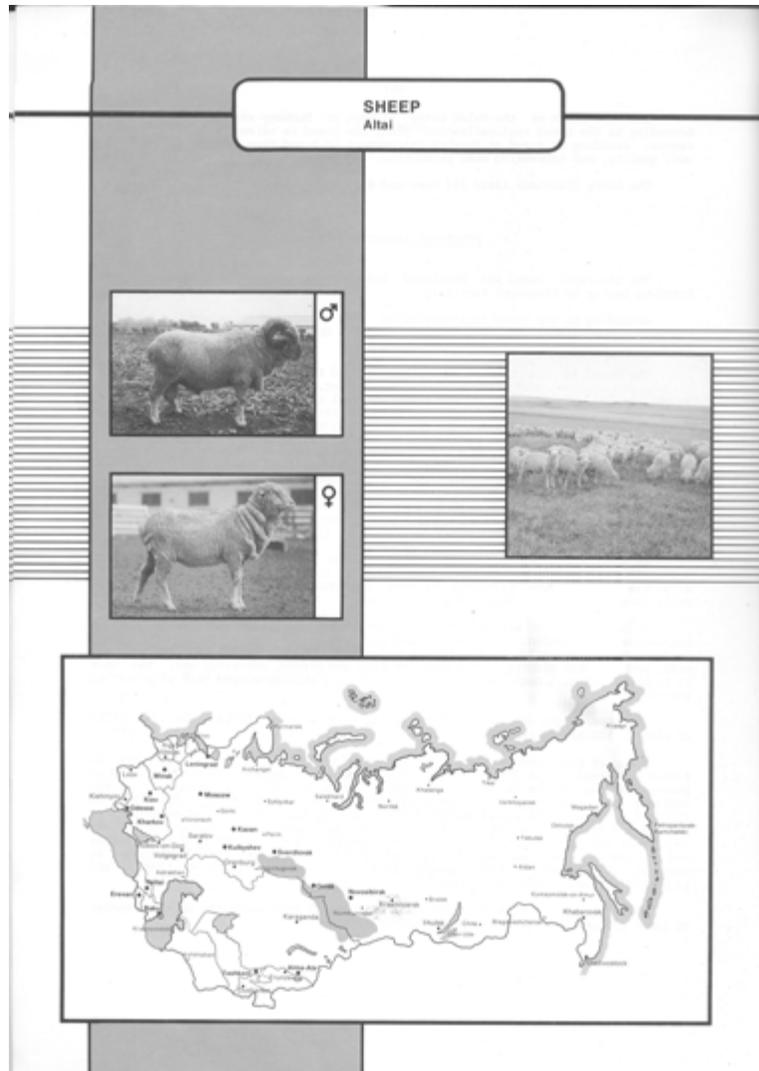
The fertility of ewes is high and in favourable conditions the average number of lambs dropped per hundred ewes lambing is 130-135.

The best Stavropol flocks are raised at Sovetskoe Runo and Rossiya breeding centres and on Lenin collective farm in Stavropol territory and on Kotovski collective farm in Volgograd region.

Stavropol sheep are widely used for improving sheep breeds on collective and state farms in the Bashkir, Dagestan, Kabardino-Balkar and North Ossetian ASSRs, Krasnodar territory and Voronezh and Kuibyshev regions of the Russian Federation, and on farms in the Kazakh, Kirgiz, Uzbek, Ukrainian, and Tajik Republics. They have been exported to and are successfully raised in Czechoslovakia, Bulgaria, Romania and other countries.

Breeding plans envisage further improvement of the wool quality and conformation.

The State Flockbook lists 17 762 ewes and 781 rams.



2. Wool-Mutton Type ALTAI (Altaiskaya)

The Altai breed was produced between 1934 and 1949 at Ovtsevod breeding centre (formerly Rubtsovsk state farm) and on Strana Sovetov collective farm in Rubtsovsk district of Altai territory.

The breed is well adapted to the severe climate of Siberia. According to the breed regionalization plan it is raised in Altai territory, the Bashkir and Buryat ASSRs, Novosibirsk, Tyumen and Kurgan regions of the Russian Federation, and in the Kazakh SSR. Sheep of this breed are also raised in the Mongolian People's Republic.

The breed is based on local Merino sheep which were brought to Siberia from the North Caucasus during 1901-05. From 1928 to 1936 they were mated to American Rambouillet rams. This considerably improved conformation and increased live weight but significantly shortened wool length. The animals obtained did not meet the desired standards; therefore

it was decided to develop a new type of highly productive Merino sheep adapted to the severe climatic conditions of Siberia.

In 1936 Caucasian rams were brought from Bolshevik state farm; Chervlennye Buruny breeding centre provided Australian Merino rams. These rams were mated to large, though shortwooled grade Rambouillet ewes and to finewool x coarsewooled ewes. The offspring obtained were used in the following way: small sheep with good wool characteristics were mated within the same flock to large rams with worsted wool. Sheep of the desired type were bred inter se, while larger individuals with short wool were mated to Caucasian rams. Small sheep with short wool were culled. In 1940 the sheep obtained were approved as a breed group designated by the name Siberian Ramouillet. During the next eight years the breed group was improved and in 1948 the breed was approved and recognized in 1949 under the name Altai Finewool.

The total numbers of Altai sheep have declined slightly since 1964 but purebreds have increased over 6 times. The total in 1980 was 4 499 819 (74% purebreds) including 68 591 breeding rams, 51 998 other rams and 3 285 544 ewes and yearlings.

In appearance the Altai sheep are similar to the Rambouillet. They are large in size; the constitution is strong; the frame is well developed and wool production is high. Rams are horned and ewes are hornless. Most rams have 2 or 3 neck folds, and ewes have 1 or 2 circular skin folds and smaller body wrinkles. The body is long, the back straight, the rump wide and somewhat sloping. The legs are strong, correctly set, but sometimes cow-hocked.

The live weight of ewes is 53-65 kg (max. 108 kg) and that of rams is 105-130 kg (max. 155 kg). Maturity is sufficiently early - by the age of 4.5 months ewe lambs weight 28-30 kg. Growth stops at the age of 2.5-3 years when sheep reach their maximum live weight.

The wool is white; the fleece and staple are uniform. The fleece has a blocky staple, close and dense; the staple is oblong or square in cross-section. The crimp is fine and distinct. The wool from ewes is chiefly of 64s quality: some 3-7% have wool of 70s quality and 8-10% of 60s. Ram's wool is of 64s-60s quality, partly 58s. The staple length of ewes is 8-8.8 cm and that of rams is 8.7-9.8 cm. The average fleece weight from ewes is 6-7 and from rams 14-18 kg. Clean wool yield is 40-42%.

Lambing rate of Altai sheep is high; the number of lambs dropped per hundred ewes lambing is 150-165. At Kuriinski breeding farm of Altai territory ewes had an average lambing rate of 152%; the lamb crop at weaning was 149.3%, and in the best flock, 168.4%. The average milk yield is 102 kg. The carcass weight varies from 42 to 45% of the live weight, with the meat/bone ratio of 3.6:1.

Within the breed, there are 4 ram lines.

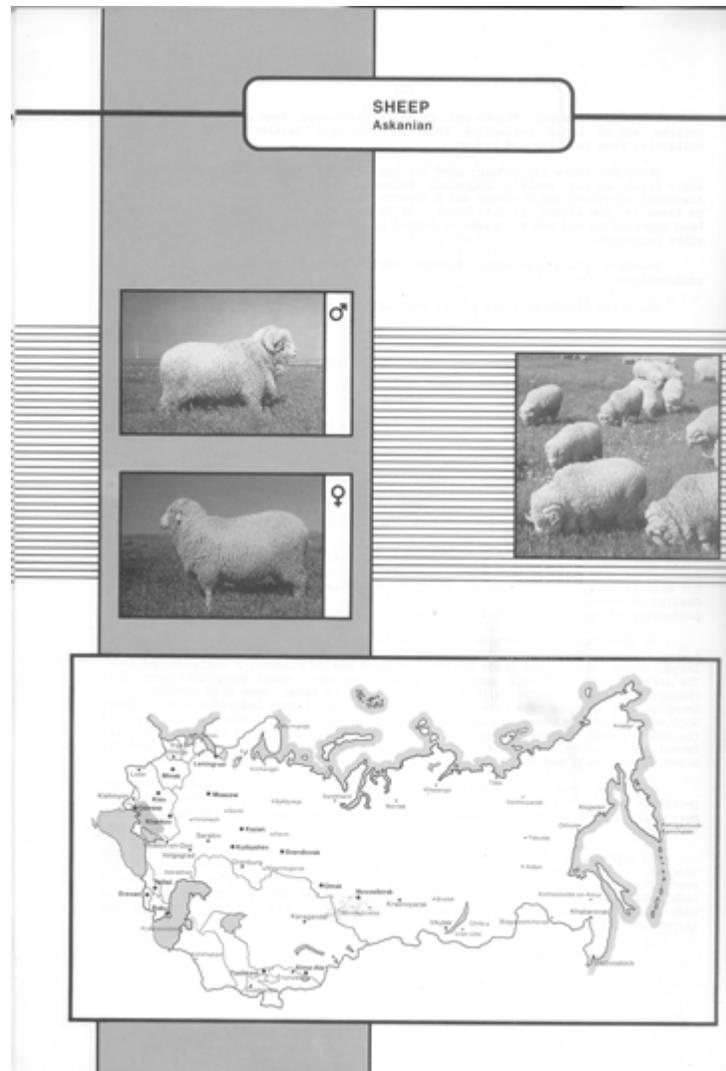
The best flocks of Altai sheep are raised at Ovtsevod and 50th Anniversary of the USSR breeding centres, and on Strana Sovetov collective farm in Altai territory.

Altai rams were used to develop the Trans-Baikal Finewool breed.

The yolk is unstable, easily washed out, and this is one of the weak points of the breed. In addition, in some animals the fleece cover of the body, particularly of the belly, is unsatisfactory. There are also sheep with uneven

or thin fleece of insufficient density. Further breeding is aimed at correcting these weak points.

The State Flockbook lists 12 583 ewes and 426 rams.



ASKANIAN (Askaniiskaya)

The Askanian breed was developed during 1925-34 by M.F. Ivanov in Askania Nova which lies in the arid steppe of the Ukraine. Finewooled sheep had been raised there for more than a hundred years. The breed is based on local Merino sheep which survived World War I and the Civil War. These were small animals with thin wool of medium fineness. Most of them had small wrinkles; the conformation was good and the production low. The live weight of ewes was 40-42 kg (max. 50 kg). The average fleece weight was 4.5-4.6 kg, with a clean wool yield of 33-35%.

M.F. Ivanov set himself the task of producing, on the basis of the Askania-Nova flock, unwrinkled sheep of the Merino type with a live weight up to 60 kg, good conformation, long worsted wool of medium fineness (60s-64s quality) and high fleece weight and wool yield. The animals were to meet the environmental conditions of the Ukrainian arid steppes.

Local Merino ewes were mated to American Rambouillet rams, with selection and culling of the offspring. Meat qualities were improved by

infusing small quantities of Pre/?/coce blood. The most valuable animals were obtained among crossbreds with one-half and one-quarter of Rambouillet blood. To fix the desired type inbreeding was practised on a moderate scale.

After the Second World War the Askanian breed was re-established by pure breeding of the remaining flock and by grading up finewool ewes brought from the North Caucasus with purebred Askanian rams.

Total breed numbers declined slightly between 1964 and 1969 but purebreds increased. Since then they have remained relatively stable. In 1980 the total was 1 782 820 (90% purebreds) including 37 417 breeding rams, 10 649 other rams, and 1 193 157 ewes and yearlings.

The Askanian breed is known for its uniform type and high productivity. Sheep are large in size, have one or two wrinkles, and good mutton conformation. Withers height of ewes is 68-70 cm, oblique body length 70-72 cm, and chest girth 100-102 cm. The skeleton is sufficiently strong; there are no particular faults in the conformation. Rams are horned, and ewes are usually polled.

The live weight of ewes is 58-65 kg (max. 120 kg) and that of rams is 110-120 kg. Ram No. 77 had a live weight of 183 kg - a world record for finewool sheep. Ewes have satisfactory precocity: heavily fed 18-month-olds reach the live weight of adult ewes. The finished weight of 9-month-old lambs is 42.2 kg and the carcass weight is 18.9 kg.

The wool is white and uniform. The fleece has a blocky staple; it is of medium density. The crimp is regular and distinct. The wool is of 64s-60s quality (22-24 *m*) in ewes and 60s-58s (24-26 *m*) in rams. The staple length is 7.5-9.0 cm in ewes and 8-10 cm (max. 13) in rams. The yolk is light yellow or cream, rarely white.

Fleece weight is 6.5-8.0 kg in ewes and 16-19 kg in rams, with clean wool yield of 42-45%. In the best flocks the clean fleece weight is 3.0-3.2 kg. The maximal fleece weight of 31.7 kg was sheared from a ram at the Krasny Chaban breeding centre in the Kherson region, which is the absolute world record for all breeds.

Lamb crop is 125-130 lambs per hundred ewes lambing; in individual flocks it may reach the figure of 150.

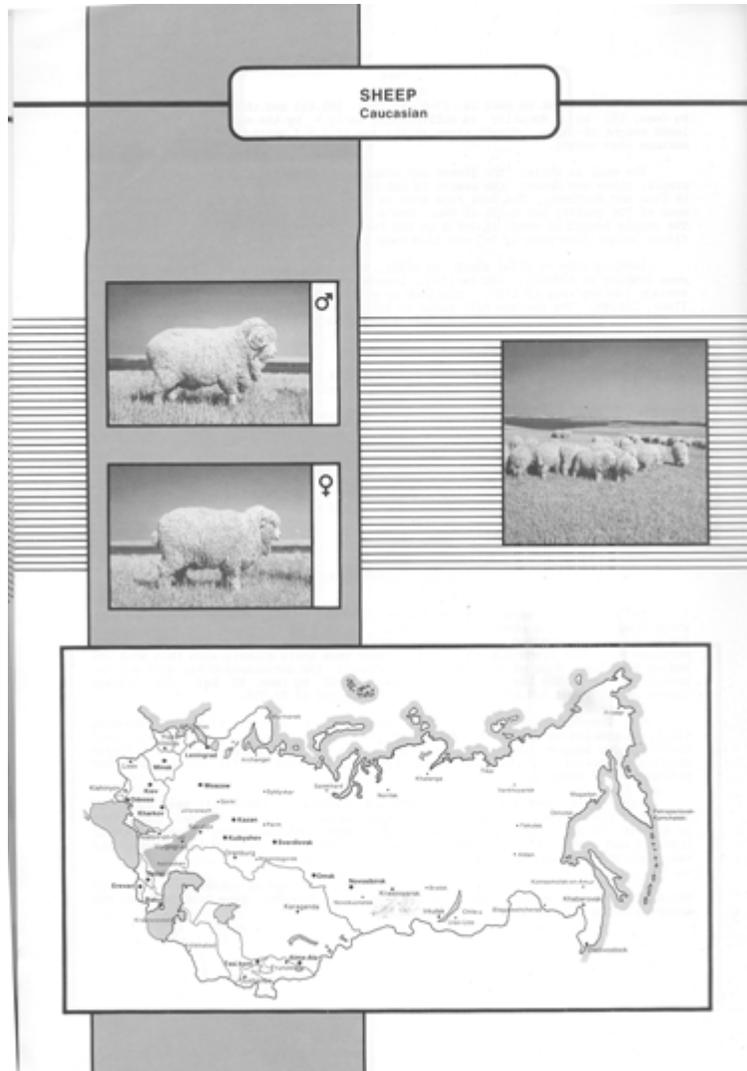
By the time the breed was approved 4 ram lines existed; later 4 new lines were produced.

The best breeding flocks of Askanian sheep are on Askania Nova and Krasny Chaban breeding centres in Kherson region and Kommunist farm in Zaporozhye region.

According to the breed regionalization plan, the breed is raised in the south of the Ukraine and is used for improving other finewooled breeds. It was used to produce such breeds as the Caucasian, Azerbaijan Mountain Merino, and Soviet Merino.

Selection work with the breed is aimed at improving wool and meat qualities, early maturity and adaptability to the conditions of intensive sheep breeding and farming.

The State Flockbook lists 4968 ewes and 200 rams.



CAUCASIAN (Kavkazskaya)

The Caucasian breed was produced between 1922 and 1936 on the Bolshevik state farm in the east of the Stavropol territory which is in an arid steppe typical of sheep raising regions of the North Caucasus. The breed is widely spread in the Stavropol and Krasnodar territories, the Volgograd, Rostov, Ulyanovsk regions and the Kalmyk ASSR. Caucasian sheep are also raised in Hungary, Czechoslovakia, Bulgaria, Romania and Poland. The breed was obtained by crossing local Merinos (Novocaucasian and Mazaev) ewes with American Rambouillet and Askanian rams. Most of the local Merinos had poor fleece density, poor conformation, a low wool yield and excessive yolk. The fleece weight was 1.5-1.6 kg and the wool yield was some 30%. The live weight of Novocaucasian rams was 61-73 kg and that of ewes 43-50 kg. Corresponding figures for Mazaev sheep were 49-65 kg and 29-48 kg respectively.

The aim was to obtain sheep with a greater live weight (55-60 kg in ewes and 100 kg in rams), with better meat conformation, and a heavier clip of long (7.5 cm or longer), strong worsted wool of 64s quality.

The breeding work consists of the following stages: from 1921 to 1926, local Merino sheep, chiefly of the Novocaucasian type, were bred and improved by inter se breeding. From 1927 to 1930, American Rambouillet rams were imported and mated to local sheep. From 1931 to 1936, sheep were bred to achieve uniformity and establish firmly the most valuable characteristics of the Rambouillet and Askanian breeds (which was used in 1935), preserving at the same time the good qualities (long and strong wool, yolk content) of the original population. At this stage rigid selection and culling were applied, sheep were artificially inseminated, and the desired breed type was developed.

Total numbers have declined slightly since 1964 but purebreds have increased two and a half times. In 1980 the total was 5 057 679 (73% purebreds) including 46 915 breeding rams, 55 374 other rams and 3 733 116 ewes and yearlings.

Today, sheep of the Caucasian breed have a strong constitution and a good conformation. They are sufficiently large although somewhat smaller than Askanian sheep but have more skin folds and better wool density. They have from one to three neck folds and numerous body wrinkles which become noticeable after shearing. Individual sheep may either have large folds or be completely without wrinkles. Rams are usually horned; ewes are polled. The body is barrel-shaped, sufficiently long; the withers are somewhat raised above the top line; the legs are strong, sometimes cow-hocked. The legs and head are densely covered with wool.

The live weight of ewes on farms of all types is 48-54 kg and on breeding farms it is 52-58 kg (max. 122 kg). The live weight of rams is 115-123 kg (max. 160 kg). The carcass weight of adult ewes is 23.5 kg and of 7-month castrates 15.2 kg with meat/bone ratios of 3.85:1 and 3.75:1 respectively. The wool is white; the fleece and staple are uniform. The fleece has a blocky staple; the outer part is dense and has a square or oblong cross-section. The crimp is regular, distinct. The wool is usually of 64s quality (20.6-23.0 *m*), the ram's wool is 60s-58s quality (24-26 *m*). The length of ewe's wool is 8.0-8.5 cm, and of rams 9-10 cm. Yolk is predominantly light cream, rarely white.

Fleece weight of ewes on farms of all types is 4.8-5.4 kg and on breeding farms 5.1-5.8 kg (max. 14.0 kg). In rams, fleece weight is 16-20 kg (max. 25.4 kg).

Ewes have high fecundity and milk yield. The average number of lambs dropped per hundred ewes lambing is 130-150. The average daily milk yield during the first 70 days of lactation is 1.5 kg with a fat content of 6.3%.

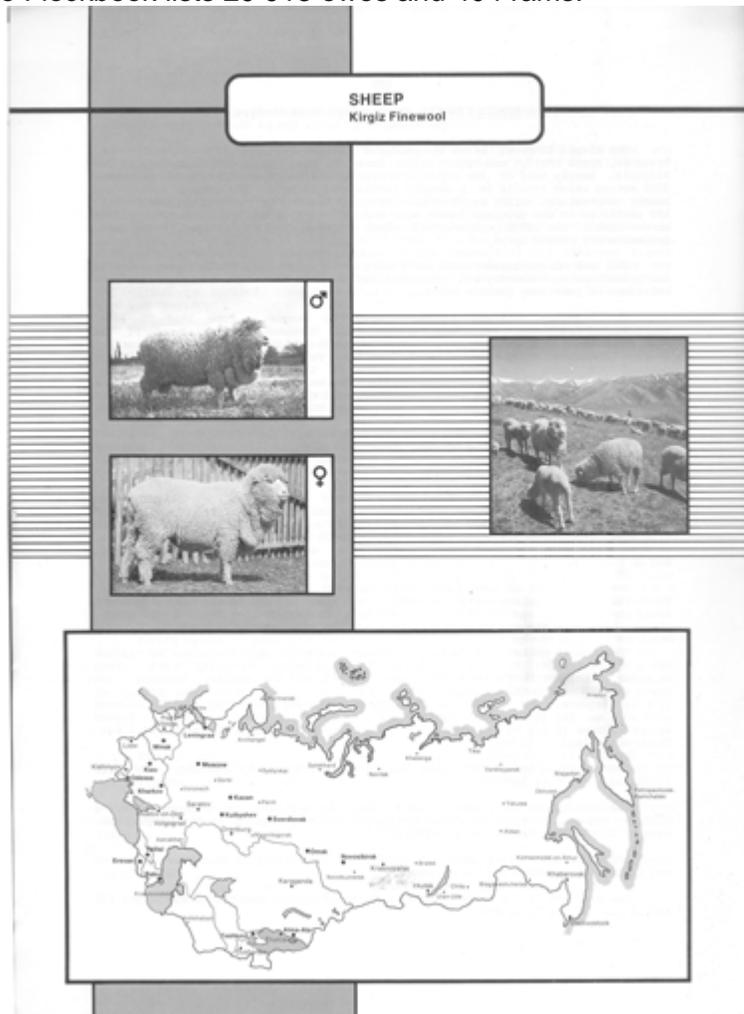
There are 6 main lines.

The best breeding flocks of Caucasian sheep are raised on Bolshevik and 60th Anniversary of the USSR breeding centres in Stavropol territory, and on Privolny state breeding centre in Volgograd region.

Caucasian sheep were used to produce such breeds as the Altai, Azerbaijan Mountain Merino, Georgian Fat-tailed Finewool, South Ural, Volgograd, and Krasnoyarsk Finewool.

The continued breeding work is aimed at increasing the wool clip and yield, improving the quality of wool and yolk and obtaining earlier maturity.

The State Flockbook lists 29 913 ewes and 404 rams.



KIRGIZ FINEWOOL (Kirgizskaya tonkorunnaya)

The Kirgiz Finewool breed was produced between 1932 and 1956 on Juan Tyube, Orgocher, Katta Taldyk and other state farms to suit the specific conditions of Kirgizia. Nearly half of the republic's territory lies at an altitude of more than 3000 metres which results in a sharply continental climate. The average winter and summer temperatures differ by 30-35 C. Kirgizia has a very variable rainfall, with 100 to 110 mm in the mountain desert zone and 800 to 1000 mm in the mountain pasture zone. Until the 1930s coarsewooled sheep of the Kirgiz fat-rumped breed were predominantly raised there.

The task of the breeders was to develop a new type of finewooled sheep suitable for transhumance husbandry and characterized by high meat and wool qualities and tolerance of year-long pasture feeding.

The breeding work was divided into three stages. From 1932 to 1940, coarsewooled fat-rumped ewes were crossed with finewooled rams, first of the Novocaucasian and Siberian Merino breeds and later with Précoce and Württemberg (Merino Landschaf) rams imported from Germany. From 1940

to 1949, sheep of the desired type, which were mainly the offspring of three generations of grading-up, were bred inter se. From 1950 to 1955, the work was aimed at improving the characteristics of the breed, particularly its wool qualities. Sheep of the desired type were mated among themselves and to rams of the Caucasian, Altai, Stavropol, Akskanian and, particularly, Grozny breeds.

Numbers, especially of purebreds, have increased steadily since 1964. In 1980 the total was 5 441 006 (99% purebred) including 51 685 breeding rams, 39 777 other rams and 3 893 895 ewes and yearlings.

Sheep of the Kirgiz breed have a strong constitution and a harmonious conformation. They have few or no skin folds; rams have 1 to 3 incomplete folds on the neck. The chest is wide and deep. The body is slightly elongated and with wide-apart legs which are of moderate length. Hoofs are tough. The colour is white; in some sheep there are light brown or brown spots on the ear-tips, around the eyes, and on the legs.

The live weight of ewes is 55-65 kg (max. 88 kg) and that of rams 100-110 kg (max. 122 kg). They are early maturing: ewes reach 85-87% of the live weight of adult sheep by the age of 18 months. In meat characters they surpass fat-rumped sheep; their carcass weight is 4-5 kg more and the meat quality is higher.

The wool is white; uniformity of fleece is good or satisfactory. The fleece has a blocky staple; it is closed and sufficiently dense. The crimp in most sheep is normal, distinct. The wool is of 64s (60-65%) and 60s quality (35-40%); the ram's wool is of 60s-58s quality. The staple length is 7.0-8.0 cm. The quality of yolk is adequate. The covering of the body is also adequate: the head is covered with wool as far as the eyes and the limbs down to the knees and hocks. Fleece weight of ewes is 4.3 kg (range 3-8.5 kg); that of rams is 12.0 (range 9.5-14.0 kg). Clean wool yield is 52-56%.

Lambing rate is 120-150 lambs dropped per hundred ewes lambing; the best flocks have a 170.6% lamb crop.

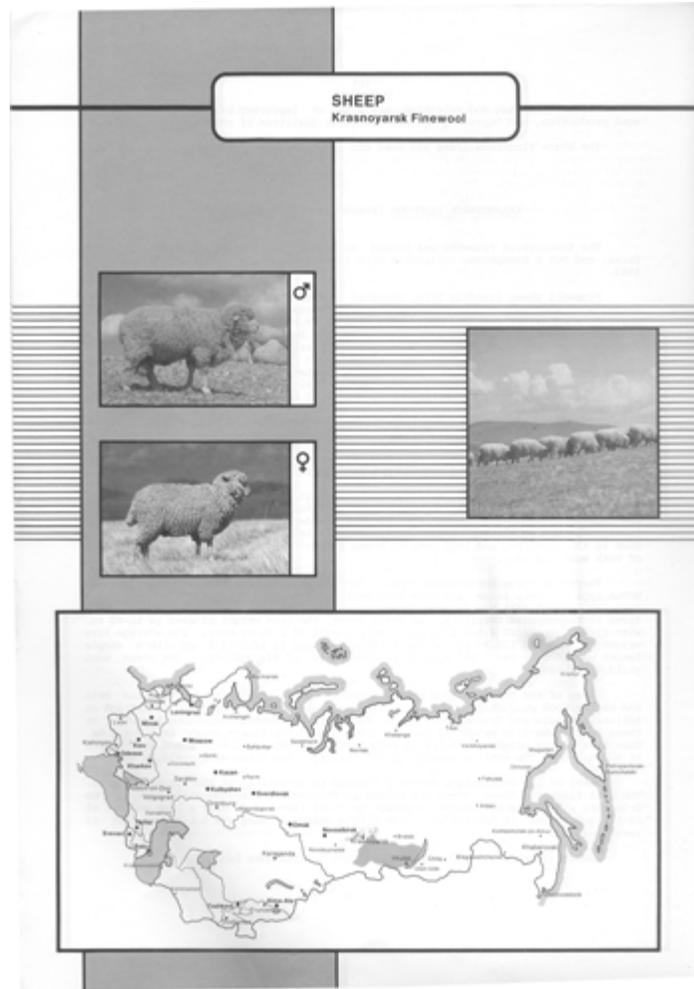
The best flocks are raised at Lushchikhin, Katta Tal dyk and Kochkorka breeding centres, and at the Orgocher Sheep Breeding Experiment Station in the Kirgiz SSR. Each of these farms has 4-5 outstanding ram lines.

Strong points of this breed are hardiness, and ability to walk long distances and subsist on mountain and valley pasture.

Sheep of the Kirgiz Finewool breed are raised in most regions of the Kirgiz SSR and in part of the Tajik SSR.

Further breeding and selection are aimed at improving breed type, increasing wool production, and improving the technological qualities of the wool.

The State Flockbook lists 395 ewes and 130 rams.



KRASNOYARSK FINEWOOL (Krasnoyarskaya tonkorunnaya)

The Krasnoyarsk Finewool was formed on Moskovski, Uchumski and Askizski state farms, and Put k Kommunismu collective farm in Krasnoyarsk territory between 1926 and 1963.

Finewool sheep breeding first appeared in Krasnoyarsk territory in 1911-12 when Mazaev and Novocaucasian Merinos were brought from the North Caucasus. In 1926 American Rambouillet rams and ewes were brought in. Along with pure breeding, mass crossing of coarsewooled ewes with finewooled rams began. In 1930, several thousand Précoce sheep were imported from Germany (i.e. German Mutton Merino). Because of their better wool, further breeding was based on Précoce and Rambouillet rams of various grades with the desired productivity. Later, Askanian and Grozny rams were used to improve the wool. The problem was to obtain strong and hardy sheep capable of subsisting on pasture, with the conformation of the Précoce but with higher wool production.

Careful breeding has resulted in the emergence of a new breed designated the Krasnoyarsk Finewool. The total numbers of sheep of this breed have doubled since 1964. In 1980 they numbered 2 169 964 (80% purebreds)

including 10 934 breeding rams, 28 019 other rams and 1 590 714 ewes and yearlings.

Sheep of this breed have a strong constitution, large size and good conformation. In appearance they resemble the Pr coce. Rams may have horns; ewes are usually polled. The chest is sufficiently wide and deep, the back is broad and level, the rump is wide and somewhat sloping. Thighs are full. The head is woolled down to the eye-line, and legs down to knees and hocks. Sheep have a good production of both meat and wool.

There are three intra-breed types: Uchum, Khakass, and Angara. Sheep of the Uchum type are very large and have good meat conformation. The best flocks of this type are at Uchumski breeding centre, and on Yenisei and Uzhurski breeding state farms in Krasnoyarsk territory. On these farms, the live weight of ewes is 55-60 kg, with fleece weight of 4.5-5.2 kg and staple length of 8 cm or over. The average live weight of rams is 120.9 kg and their fleece weight is 10.0-14.4 kg with a staple length of 8.8-9.6 cm. The wool is predominantly of 64s quality. The clean wool yield is 50-52%.

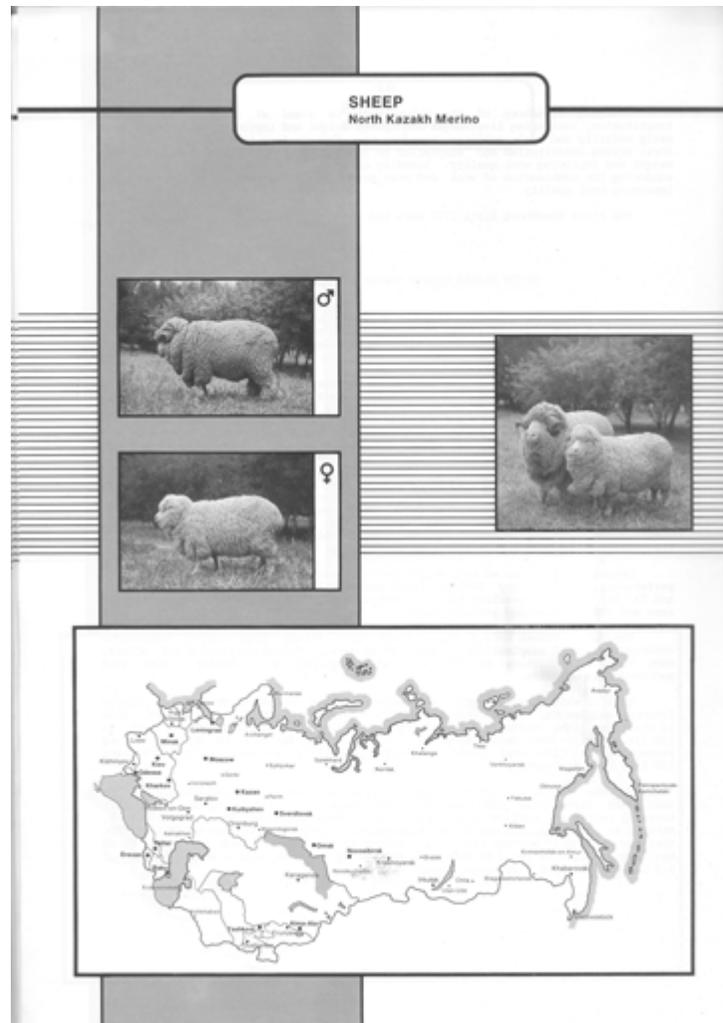
Sheep of the Khakass type have a somewhat lower live weight, more loose skin and higher wool production. The best flocks are at Moskovski breeding centre and on Askizski, Rossia and Krasnoozerny state farms of the Khakass Autonomous Region. In these flocks the live weight of ewes is 50-55 kg and the fleece weight is 5.2-6.2 kg. Rams have a live weight of 93-118 kg with fleece weight of 12.6-16.1 and wool length of 9.0-9.6 cm. The wool is chiefly of 64s quality. The clean wool yield is 48-50%.

Sheep of the Angara type are well adapted to conditions of the cis-Baikal area. The best flocks of these sheep are raised on Prevomaiski breeding state farm and on Primorsky state farm of Irkutsk region. On these farms, ewes have a live weight of 55-60 kg and rams of 100-111 kg; the fleece weight of ewes is 5-6 kg and that of rams 13-14 kg.

Lambing rate is 120-130 lambs dropped per hundred ewes lambing.

Breeding of sheep of the Uchum type is aimed at strengthening their constitution, increasing live weight and fleece weight and improving meat qualities, early maturity and wool quality. Breeding the Khakass type is aimed at preserving their strong constitution and adaptation to range conditions, at increasing fleece weight and improving wool quality. Breeding of sheep of the Angara type is aimed at enhancing the combination of wool and meat production, increasing fleece weight and improving wool quality.

The State Flockbook lists 2777 ewes and 46 rams.



NORTH KAZAKH MERINO (Severokazakhskii merinos)

North Kazakh Merinos are finewool sheep of wool-meat type. The breed was recognized in 1976. It was formed on farms in the northern and northeastern regions of Kazakhstan. This area is assigned to this breed in the Breed Regionalization Plan.

The farms of Pavlodar region used to breed finewool sheep of the Novocaucasian and Mazaev types. American Rambouillet rams were then used as improvers. The crosses were satisfactory in weight, constitution and adaptability to the local environment but in wool length and evenness they resembled their female parents. To remove the shortcomings and better the performance, Altai and Askanian rams were used and subsequently Grozny blood was added. Finally only home-bred sires were used.

Finewool sheep populations in Semipalatinsk and Kustanai regions were formed through crossbreeding of coarsewool fat-rumped ewes with rams of the Novocaucasian Merino, Rambouillet and Précoce breeds and the subsequent use of Askanian, Stavropol and the best home-bred rams. The farms of Semipalatinsk region employed Altai, Askanian and Stavropol rams

since 1962. The final stage involved rams of Beskaragaiski breeding centre of Pavlodar region which led to a great similarity in the biological and productive traits of these sheep.

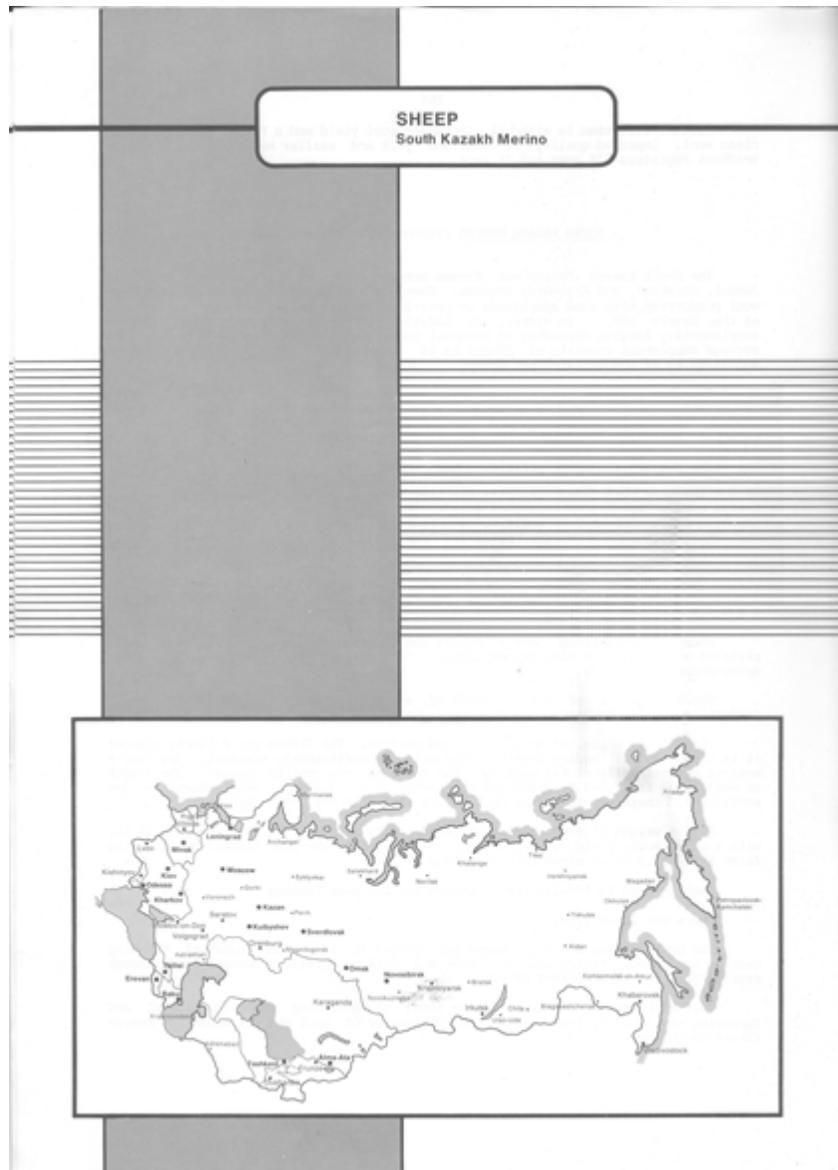
Selection has resulted in a Merino breed characterized by a comparatively high performance. On 1 January 1980 the breed numbered 1 006 300 including 19 400 rams and 733 300 ewes and yearling ewes. Purebreds amounted to 568 300 including 19 400 rams and 390 500 ewes and yearling ewes.

The North Kazakh Merino has a large body, strong constitution, harmonious conformation, good adaptability. Rams are generally horned while ewes are polled. Rams have 1-2 wrinkles on the neck and developed skin folds; ewes have medium-developed folds.

Wool is white, Merino type, 64s quality, with a fine crimp and even in staple fineness and length. Staple length is 8.0-8.5 cm. Fleece has a closed staple. Yolk is white or light cream. Productivity is fairly high. Live weight of rams is 100-110 kg while ewes weigh 55-60 kg. Fleece weight is 10-12 kg and 5.5-6.0 kg respectively. Clean wool yield is 40-43%. Fertility averages 110-120% reaching 130-140% in some flocks.

The best flocks are at Beskaragaiski breeding centre, 50th Anniversary of the USSR state farm, 22nd CPSU Congress state farm in Pavlodar region, Sulukolski breeding centre in Kustanai region and Karakol breeding state farm named after B. Abkanov in Semipalatinsk region of Kazakhstan. These animals are celebrated for their performance: average rams' live weight is 100-110 kg; ewes' weight is 60-65 kg; fleece weight is 13-15 kg for rams and 6-7 kg for ewes, with a staple length of 9.0-9.5 cm and 8.0-8.5 cm respectively.

Further selection is aimed at increased wool yield and a higher percentage of clean wool, improved quality of wool and yolk and earlier maturity. The State Herdbook registers 528 ewes and 36 rams.



SOUTH KAZAKH MERINO (Yuzhnokazakhskii merinos)

The South Kazakh Merino was formed between 1944 and 1964 at state farms in Jambul, Chimkent, and Kzyl-Orda regions. Sheep of this breed combine relatively high wool production with good adaptation to year-long ranging in semi-deserts and deserts of the Kazakh SSR. In winter, in addition to pasture forage, sheep receive supplementary feeding depending on seasonal conditions and the time of lambing. The average supplement consists of 20-200 kg of roughage, 10-150 kg of succulent feeds and 14-40 kg of concentrates per sheep.

The work aimed at transforming coarsewooled sheep into finewools began in 1932. Fat-rumped ewes were first mated to Novocaucasian and Soviet Merino rams, and then to rams of the Caucasian, Grozny and Stavropol breeds. Small numbers of Altai and Askanian rams were also used. The

objective was to improve the quality of wool and increase the clip. The breed of rams used on each farm depended on the quality of the first crosses and the specific economic conditions. Sheep of the desired type were selected among the improved crossbreds regardless of their relationship or origin and were bred inter se. In the last stages, purebred rams of the improver breeds were mated only to crossbred ewes which diverged from the desired type. Pure breeding was accompanied by positive assortative mating in order to fix the desired characters. Thus, a Merino breed has emerged which is well-adapted to local conditions.

Numbers have increased considerably since 1964. There are now (1980) 2 562 817 in all (98% purebreds) including 42 091 breeding rams, 10 903 other rams and 1 839 919 ewes and yearlings.

Sheep of this breed have a strong constitution, a good conformation, solid skeleton and relatively high productivity. On the lower part of the neck they have apron-shaped skin folds.

The live weight of ewes is 50-55 kg, and that of rams is 100-120 kg. Meat production is satisfactory; the slaughter yield of 18-month-old wethers is 47%.

The wool is white, of Merino type and uniform. The fleece has a blocky staple; it is closed and of medium density. The crimp is sufficiently distinct. The ewe's wool is predominantly of 64s quality; the ram's is one quality coarser. The length of ewe's wool is 7.5-8.0 cm and of the ram's is 8.5-9.0 cm. Yolk content is not sufficient; therefore the outer part of the fleece is dry and dirty.

Fleece weight of ewes is 3.7-4.5 (max. 6.2 kg) and that of rams is up to 12 kg, with a clean wool yield of 50-53%. In recent years, the clip sheared on breeding farms is 2.4-2.5 kg of clean wool per sheep.

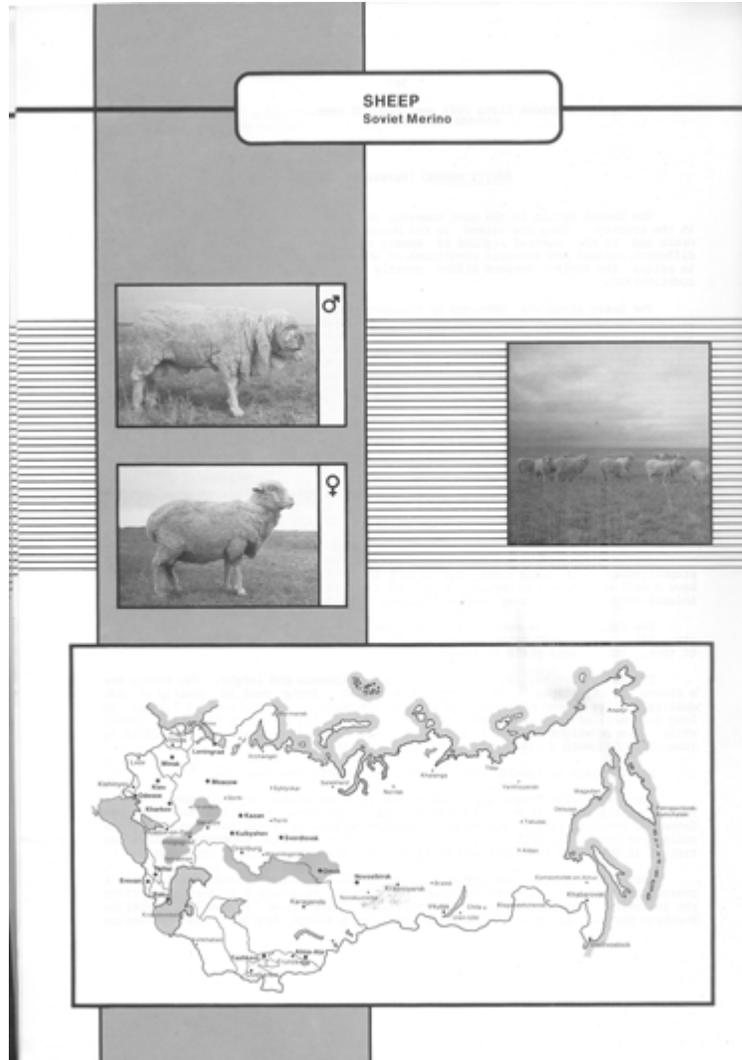
Lambing rate is 140-145 lambs dropped per 100 ewes lambing.

There are 5 ram lines.

The best flocks of this breed are raised at Lenin and Merkenski breeding centres in Jambul region and at Kuyuk and Zhdanov breeding centres and Chanak experimental farm in Chimkent region.

Further breeding and culling are aimed at increasing the clip of wool and improving its quality (increasing the uniformity of wool and eliminating coarse fibres on thighs).

The State Flockbook lists 3044 ewes and 708 rams.



SOVIET MERINO (Sovetskii merinos)

The Soviet Merino is the most numerous and widespread breed of finewooled sheep in the country. They are raised in the North Caucasus, in the Volga area and the Urals and in the central regions of Russia and Kazakhstan. Because of the many different natural and economic conditions in which they are bred and the differences in origin the Soviet Merinos differ greatly among themselves in productivity and constitution.

The basic stock was obtained by crossing local coarsewooled sheep in various parts of the country with finewooled rams of different breeds and breed groups. In the early stages (1925-30) American Rambouillet and Askanian rams were widely used to improve conformation, strengthen the constitution and increase wool production. Later (1930-46), grade Rambouillets and Australian Merinos were used, and when the Caucasian, Stavropol, Grozny, and Altai were developed rams of these breeds were also used for improving the Soviet Merino. In 1938, the finewooled sheep obtained was designated by the name Soviet Merino.

The Soviet Merino breed has a developed structure. There are varieties (North Caucasian and Siberian) and intra-breed types (wool-mutton, wool). Every type is represented by breeding centres, breeding and commercial farms. Breeding farms have various lines based on outstanding sires. The numbers of Soviet Merino sheep increased 4-fold between 1964 and 1969 since then they have declined even more sharply. The total in 1980 was 7 875 218 (69% purebreds) including 115 832 breeding rams, 189 290 other rams and 5 600 810 ewes and yearlings.

Soviet Merino sheep are known for their good conformation, strong constitution, proportionate build, good frame, and correct set of legs. Sheep of the desired type have a well-developed transverse wrinkle on the neck and well-developed body folds. Animals with cow hocks, sway backs or sloping rumps are rare.

The live weight of ewes is 45-55 kg (max. 98 kg) and that of rams is 98-124 kg (max. 147). Ewes reach mature weight at the age of three years and rams at the age of four. The carcass yield is 42-48%.

The wool is white; it is uniform in fibre fineness and length. The fleece has a closed blocky staple. The crimp is distinct. Ewe's wool is usually of 64s quality; a few sheep have wool of 60s and 70s quality. Ewe's wool is 7.5-8.5 cm long and that of rams is 8.5-9.0 cm. The yolk is light yellow or cream, rarely white. Fleece weight of ewes is 5.5-7.0 kg (max. 9.4 kg), and that of rams 11-12 kg (max. 28.4 kg) with a clean wool yield of 39.0-43.0%.

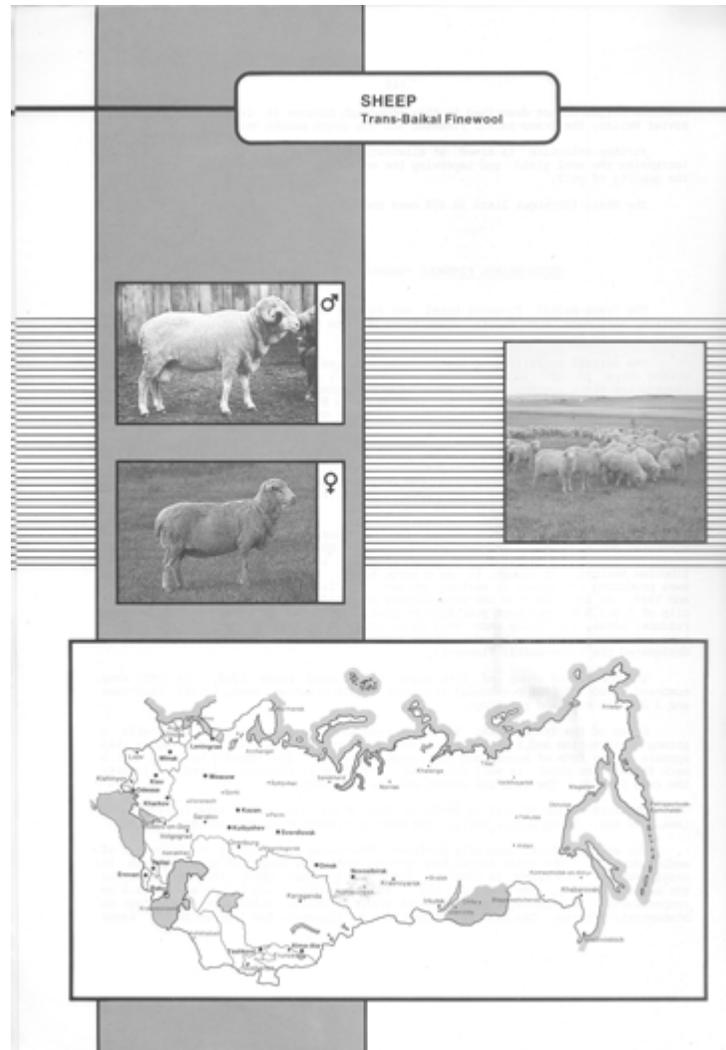
Lambing rate is 130-140 lambs dropped per hundred ewes lambing.

The best Soviet Merino flocks of mutton type are raised at the breeding centre of Kirov collective farm in the Kalmyk ASSR, and those of wool-mutton type at Gashunski breeding centre and at the breeding centres on Lenin and Zavety Ilyicha collective farms in Rostov region, at Aigurski and Krasny Budennovets breeding centres in Stavropol territory and at Maryanovski breeding centre in Omsk region.

Soviet Merino rams were widely used for grading up coarsewooled and finewool x coarsewooled ewes in different parts of the country. As a result of further crossing the following new breeds have emerged: the Trans-Baikal Finewool, Azerbaijan Mountain Merino, South Kazakh Merino, and North Kazakh Merino. The Azerbaijan Mountain Merino is not described in this monograph because it is very similar to the Soviet Merino, the Trans-Baikal Finewool and the South Kazakh Merino.

Further selection is aimed at eliminating weak points in the conformation, increasing the wool yield and improving the evenness of the fleece and staple, and the quality of yolk.

The State Flockbook lists 38 379 ewes and 2324 rams.



TRANS-BAIKAL FINEWOOL (Zabaikalskaya tonkorunnaya)

The Trans-Baikal Finewool breed was formed between 1927 and 1956 at Krasny Velikan, Karl Marx, Komsomolets state farms and on Kommunist and Russia collective farms of Chita Region.

The natural conditions of the Trans-Baikal area are severe. The temperature in winter drops to -40° to -50° C sometimes to -60° ; the summer is hot, and the temperature often reaches 40° C or more; the mean annual temperature is -2° to -3° C. The number of frost-free days in the year is 70 to 80. The rainfall is 250-300 mm. Solar radiation is abundant; cloudy days are few. The vegetation on steppe pastures and hay meadows is scarce and consists mainly of short-stemmed grasses: wheatgrass (*Aneurolepidium racemosum*), fescue (*Festuca sulcata*), hairgrass (*Koeleria gracilis*), meadow grass (*Poa*) and others. The hay yield is 200 to 400 kg per hectare. In the past, mainly Mongolian and Buryat coarsewooled fat-tailed sheep were raised in this region. These sheep produced only 1.0-1.2 kg of coarse wool, but they were well-adapted to the severe local conditions.

Finewooled sheep first appeared in the Trans-Baikal area in 1831 when 316 Electoral and Infantado sheep were brought there. However, neither pure breeding nor crossbreeding was a success. Between 1927 and 1930 Précoce, Novocaucasian and Siberian Merinos were brought in on a large scale. They were mated to coarsewooled ewes producing crossbreds of various grades. The latter were bred inter se in 1943 and 1944. In 1947 and 1948 the best crosses obtained by inter se breeding had a wool clip of 3.2-3.5 kg when kept year-long on pasture. Later, in order to improve them, Précoce, Altai, and Grozny rams were used. Rigid selection of sheep of the desired type and their inter se breeding have resulted in the emergence of a new breed designated the Trans-Baikal Finewool.

The number of sheep of this breed has doubled since 1964. In 1980 they numbered 4 360 534 (80% purebreds) including 31 378 breeding rams, 52 162 other rams and 3 261 313 ewes and yearlings.

Sheep of the Trans-Baikal Finewool breed are medium or large in size, with a strong constitution and a proportionate build. They have few skin folds; spare skin appears in the form of aprons and small body wrinkles. Rams usually have 0.5 to 1.5 neck folds. The chest is well developed. The back is straight, of medium length; the rump is wide. The legs are strong and set correctly.

The live weight of ewes is 55-60 kg (max. 96 kg) and that of rams is 100-115 kg (max. 150 kg). Sheep mature early; the meat conformation is satisfactory.

The wool is white, generally uniform. The fleece has a blocky staple and is of medium density. The outer staple has predominantly the shape of small squares in cross-section. The crimp is distinct, large and somewhat open. The ewe's wool is 60s and 64s quality, ram's 60s and 58s. Staple length is 7.0-8.5 cm and 8.0-9.0 cm respectively. Yolk is light yellow, light cream or white, sufficiently resistant to atmospheric effects. The head is woolled down to the eyes, the legs up to the knees

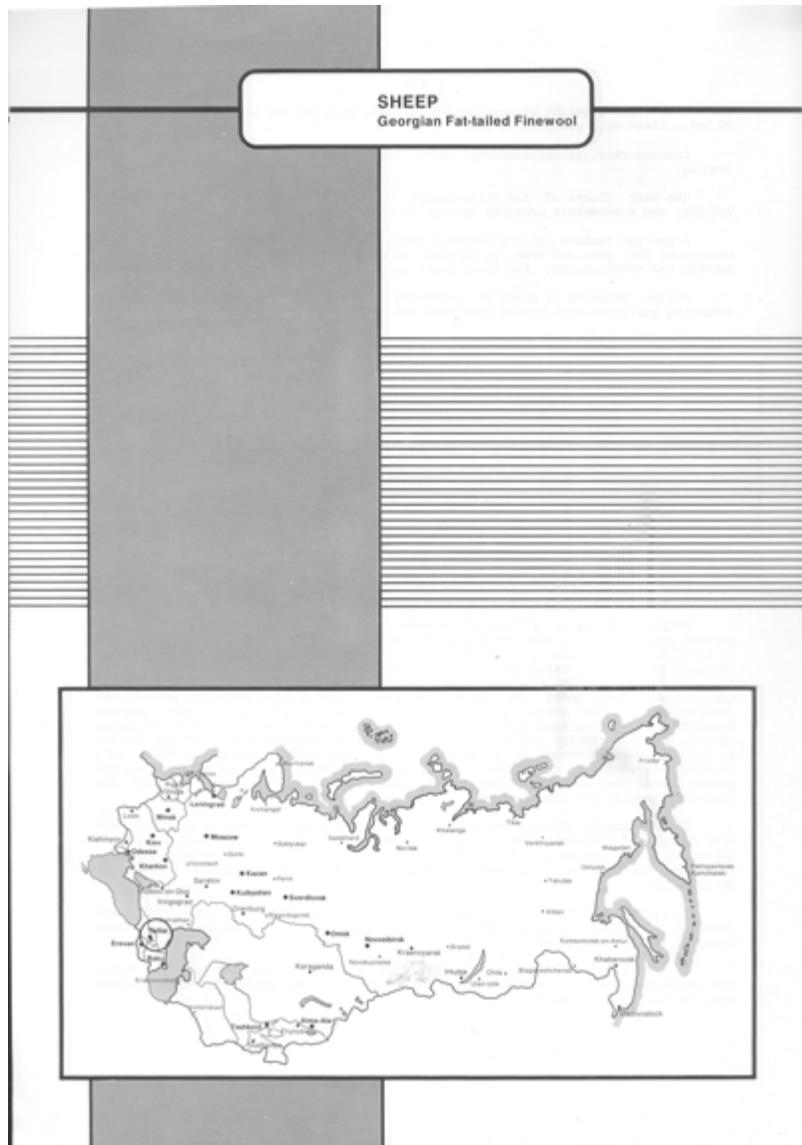
Lambing rate is satisfactory, with 120-130 lambs dropped per hundred ewes lambing.

The best flocks of the Trans-Baikal breed are raised at Karl Marx, Krasny Velikan, and Komsomolets breeding centres in Chita region.

A special feature of Trans-Baikal sheep is their ability to live on pasture throughout the year and even to subsist on snow-covered grasslands. They easily survive low temperatures; therefore light roofless pens are sufficient in winter.

Further breeding is aimed at improving wool quality, increasing the clip, and enhancing qualities that ensure hardiness and viability.

The State Flockbook lists 845 ewes and 205 rams.



3. Mutton-Wool Type GEORGIAN FAT-TAILED FINEWOOL (Gruzinskaya zhirnokhvostaya tonkorunnaya)

The breed was created on Eldari sheep state farm in the Georgian SSR between 1936 and 1959. It was developed by selection, rigid culling, and inter se breeding of crosses of the first and partly of the second generation obtained by mating Tushin ewes to finewool rams.

The breed was developed in peculiar feeding and climatic conditions. Most of the winter pastures of Eldari state farm lie some 450 km away from the farm in a semi-desert steppe area, while summer ranges are alpine and sub-alpine, at altitudes of 1800 to 3050 m. This means that sheep are kept on a transhumance system.

Winter pastures are at 160-170 m above sea level. The climate is dry: the average annual rainfall does not exceed 250-300 mm and the average

annual temperature is 14-15°C. The soils are mainly brown or light chestnut, covered by wormwood (*Artemisia*) and other halophytes. Sheep run on winter pastures from 15 October to 10 May i.e. for about 200 days a year. It takes them some 35 days to reach summer quarters where they spend the rest of the year. The climate there is mountainous continental and the average annual rainfall is 500 to 550 mm. Summer pasture consists mainly of various types of fescue. Vegetation is scarce on winter pastures, therefore, sheep receive supplemental feeding (hay and concentrates) when the weather is bad. In summer sheep subsist on pasture, and supplemental feeding is given only to breeding rams and market rams. When sheep are moved from winter quarters to summer ranges they cover 25-40 km/day instead of the 10 or 15 km which is usual for finewool sheep in the steppe zones.

The aim was to obtain a new breed that would maintain the high productivity and wool quality of finewool sheep and develop viability, hardiness and ability to store nutrients in the fat tail. The new breed was to be capable of subsisting on pastures throughout the year and of covering large distances. Early maturity was also a desired trait.

In 1936, local Tushin ewes were first mated to Soviet Merino rams from state farms of the Rostov region. After 1940 Caucasian rams from the Bolshevik state breeding farm in the Stavropol area were used.

In the first phase of breeding (until 1945), finewool rams were mated to Tushin and crossbred ewes with semicoarse wool in order to obtain crossbreds with uniform semifine wool and fat tails.

In the second phase, when there were enough sheep with semifine wool and fat tails, breeders began work to improve the quality of wool. They used crossbred rams with finer wool; the offspring of these rams fuller corresponded to the desired type.

The result was the emergence of sheep which combined the productivity and biological features of the parent breeds, i.e. uniform fine wool and fat tails. In 1985 the sheep were recognized as a new breed with the name Georgian Fat-tailed Finewool.

Sheep of this breed are raised in two districts of Georgia, i.e. Tsiteli Tskaro and Bogdanovka. According to the breed regionalization plan, in 26 regions of eastern Georgia Georgian Finewool Fat-tailed rams are used along with other breeds of Merino rams.

The numbers of this breed had declined very much even ten years after its recognition. From 42 012 in 1964 it now (1980) numbers only 2018 with 67 breeding rams and 1166 ewes and yearlings.

The special features of Georgian Fat-tailed Finewool sheep are their relatively heavy weight, fat tails and fine wool. They usually have a fine constitution, solid frame and good conformation. The head is light and lean; the profile is straight; the withers are level and sufficiently wide; the chest is wide with well-sprung ribs; the back and rump are level. Muscles are well developed. The body is compact. The legs are strong, correctly set, and with tough hoofs.

The fleece has a blocky staple. The wool is close and dense; these qualities, which are very important with extensive husbandry, are pronounced in most sheep. The wool is mainly of 60s and 64s quality, with a length of 7 cm or more, uniform in length and fineness and with crimp like a Merino. The length, strength, fineness, uniformity, condition and

technological characteristics of the wool make it suitable for the production of worsted fabrics. Yolk is light yellow or white; it helps to preserve the wool. The clean wool yield is 47-53%.

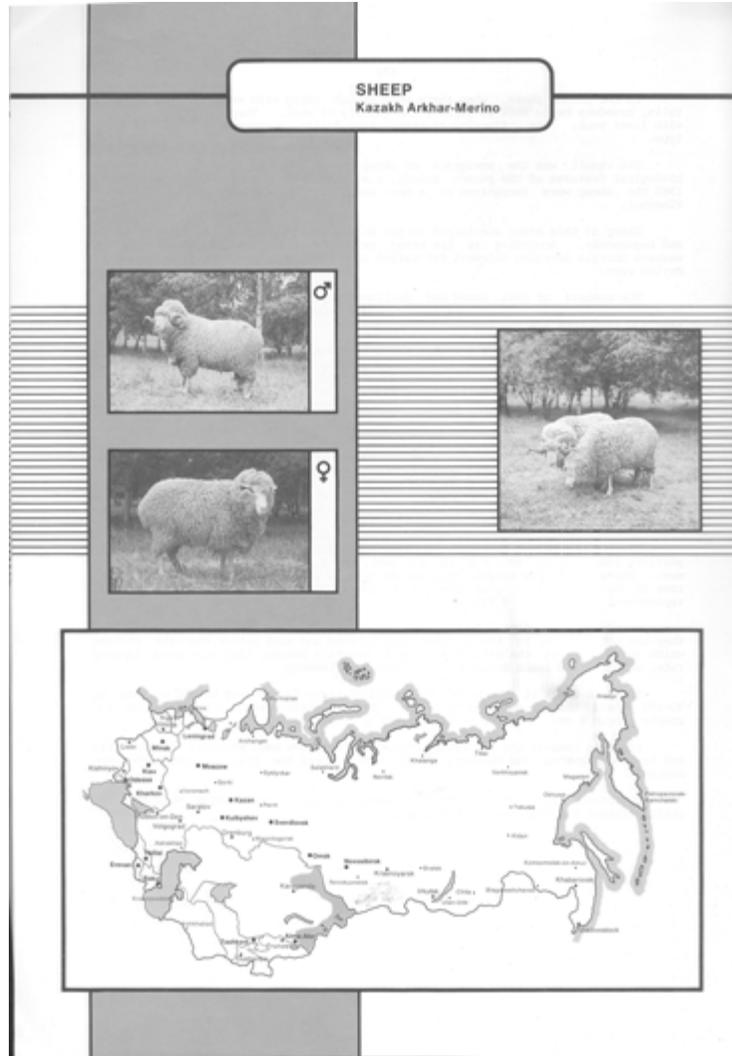
Fleece weight is 7 kg (max. 11 kg) for breeding rams, 5 kg (max. 9.8 kg) for yearling rams, 3.8 kg (max. 6.8 kg) for ewes, and 3.4 kg (max. 9.4 kg) for yearling ewes. The average live weight of breeding rams is 82 kg (max. 120 kg), of yearling rams 50 kg (max. 84 kg), of ewes 56 kg (max. 98 kg) and of yearling ewes for replacement 40 kg (max. 78 kg).

Sheep are well adapted to the extreme conditions of transhumance; in hardiness they are not inferior to the parental Tushin breed and much better than the crosses which are popular in the area. Like other mountain breeds, they have good lambing rate, with 110-118 lambs dropped per hundred ewes lambing.

The best flock of this breed is on Eldari state farm. Live weight of rams is 90-100 kg and that of ewes is 50-55 kg. Average fleece weight is 3.5-4.0 kg and staple length 8 cm. The wool is predominantly of 64s quality.

Breeding rams of the Fat-tailed Finewool breed have been exported to Tajik SSR and to the Dagestan and Checheno-Ingush ASSRs, where the climatic conditions are suitable.

The breed represents a genetic resource of sheep with uniform wool and fat tails suitable for transhumance husbandry.



KAZAKH ARKHAR-MERINO (Kazakhskii arkharomerinos)

The Kazakh Arkhar-Merino breed was produced between 1934 and 1950 at Kurmektinski experiment station of the Academy of Sciences of the Kazakh SSR. The station lies in the Kungei and Zailiiskii Alatau mountains of the Alma Ata region, at an altitude of 2200 metres above sea level. The breed is based on interspecific hybridization of wild arkhar rams with finewool ewes of the Novocaucasian Merino, Précoce and Rambouillet breeds.

The aim was to develop a new breed of finewool sheep which would combine the valuable qualities of the Merino (fine wool, large wool clip, early maturity and good meat qualities) with adaptability to year-long keeping on mountain pastures at altitudes of 2500 to 3000 m.

The work began in autumn 1934 on Kzyl Oktyabr breeding state farm in the Kirgiz SSR. The semen of slaughtered arkhar rams was used to inseminate Novocaucasian Merino ewes, and in 1935 first crosses were obtained. In 1936 four crossbred rams were brought to Kazakhstan and used to inseminate Précoce and Rambouillet ewes. Third-generation cross rams, with 7/8 of the blood of finewool ewes and 1/8 of the arkhar blood, were

mated to second-generation ewes. Ewes with coarse wool were inseminated by Précoce rams.

Numbers have increased only slightly since 1964. The total in 1980 was 617 847 (84% purebreds) including 8216 breeding rams and 453 733 ewes and yearling ewes.

Sheep of the Kazakh Arkhar-Merino breed have a strong constitution and a well-developed and solid frame. Meat and wool production is satisfactory. Sheep are large, long-legged, with a relatively wide, deep and full chest. There is one small lengthwise skin fold on the neck. Rams are usually horned and ewes are polled. The conformation is good and corresponds to that of mutton-type sheep. The legs are strong and correctly set. Sheep are good jumpers and traverse easily the mountainous terrain. Like the arkhar, they have good hearing and a keen sense of smell.

The live weight of ewes is 55-60 kg (max. 90 kg) and that of rams is 90-100 kg (max. 150 kg). The lambs are early maturing and reach 60% of the adult weight by the age of 4-5 months. The slaughter yield of adult wethers is 53% with a carcass weight of 37 kg.

The wool is thin, sufficiently uniform. The fleece has a blocky staple; it is closed and of moderate density. The outer staple has predominantly the shape of small squares in cross section. The wool is chiefly of 64s and 60s quality. The ewe's wool is 7.0-7.5 cm long and the ram's is 8-10 cm long. The head is woolled down to the eye-line and the legs down to the knees and hocks.

Fleece weight of ewes is 3.0-3.5 kg (max. 6.3 kg) and that of rams is 7-8 kg (max. 11.0 kg). The average clean wool yield is 53% (range 50-55%).

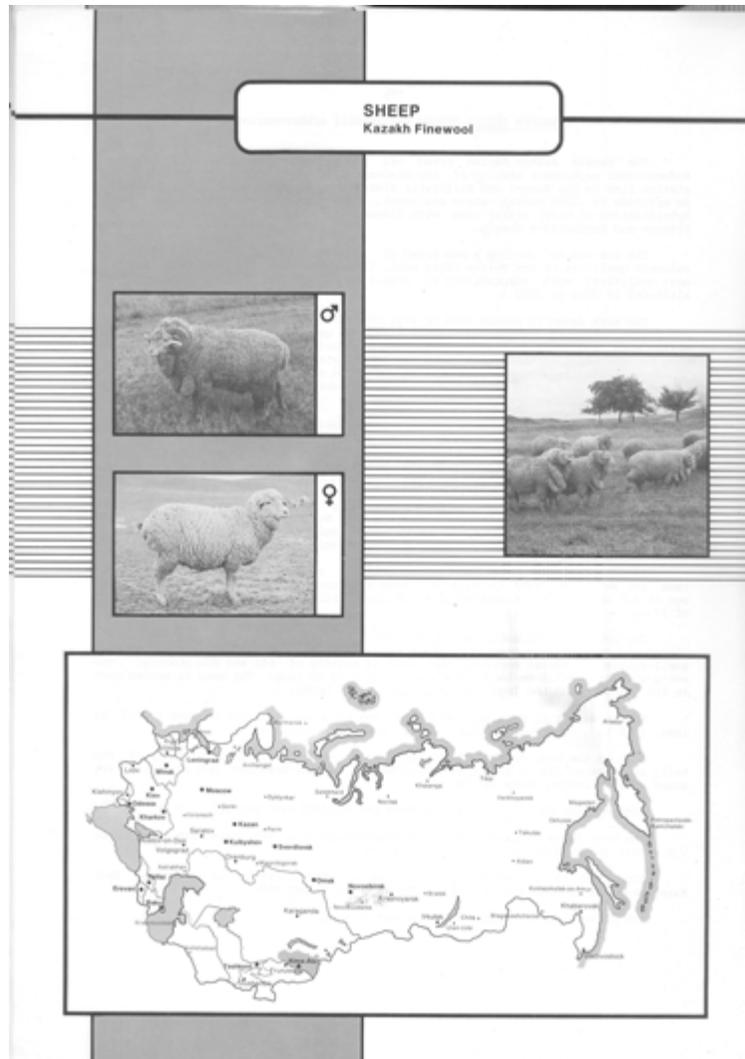
Some of the weak points of the breed are a low wool yield, poor cover of the belly and uneven fleece and staple fineness. Further breeding and selection are aimed at eliminating these faults.

Lambing rate is 115-130 lambs dropped per hundred ewes lambing.

The best flock of this breed is on Uzunbulakski breeding state farm named after V.I. Lenin and N. Krupskaya in Alma Ata region.

The breed is recommended for raising in some districts of Alma Ata, East Kazakhstan, Karaganda, and Pavlodar regions of the Kazakh SSR.

The State Flockbook lists 634 ewes and 24 rams.



KAZAKH FINEWOOL

The Kazakh Finewool was bred on the Mynbaev experimental farm of the Kazakh SSR between 1931 and 1946. The breed is based on the flock of fat-rumped ewes from the former Kargalinsky breeding farm, which were mated to finewool, chiefly Rambouillet and Précoce, rams. The aim was to obtain a new breed that would combine the valuable qualities of the Kargalin variety of the Kazakh Fat-rumped sheep (large size, hardiness and adaptation to local conditions) with wool qualities of the Précoce. The breed was developed in the severe climatic conditions of southern Kazakhstan (Alma-Ata region). Ewes and lambs used to subsist on pasture throughout the year; they received supplemental feeding only when there were snowdrifts or pastures were covered with ice.

In the first stage, fat-rumped ewes were mated to Précoce rams; after selection and culling the offspring of the first and the second generations were bred inter se. Most of the offspring of the first crosses bred inter se had thin, overdeveloped, brittle wool, weak in fibre, and the belly was poorly covered. Therefore, since 1939, local ewes with fine wool were crossed with

American Rambouillet rams. Further selection produced a flock of sheep of the desired type. Finewooled sheep of the flock had high productive qualities and in terms of their adaptability to local conditions were not inferior to fat-rumped sheep.

Numbers have increased considerably since 1964. The total in 1980 was 3 475 799 (92% purebreds) including 55 642 breeding rams, 18 915 other rams and 2 616 652 ewes and yearlings.

Sheep of the Kazakh Finewool breed have good meat and wool production, a high carcass weight, and are suitable for a transhumance system of management. They have a large body size, strong constitution and skeleton and good conformation. Most sheep do not have skin folds or wrinkles. Both rams and ewes are hornless. The body is somewhat elongated; the meat conformation is well pronounced.

The live weight of ewes is 60-65 kg (max. 105 kg) and that of rams is 105-118 kg (max. 140 kg). The weaning weight of ewe lambs is 27-32 kg and that of ram lambs is 30-34 kg. Sheep mature early; by the age of 18 months rams weigh 71% and ewes 86% of the mature weight. In fat wethers the yield of meat and fat reaches 42-47 kg or 55%.

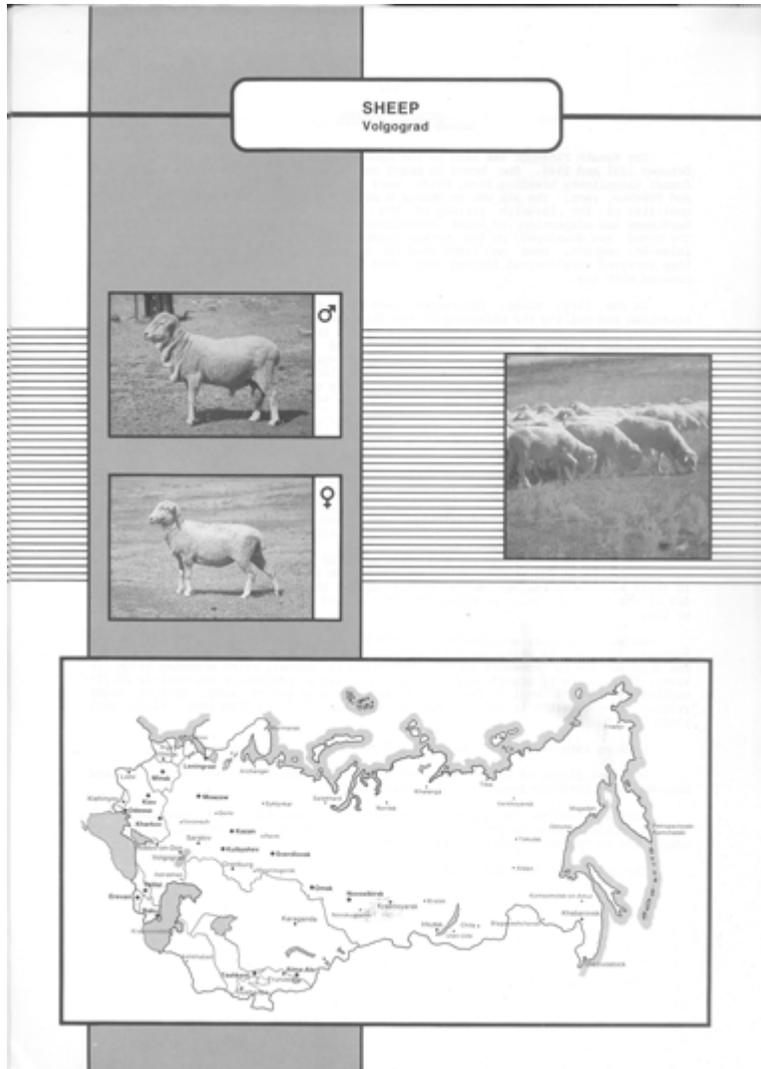
In wool character and fleece structure Kazakh Finewool sheep are similar to the Précoce. The wool is white, usually strong. The fleece has a closed blocky staple; the outer staple is somewhat loose. The crimp is normal, often somewhat large in size. The wool is of 60s-64s quality; a negligible proportion of the wool is of 70s quality. The ewe's wool is 7-8 cm long and ram's is 8-9 cm long. Yolk is light yellow. Fleece weight is 4.3-5.5 kg from ewes and 10-11 kg from rams. Clean wool yield is 50%.

Lambing rate is 105-135 lambs dropped per hundred ewes lambing.

The best flocks of Kazakh Finewool sheep are raised at Mynbaev, Kastekski and Sary-Bulakski breeding centres in the Kazakh SSR.

Further breeding is aimed at increasing fleece weight and improving wool quality, while preserving and increasing the large size and live weight, and perfect adaptation to the severe semi-desert conditions.

The State Flockbook lists 3119 ewes and 260 rams.



VOLGOGRAD (Volgogradskaya)

The Volgograd breed was formed between 1932 and 1978 on Romashkovski state farm in Volgograd region by crossing coarsewooled fat-rumped ewes with finewool rams of the Novocaucasian and Précoce (Soissonnais type) breeds, with some blood of the Caucasian and, in small amounts, of the Grozny breed.

Crossbreds were first obtained by mating fat-rumped ewes to Précoce rams. Then, crossbreds of the desired type, chiefly of the second generation, were bred inter se. The offspring obtained did not meet the desired standards of wool production. Therefore, the problem was not only to improve meat qualities and achieve early maturity but to improve wool production as well. To achieve this, rams of the Caucasian and, in some case, of the Grozny breed were used since 1948. Selection and rigid culling produced a stock of sheep of a new type, which in 1978 were approved as a new breed with the name Volgograd.

The number of sheep of this breed has increased from 22 616 in 1964 to 614 338 (20% purebreds) in 1980 including 2395 breeding rams, 5477 other rams and 412 726 ewes and yearlings.

Sheep of the Volgograd breed are large in size and have well-pronounced meat features and a harmonious conformation. Withers height is 68-70 cm and oblique body length 70-73 cm. Ewes and most rams are polled. Sheep have no wrinkles, except an apron or a skin fold on the neck. Withers, back and loins are wide and the back is level. The body is compact; the legs are strong, correctly set, and the thighs are full.

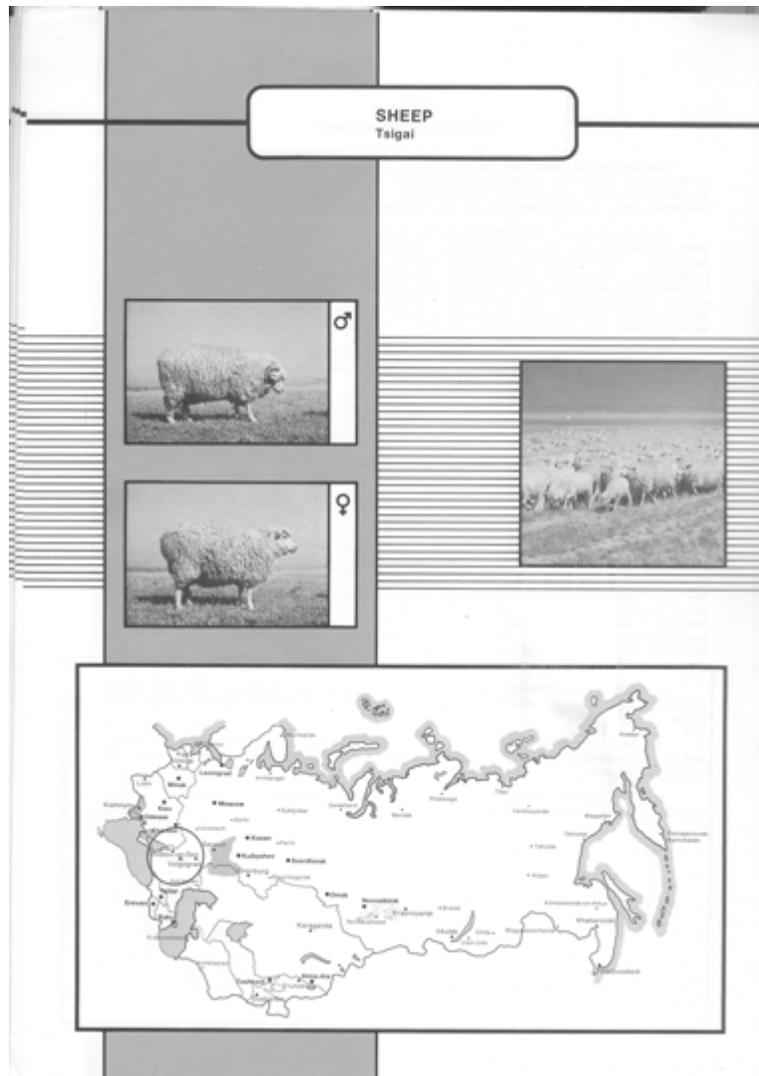
Volgograd sheep combine meat and wool production. The live weight of ewes is 58-65 kg and that of rams is 110-125 kg. They mature sufficiently early; the live weight of lambs at weaning is 30-35 kg and by the age of one year ewes reach 80% of their mother's weight. Rams at the age of 7-9 months produce carcasses of 20-24 kg.

The wool is white; density (by feel) and uniformity are satisfactory. The fleece has a blocky staple; it is closed and of medium density (by measurement). The outer staple has predominantly the shape of small squares in cross-section. The crimp is distinct, uniform, and somewhat open. The wool is of 60s and 64s quality. The ewe's wool is 8-9 cm long and ram's is 9.5-10.5 cm. Yolk is in light colour, particularly light cream. The head is covered with wool down to the eyes and the legs down to the knees and hocks. Fleece weight of ewes is 5.5-6.0 kg and that of rams is 12-15 kg. The clean wool yield is 48-50%.

Lambing rate is 130-160 lambs dropped per hundred ewes lambing. The milk yield is good: 95-105 kg of milk from ewes with one lamb and 145-150 kg from those with twins.

The best flocks of this breed are raised on Romashkovski breeding state farm, and on Pallasovski, Eltonski, Druzhba and Sorok Let Oktyabrya state farms in Volgograd region.

Further breeding is aimed at eliminating some dryness of the wool and making the fleece more uniform in fineness.



II. SEMIFINEWOOL BREEDS

1. Wool-Mutton Type TSIGAI (Tsigaiskaya)

Tsigai sheep are widespread in many countries of the Balkan Peninsula. To Russia they were imported from Romania in 1914 by Transylvanian sheep breeders.

Tsigai sheep have a strong constitution, hardiness and low feed requirements. Thanks to these characteristics they are raised successfully in regions with varied natural conditions. According to the Breed Distribution Plan the main flocks of the Tsigai sheep are in Crimea, Saratov and Rostov regions, in Moldavia and in Kazakhstan.

Numbers increased by about one-third between 1964 and 1980. The total is now 4 149 688 (62% purebreds) including 120 344 breeding rams, 28 171 other rams and 2 922 757 ewes and yearlings.

Due to differing selection aims Tsigai sheep vary from one part of the country to another. For example, in Crimea, Saratov and Rostov regions a

wool-mutton type is bred, in Moldavia a wool-mutton-milk type and in Donetsk region of the Ukraine a mutton-wool type. However, in spite of these differences Tsigai sheep of all groups have much in common in constitution and productivity.

They have strong constitution and rugged bone. The head is clean-cut, of medium size; the rams are horned and the ewes hornless. The chest is deep, the back broad and straight; the shoulders and the rump are wide. The body stands on strong legs with tough hoofs. The face and legs are woolled the former down to the eyes, the latter up to the knees and hocks. The hair on face and legs is white.

The fleece has a tippy staple. The wool is white, uniform and elastic; the fineness grade is 56-46s and the staple length 9-10 cm.

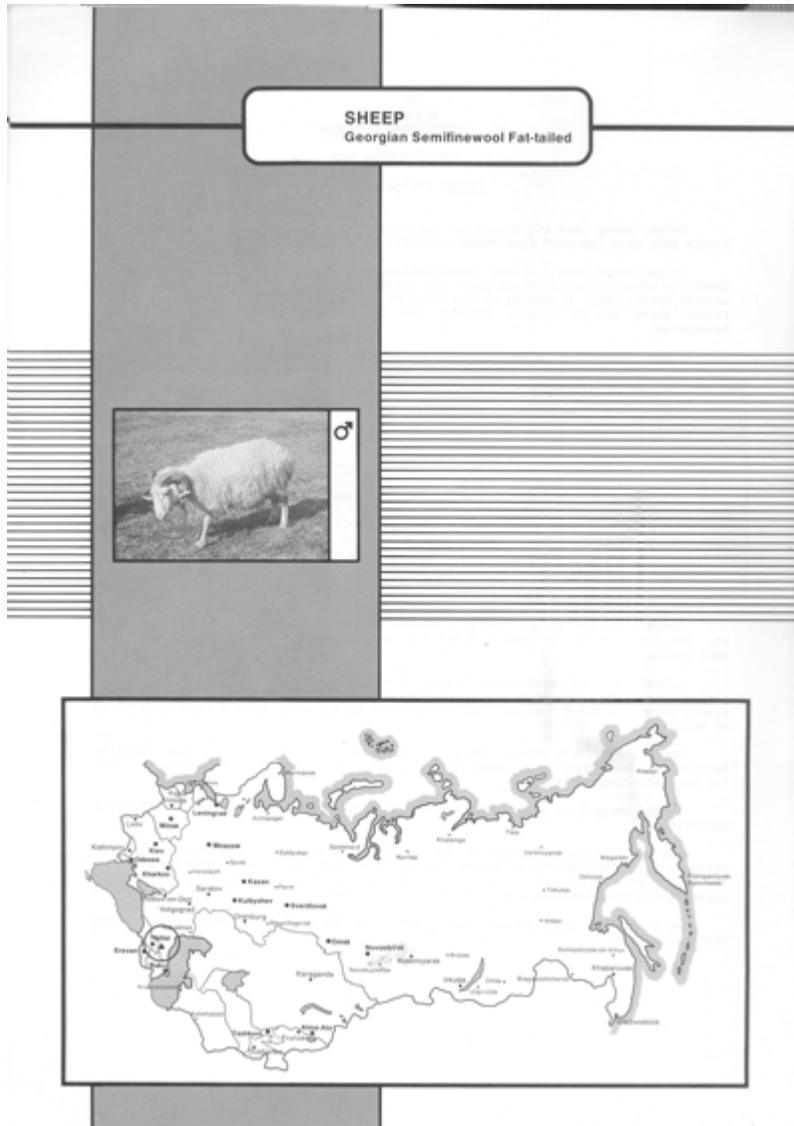
Animals are not large: the live weight of rams is 85-95 kg, that of ewes 45-50 kg. The fleece weight of rams is 6.5-7.5 kg and of ewes 3.5-4.0 kg with 56-58% clean wool yield.

Animals of the mutton-wool type (Priazov) are distinguished by a higher performance. The rams have a live weight of 100-110 kg, the ewes 55-60 kg. The fleece weight is 7.5-8.5 kg for rams and 4.0-4.5 kg for ewes, with a clean wool yield of 56-60%.

The pelts of the Tsigai sheep are of great importance for the fur industry because they have good dense even wool, and firm inner surface. The pelts are used for manufacturing fur articles.

Tsigai sheep have a high milk production - they yield 100 litres of milk for 4 lactations.

The best breeding flocks of the wool-mutton type are concentrated on the breeding farms Chernomorsk in Crimea, Algai in Saratov, Orlov in Rostov regions and the mutton-wool type in Rosa Luxemburg breeding centre in Donetsk region. In all these flocks pure breeding with line breeding is used. On 1 January 1980, 19 900 sheep, including 583 rams, were registered in the State Flockbook.



GEORGIAN SEMIFINEWOOL FAT-TAILED (Gruzinskaya polutonkorunnaya zhirkokhvostaya)

This breed was developed between 1931 and 1949 on Udabno State Farm in Sagarejo district of the Georgian SSR.

Some 80% of sheep in Georgia are raised in transhumance systems. They winter on low altitude steppe ranges and then moved to summer mountain pastures which lie at altitudes of 2000 to 3000 m. Summer ranges are sometimes 200-500 km away from winter quarters; it usually takes one or two months to travel between them.

The Tushin used to be the main breed of sheep in eastern Georgia. This breed required improvement in wool production. Attempts to grade the Tushin to recognized finewool breeds were unsuccessful. Only first generation crosses had a heavier fleece (30-50%) than Tushin sheep and

were not inferior to them in hardiness. Crosses of later generations lost the fat tail and therefore became less hardy.

Observations of local breeds, between 1931 and 1933, at the Kommunisgzit collective farm of the Tseteli Tskaro district showed that Tushin sheep could not be improved by grading up but by crossbreeding aimed at forming a new breed.

The aim was to obtain fat-tailed sheep with uniform wool, strong, hardy and suitable for the severe conditions of transhumance husbandry where sharp seasonal fluctuations in forage supplies may occur.

Local crosses, which were available at the former Gyaurarkhski regional sheep experiment station, were chosen as foundation stock. These sheep were obtained by crossing Tushin ewes with Rambouillet and Précoce rams. In 1936 the experimental flock was transferred to Udabno state farm.

The success of the operation was due to one second generation ram born in 1935. It had a well-developed fat tail and uniform, sufficiently even, semifine wool. It transmitted these characteristics to its offspring and therefore was widely used on crosses of the first and second generation (i.e. first crosses and backcrosses to the finewool ram). At the same time this ram was mated to the best Tushin ewes in order to obtain offspring free of certain weak points which were inherent in this ram, i.e. a low-slung fat tail that made it difficult for it to walk in the mountains, and coarse wool. Long-term breeding resulted in a group of sheep which met the desired standards. This group was approved as a new breed. It numbered 9633 in 1964 but only 2104 in 1980 including 59 breeding rams and 1250 ewes and yearlings.

Sheep of this breed are of medium size and white in colour. Rams are horned; ewes are polled. In conformation they are similar to the Tushin but finer boned. In major parameters, they surpass the Tushin but in lambs the differences are less distinct than in adults. In shape and size the fat tail is similar to that of the Tushin. Some have even larger tails due to larger bodies and higher live weight.

Organoleptic evaluation has shown that in terms of appearance, colour, smell, quality of meat and fat, and palatability the meat of these Georgian sheep is not inferior to that of Tushin sheep.

Georgian Semifinewools have a strong constitution, fine but strong bone and proportionate conformation. The legs are set correctly and the hoofs are hard.

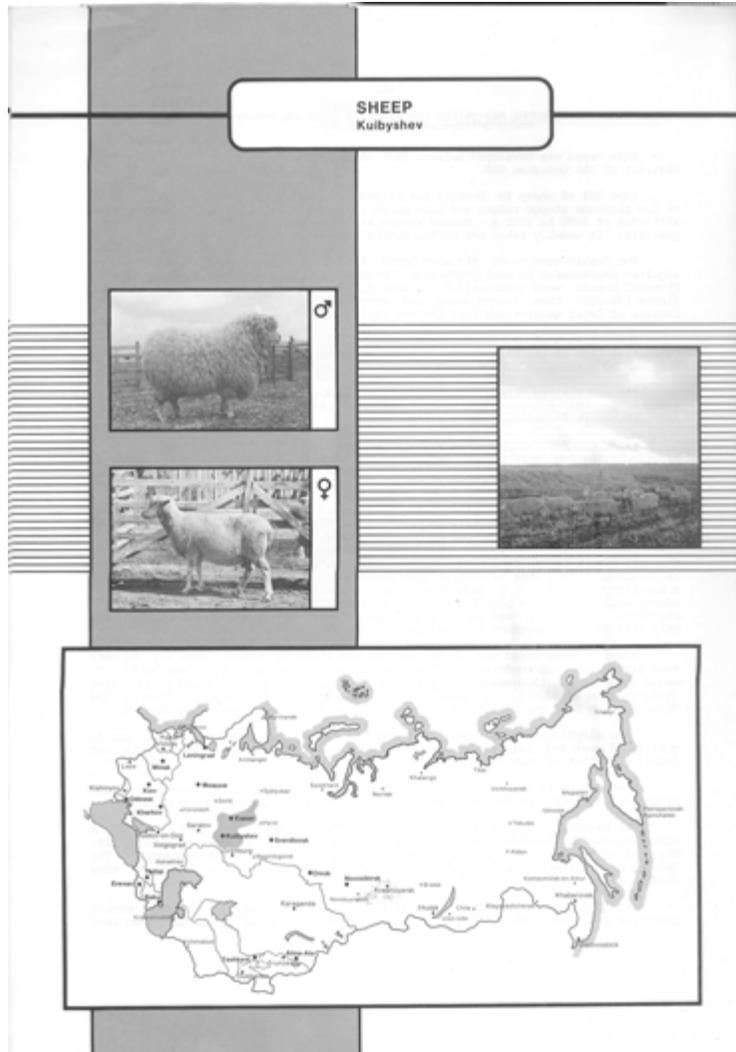
The fleece has a blocky staple. The wool is white and uniform, with a crossbred crimp. Average fleece weight is 3.2-3.5 kg and clean wool yield is 50-52%. The wool is predominantly of 50s-56s quality, strong, and 9-12 cm in length. The density of ram's wool is 2240 fibres per cm and that of ewe's is 1941; in some animals it exceeds 4000.

It should be noted that more than 70% of all sheep and 58% of ewes during lactation are subject to wool shedding. Wool chiefly falls out at the time when ewes need more nutrients. Predisposition to wool shedding is hereditary. Three factors (feeding, heredity and season) affect the coat shedding of sheep of this breed.

The average live weight of adult ewes is 48.4 kg (max. 70 kg), and that of rams is 82.0 kg (max. 125 kg). In August young wethers from the winter lambing had a live weight of 36 kg (max. 49 kg). The carcass weight of adult ewes is 20-21 kg, with more than 2 kg of tail fat.

Some 110 lambs are dropped per hundred ewes lambing. Lamb crop is 90-93% at the beginning of the year. This shows that sheep of this breed are well adapted to transhumance husbandry. They are raised on some farms in Georgia and have been exported to the Dagestan, Checheno-Ingush, North Ossetian, Kabardino-Balkar ASSRs, and to the Mongolian People's Republic where they are used for producing fat-tailed sheep with uniform wool, suitable for semi-desert conditions.

By producing this breed scientists have proved that it is possible to breed sheep which have both fat tails and uniform semifine wool. Further breeding is aimed at increasing the stock, improving productivity, and eliminating wool shedding.



2. Mutton-Wool Type
 (a) Longwool type
 KUIBYSHEV (Kuibyshevskaya)

This breed was produced between 1936 and 1948 on farms of Kuibyshev region by crossing Cherkassy coarsewooled and the now extinct Vagas semifinewooled ewes with Romney Marsh rams. The former have large size (live weight in autumn is up to 56 kg) and a satisfactory clip of long wool. The offspring combined the adaptability of local breeds with the high meat and wool production of the improver breed. Crossing with Romney rams continued mainly until the second generation since further grading did not increase productivity. On the contrary, it weakened the constitution and reduced viability. Crosses of the first and second generations were divided into two groups - desired and undesired. The chief criterion was uniformity of fleece. Ewes of the desired type were mated to the best second-generation rams of the desired type. Regardless of generation, sheep of the

undesired type (with semicoarse and partly with coarse wool) were again mated to purebred Romney rams.

At present the Kuibyshev breed is included in the breed regionalization plan and accordingly is raised in Kuibyshev and Ulyanovsk regions and in the Tatar and Mordovian ASSRs. The numbers of sheep of this breed have declined slightly since 1964. In 1980 there were 255 205 (52% purebreds) including 4308 breeding rams, 768 other rams and 187 666 ewes and yearlings.

In appearance and conformation sheep of the Kuibyshev breed are similar to the Romney. They have a strong constitution and a barrel-shaped and somewhat elongated body. The legs are relatively short. They have a broad head, short neck, muscular shoulders, wide and level back and loin, full and deep thighs. Both rams and ewes are hornless.

The fleece has a tippy staple. The wool is white and even, of 56s-48s quality. Staple length is 12-14 cm. Fleece weight is 6-7 kg for rams and 3.5-4.5 kg for ewes. The clean wool yield is 55-65%.

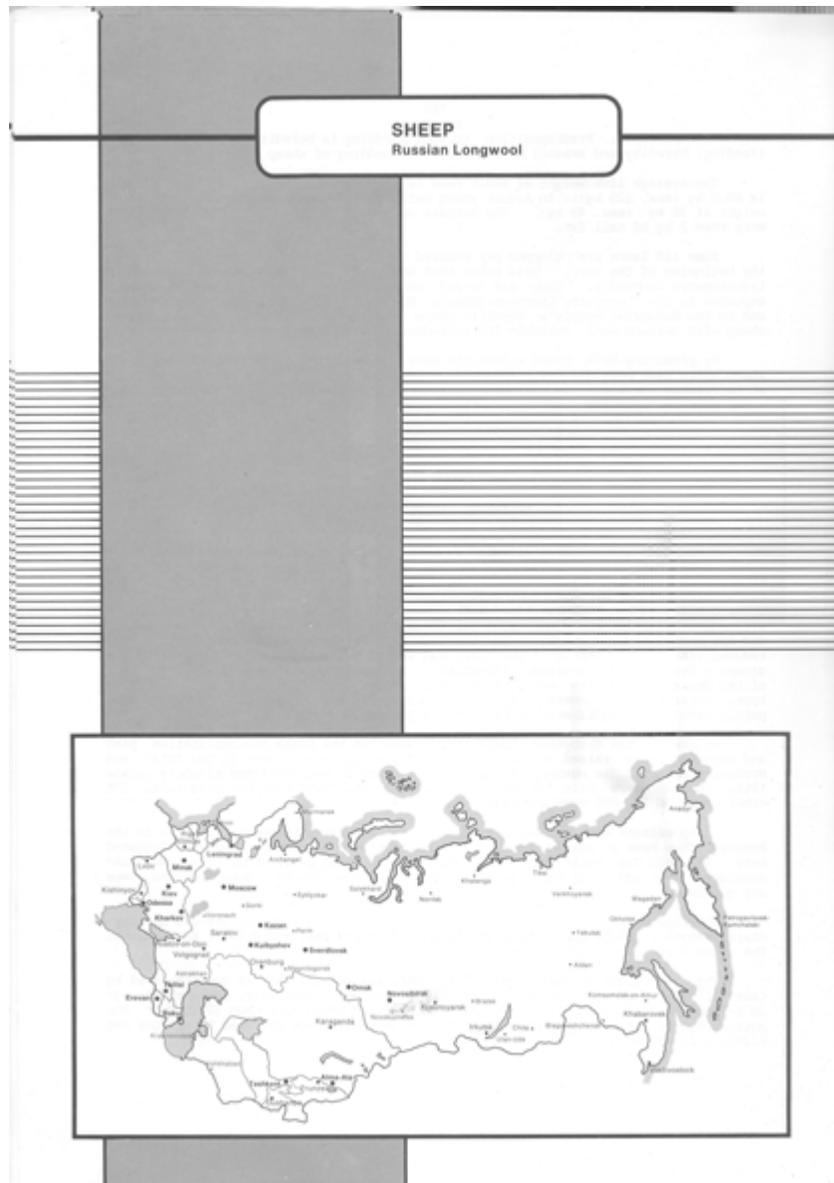
The live weight of rams is 90-110 kg (max. 164 kg) and that of ewes is 63-64 kg (max. 117 kg). Kuibyshev sheep mature early. When fed intensively, lambs at the age of 6-7 months reach 40-50 kg, with the carcass yield being more than 50%. Over the ages of 6.5 to 8.5 months, some 6.77 to 8.65 fodder units are required to produce one kilogram of weight gain.

Lamb crop is 120-130%.

In the process of breeding 8 ram lines were obtained; the last 3 were approved in 1977.

The best flock of the Kuibyshev breed is on Druzhba breeding state farm in Kuibyshev region.

On 1 January 1980, the State Flockbook listed 820 sheep, including 70 sires.



RUSSIAN LONGWOOL (Russkaya dlinno-sherstnaya)

The breed was recognized in 1978. Within the breed there are two types: the Liski, which includes the Nizhnedevitsk, and the Kalinin.

Liski sheep were produced in Voronezh region by crossing Mikhnov coarsewooled ewes with Lincoln rams and backcrossing to the Lincoln. Then sheep of the desired type were selected and bred inter se. The breeding work began in 1936.

Sheep of the desired type are large in size; withers height is 75.2 cm in rams and 65.8 cm in ewes. The constitution is strong. The skeleton is well developed. Live weight of rams is 95-105 kg and that of ewes is 56-65 kg. These sheep have wide back and loin, somewhat sloping rump, short and thick neck, and full chest. The legs are of medium length, correctly and widely set and the hoofs are hard. Both rams and ewes are hornless. There

is a characteristic tuft of wool on the forehead covering the eyes. The hair on the head and legs is white, with small dark spots.

Fleece weight is 6.0-6.5 kg for rams and 3.5-4.8 kg for ewes. Clean wool yield is 61-65%. The wool is white and uniform, of 44s-50s quality. Staple length is 14-16 cm. The fleece hangs in locks; some sheep have a semi-open staple.

Liski sheep mature early. with intensive feeding, young wethers can reach a live weight of 50 kg at the age of 6 months; with a carcass weight up to 24.6 kg and slaughter yield of 49.8%.

The best flocks of Liski sheep are on Kolybelski breeding state farm and on the breeding farms of Rodina, Rossia, and Dinovgorye collective farms in Voronezh region. The breeding flocks of these farms have five genealogical groups.

Kalinin sheep were obtained by crossing coarsewooled Northern Short-tailed ewes with Lincoln rams until second generation crosses were obtained. Then sheep of the desired type were selected and bred inter se. The breeding work began in the Kalinin region in 1937.

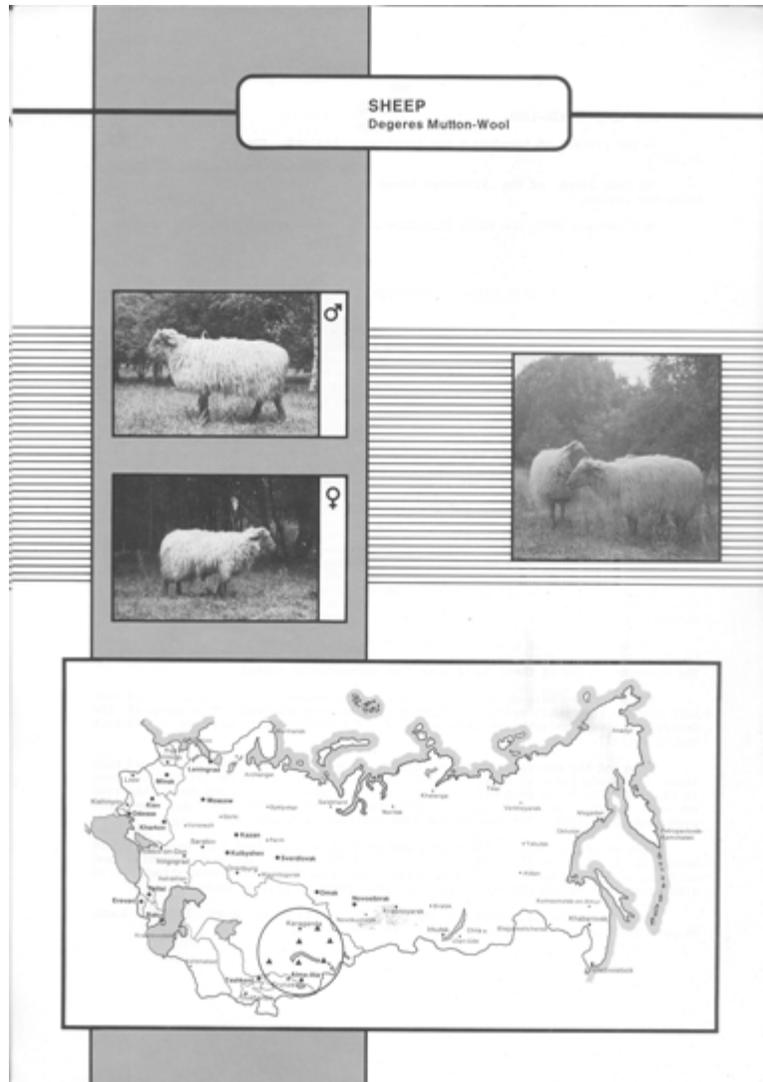
Sheep of the desired type have a strong constitution and a well-developed body frame. They are large in size: withers height of rams is 77.3 cm and that of ewes is 69.7 cm. The back, loin and rump are wide; the chest is wide and deep; the ribs are well sprung, and the head is relatively short. Both rams and ewes are predominantly polled. The hair on the legs and face is chiefly white.

Live weight of rams is 100-110 kg and that of ewes is 51-65 kg. Average fleece weight is 6.2-6.3 kg for rams and 3.3-4.2 kg for ewes. The wool is white and uniform, of 44s-50s quality. Staple length is 15-18 cm. The fleece structure is similar to that of Lincoln sheep, i.e. the wool hangs in pointed locks.

Fecundity, inherited from the Northern Short-tailed, is high: 140-150 lambs dropped per hundred ewes lambing.

The number of sheep of the Russian Longwool breed has doubled since 1964. In 1980 the total was 215 627 (83% purebreds) including 2442 breeding rams, 2691 other rams and 157 719 ewes and yearlings.

The best flock of Kalinin sheep is on Sakharovo experimental farm in Kalinin region, which has six genealogical groups.



(b) English Shortwool type

DEGERES MUTTON-WOOL (Degeresskaya myasosherstnaya)

This breed was formed in Alma-Ata region of Kazakhstan during 1931-80. Local coarsewool ewes were mated to imported Shropshire and Précoce rams. The objective was to combine high meat-fat performance with improved wool quality, while preserving good adaptability to range conditions in an extreme continental climate with temperatures reaching +45°C in summer and -44°C in winter. The annual rainfall does not exceed 135 mm; 70% of days are windy with the wind speed ranging from 2 to 4.2 metres per second.

The first experiments on mating Kazakh Fat-rumped ewes to Shropshire rams were conducted at Degeres state farm. Crosses were produced with a small rump (44.5%) or short fat tail (55.5%) and relatively even, white, bright semicoarse wool of 15-17 cm staple length.

During 1931-36 Mynbaev Experimental Farm of the Kazakh Animal Breeding Research Institute mated local coarsewool ewes to semifinewool

Shropshire x fat-rumped cross rams; subsequently Précoce blood was introduced, in the form of fat-tailed Précoce x fat-rumped crosses, to increase wool yield and quality.

Later (1944-55) Oktyabrski state farm in Taldy-Kurgan region, started the formation of fat-rumped sheep with even, semifinewool and this was continued, since 1965, on Bakanasski state farm in Alma-Ata region.

Précoce x fat-rumped ewes and Degeres rams bred on Mynbaev Experimental Farm were used.

Many years of work have resulted in a semifinewool breed with good meat-fat traits.

In 1980 the breed numbered 123 800 including 3100 breeding rams and 91 600 ewes and yearlings. The Degeres is bred in southern and southeastern regions of Kazakhstan where local coarsewool fat-rumped sheep are raised. Degeres sheep have a large, broad and compact body. They are usually polled but some have scurs and a few are horned. The head is of medium size with a slightly Roman nose. The neck is short and muscular. The chest is deep and the sacrum is broad. The skeleton is strong. The rump is of medium size and raised; some rams have a slightly pendant rump. The weight of the rump is 2-3 kg in ewes and 4-6 kg in rams.

Body measurements are a bit less than those of Edilbaev sheep. Average withers height is 77.5 cm (rams) and 70.9 cm (ewes); oblique body length is 80.2 cm and 75.1 cm respectively; chest depth is 40.2 cm and 35.7 cm; chest width is 24.9 and 21.0 cm; chest girth is 100.7 and 99.6 cm.

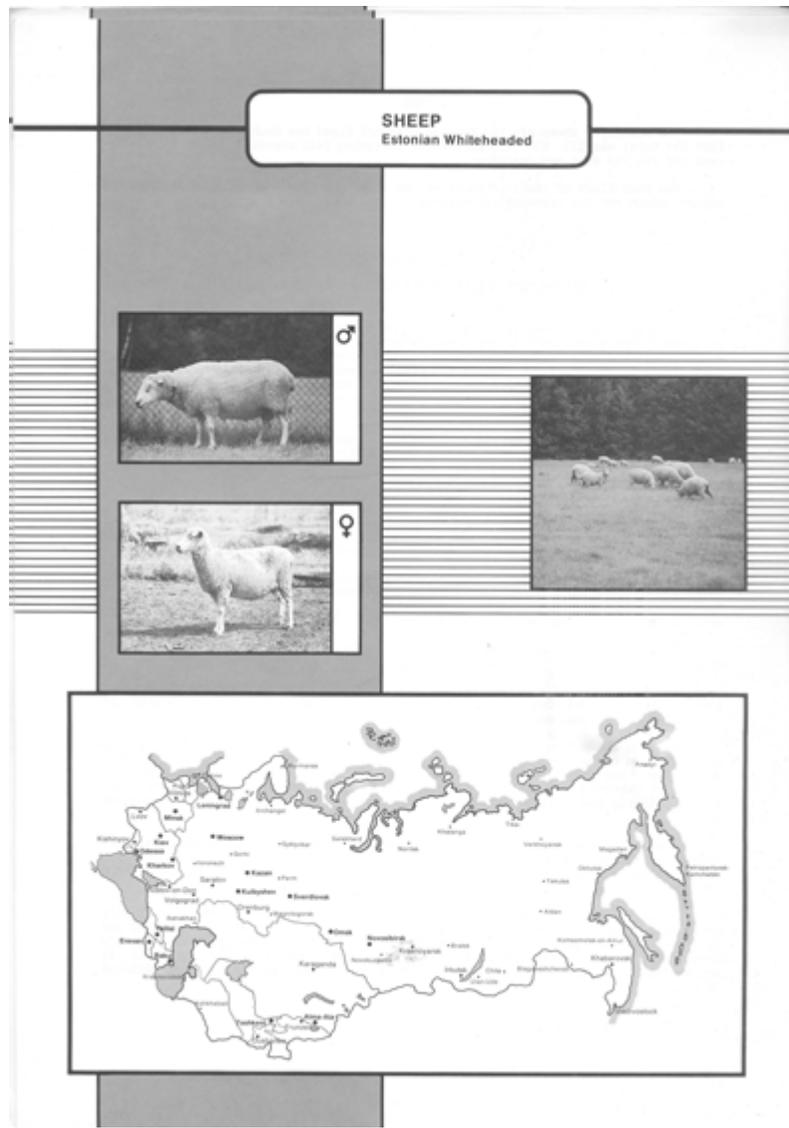
Fleece is tippy. Wool is white, even, bright. Wool of newborns is generally brown or tan but it becomes white by the time of weaning. Hair coat on the head and legs does not change its colour. Wool is of 48s and 50s quality (70%). Staple length is 12-17 cm (rams) and 9-14 cm (ewes). Fleece weight is 6.5-7.8 kg (11 kg maximum) for rams and 2.5-4.9 kg (7.5 kg maximum) for ewes, with clean wool yield of 58-62%.

The live weight of rams is 101-110 kg (138 kg maximum) and ewes weigh 58-66 kg (102 kg maximum); 4-4.5-month-old lambs weigh 30-35 kg, reaching 35-40 kg in favourable years. At this age the daily live-weight gain is 256-280 g in males and 225-250 g in females. Seven-eight-month-old lambs consume 7.8-8.1 feed units per kilogram of gain. The live weight of 18-month-old replacement rams reaches 76 kg or 89% of the adult live weight. Growth is over by 2.5 years of age. The carcass dressed weight is 18.0-20.3 kg (4-4.5-month-old lambs) and 35 kg (adult castrated rams); yield of rump and internal fat ranges from 4.1 to 9.8 kg; meat yield is 51-59%.

Fertility ranges between 102 and 120%. Barren ewes make up 5-6%. Young stock has good viability, mortality rate being 3.5%. The average milk yield during lactation is 96.5 kg with a range of 73.5-132.6 kg. Ewes rearing twins produce 46.5% more milk than ewes rearing singles.

There are 5 lines of rams in the breed. No. 6027 - animals typical as regards conformation, size and shape of the rump and wool yield; No. 7424 - conformation closer to that of local fat-rumped sheep, animals lively, strong, rump slightly lowered; No. 91184 - meat productivity well marked; No. 9035 - wool very thick of 48s quality, 19 cm or more long; No. 36364 - animals celebrated for compact conformation, rather wide and deep chest and well-marked meat traits.

The best sheep are kept on Bakanasski breeding state farm, Mynbaev Experimental Farm and Zhamshinski state farm (Jezkazgan region).



ESTONIAN WHITEHEADED (Estonskaya belogolovaya)

This breed was developed in Estonia by crossing local white-faced coarsewooled ewes with English Leicester and later with Cheviot rams, until crosses of the desired type were obtained, i.e. with uniform semifine wool, good meat traits and suited to the local conditions.

The development of the Estonian Whiteheaded breed was largely due to economic factors. Farmers of the Baltic region raised mainly semicoarsewooled sheep obtained by mating coarsewooled ewes to rams of various semifinewooled breeds. At the beginning of the 20th century the demand for mutton sharply increased and the demand for home-grown wool drastically fell since large quantities of better and cheaper wool were imported from Britain. Home-grown wool was used mainly for knitting and rug-making which required uniform semifine wool. Therefore, local sheep had to be upgraded. In order to improve local breeds, the Leicester and Cheviot were imported from Britain and Sweden. The Cheviot breed played

the decisive role in producing the stock of white-faced sheep. Systematic breeding of these sheep began in 1940 and was successfully continued after the Second World War. Selection and rigid culling produced a large stock of white-faced sheep which were bred pure.

At present Estonian Whiteheaded sheep are zoned for raising in five districts of southern Estonia.

The number of sheep of this breed declined from 8112 in 1964 to 1529 (all purebred) in 1980. This figure included 92 breeding rams, 15 other rams and 1152 ewes and yearlings.

In appearance Estonian Whiteheaded sheep resemble the Cheviot. The head is of medium size, the forehead broad, the nose short, often Roman. The head is covered with lustrous hair. Both sexes are hornless. The neck is short, thick and muscular. The chest is deep and wide. The withers are high and well covered. The body is broad, deep, and somewhat elongated. The back and loin are long; the rump is wide and somewhat sloping. The tail is long, and thighs are well covered. The front legs are strong, short, and correctly set. The forelegs are covered with white wool down to the knees and the hindlegs down to the hocks.

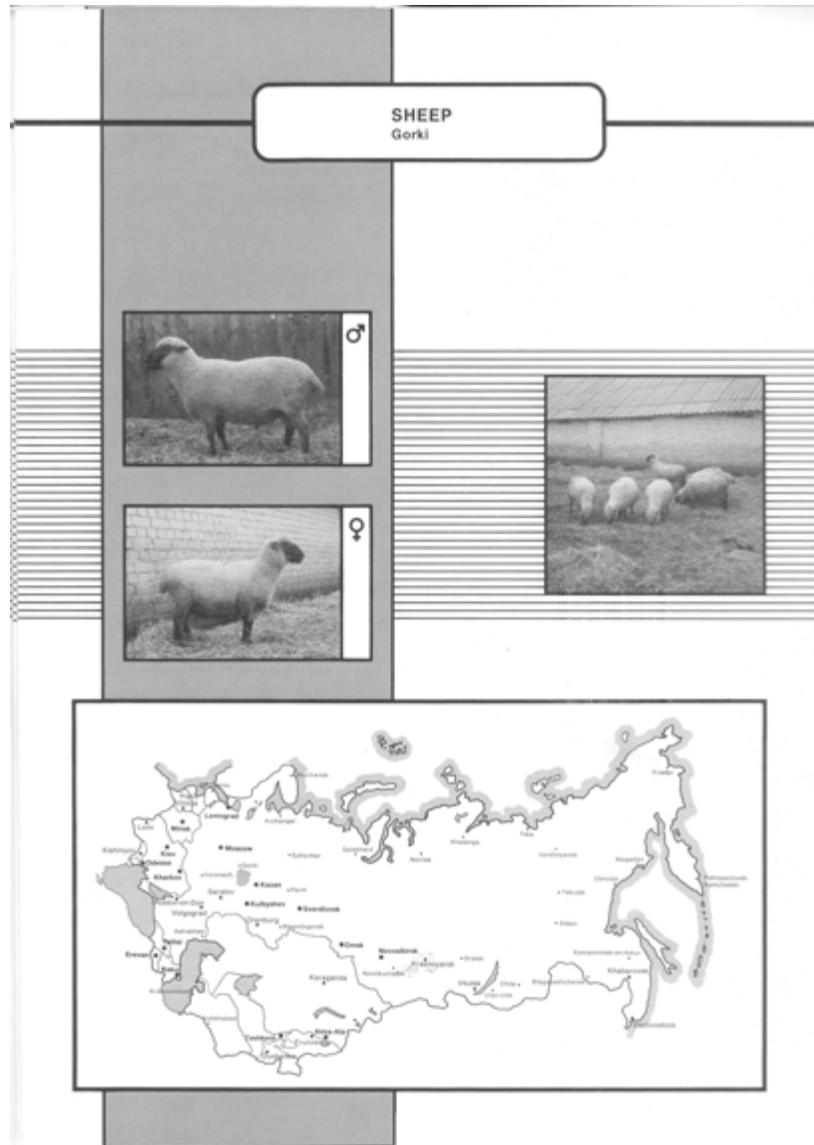
The average live weight of rams is 68 kg (range 50-80 kg) and that of ewes is 43 kg (range 35-70 kg). The weaning weight of lambs is 26-28 kg. The annual fleece weight is 3.6-3.8 kg for rams and 2.5-2.6 kg for ewes.

The fleece has a tippy staple; yolk is white or light cream. Staple length is 10-12 cm; the wool is 48s-50s quality. Clean wool yield is 50-55%. The wool is elastic and lustrous; these traits are particularly valued in knitted goods.

Lambing rate is 120-130 lambs dropped per hundred ewes lambing.

Sheep of this breed combine uniform semifine wool of high quality with early maturity and good meat traits. They are suited to the damp climate of Estonia. At the same time they can be used on a wide scale in some regions of the Russian Federation for commercial crossbreeding to produce lambs for sale in their first year.

The State Flockbook lists 263 sheep, including 30 rams.



GORKI (Gorkovskaya)

This breed was developed in Gorki region between 1936 and 1950 by crossing coarsewooled Northern Short-tailed ewes with Hampshire rams imported from England. Local sheep had a low productivity - live weight was 24-40 kg and the wool clip was 1-1.6 kg. Meat conformation was poor. At the same time the sheep were active and fertile. In order to improve meat and wool traits, Hampshire rams were imported in 1936. Their average live weight was 85 kg; fleece weight was 3.96 kg; the wool was of 56s quality; staple length was 6-9 cm and clean wool yield was 45-56%. The imported rams, however, did not thrive in the severe conditions of the Gorki region. Fleece weight declined and most of the rams died in 2 or 3 years. Crossbreeding revealed that crosses of Hampshire rams had sufficiently high production and were well adapted to the environmental conditions. Therefore two crosses of Hampshire rams on the local sheep were made.

The next stage was selection of crosses of the desired type and their breeding inter se.

In conformation the Gorki sheep are similar to the Hampshire. They have a deep, barrel-shaped body on short legs; the chest is deep and wide; the back, loin and rump are level and wide. The head is broad and the neck is short and thick. Both rams and ewes are hornless. The hair on the head, ears and legs is dark in colour.

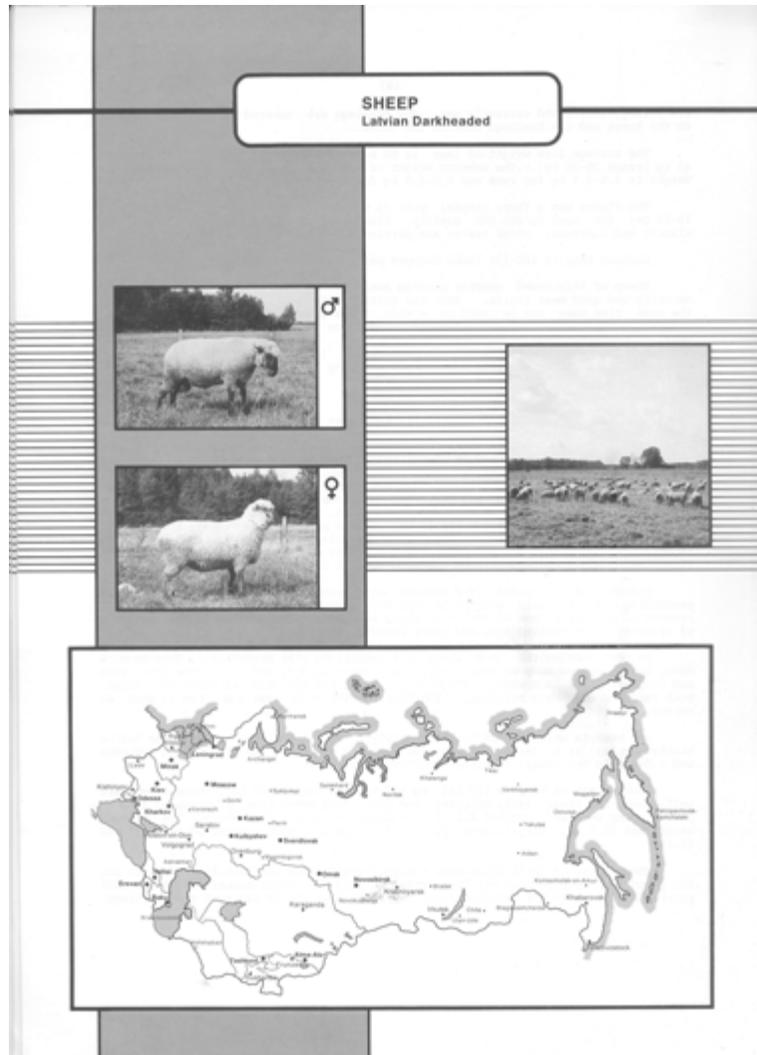
The wool is uniform, of 50s-58s quality, 7.5-8.5 cm long. The fleece has a blocky staple; it is uniform in fineness. Fleece weight is low, 3.0-3.7 kg for ewes and 4.0-4.5 kg for rams. The clean wool yield is 55-65%.

Live weight of rams is 110-120 kg and that of ewes 59-67 kg. These sheep are well known for their early maturity and good food conversion. During a 4-month period young wethers consumed 4.2 fodder units to gain 173 g daily. The carcass weight was 22.6 kg, the slaughter yield 51.8% and the meat content of the carcass 85.4%.

The numbers of Gorki sheep have remained steady over the last fifteen years but the proportion of purebreds has increased. In 1980 the total number was 59 619 (89% purebreds) including 836 breeding rams, 142 other rams and 39 240 ewes and yearlings.

The best flocks of breeding sheep are on Kamenski and Khvoshchevski state farms, on Mir and Krasny Partizan collective farms and on Shcherbinki training farm, in Gorki region. There are 7 lines and 30 families.

On 1 January 1980 the State Flockbook listed 410 licensed ewes of the Gorki breed.



LATVIAN DARKHEADED (Latviiskaya temnogolovaya)

This breed was created between 1920 and 1940 in the Latvian SSR. Crosses of finewooled, semifinewooled, and coarsewooled ewes were mated to Shropshire and Oxford rams until animals were obtained which had uniform semifine wool and good meat traits, and were suited to local conditions.

Sheep of the desired type have a strong constitution and fine bone. Both rams and ewes are polled. The head is short and broad, the neck short and thick. The shoulders, back and loin are broad; the chest is wide and full. The legs are straight, wide apart. The head, ears and legs are covered with dark hair.

The wool is uniform; it is white on the body, but some sheep have coloured fibres. It is predominantly of 50s-56s quality. Wool length is 9.0-9.5 cm. The average wool production is 5.2-5.9 kg for rams and 3.2-3.6 kg for ewes. The clean wool yield is 55-57%.

The live weight of rams on the leading farms is 100-115 kg and that of ewes is 62-76 kg. Sheep of this breed exhibit early maturity and rapid weight

gains; the average daily gain of lambs up to weaning is 210-240 g. The slaughter yield of adult sheep is 55-57% of the live weight; the finished live weight of lambs is 35-37 kg and the slaughter yield is 50-52%. The yield of first-grade meat is 72-75%. According to data from a progeny test station, one kilogram of weight gain in young animals of 9 to 12.5 months of age requires 5.4-6.8 fodder units.

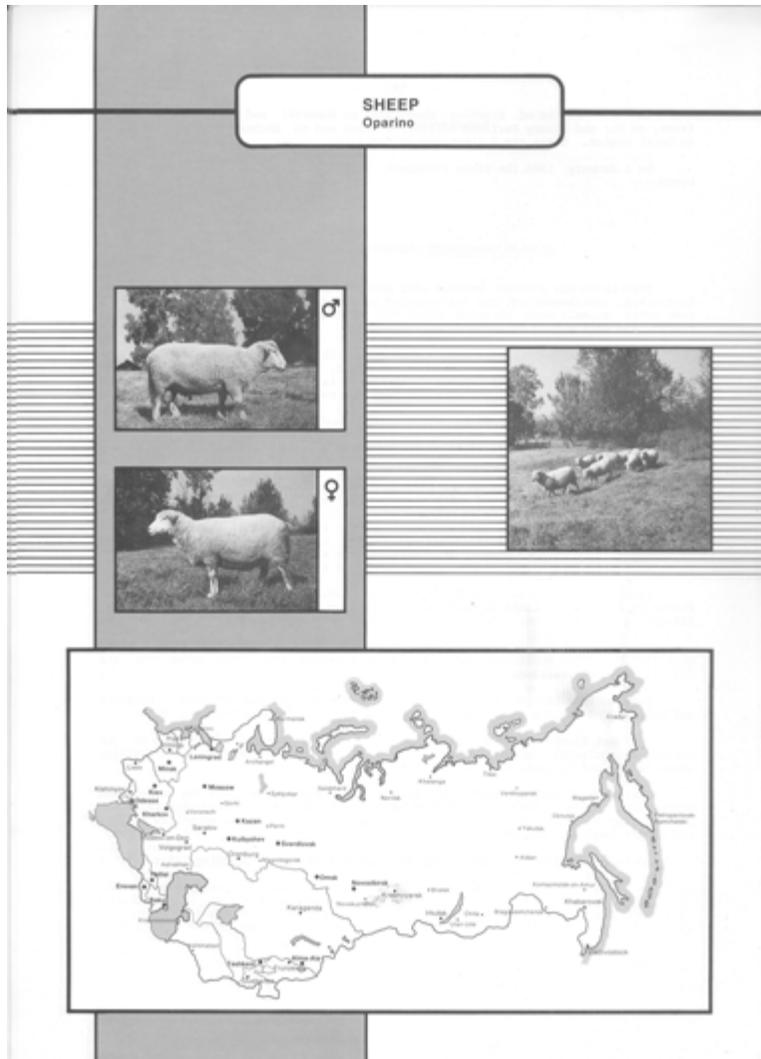
Lambing rate is 120-130 lambs dropped per hundred ewes lambing. In individual flocks it is 160-170 lambs dropped and 150-160 weaned. The average milk yield is 120-130 kg per lactation; this is enough to feed twins. The number of Latvian sheep has more than doubled since 1964. In 1980 there were 385 632 (65% purebreds) including 9079 breeding rams, 7264 other rams and 232 973 ewes and yearlings.

Sheep of the Latvian breed are raised in the Latvian SSR, in Pskov, Novgorod and Kaliningrad regions of the RSFSR and in the Byelorussian and Ukrainian SSRs.

The best flocks of this breed are raised on Vetsautse training farm of the Latvian Agricultural Academy, on Yaunais Rits collective farm, on Eleya and Vietalva state farms, and on Saulaine training state farm.

There are 18 strains within the breed, 12 of which come from the Oxford and Shropshire. Sheep of Minka 14's family have a particularly high productivity: the average live weight of adult sheep of this family is 87 kg; fleece weight is 5.3 kg, and staple length is 9.4 cm.

On 1 January 1980 the State Flockbook listed 2530 ewes, including 120 sires.



OPARINO (Oparinskie ovtsi)

The Oparino sheep were developed in Oparino district of Kirov region. They are only of local significance, few in number and raised exclusively on private plots in the upper reaches of the Moloma and Kirchug rivers in Kirov region. The emergence of these sheep is associated with the migration of the Letts and Estonians who come to the Oparino district from the Baltic area between 1908 and 1915 and brought with them finewooled and semifinewooled sheep (of the Merino and Lincoln breeds according to M.F. Ivanov). Later they were mated to local Northern Short-tailed sheep. Selection and rigid culling resulted in the emergence of a special mutton and wool type designated by the name Oparino.

The number of Oparino sheep has remained fairly steady since 1964. In 1980 there were 8164 (97% purebreds) including 80 breeding rams, 31 other rams and 5550 ewes and yearlings.

Oparino sheep have thin tails usually reaching to the hocks. The conformation is good. Rams are horned. Ewes are predominantly hornless. The head profile is straight. The neck is of medium length, smoothly joined

with the shoulders. The chest is sufficiently deep, the back relatively broad and level, the body of medium size, the legs relatively short. The brisket is well developed and prominent. The thighs are full.

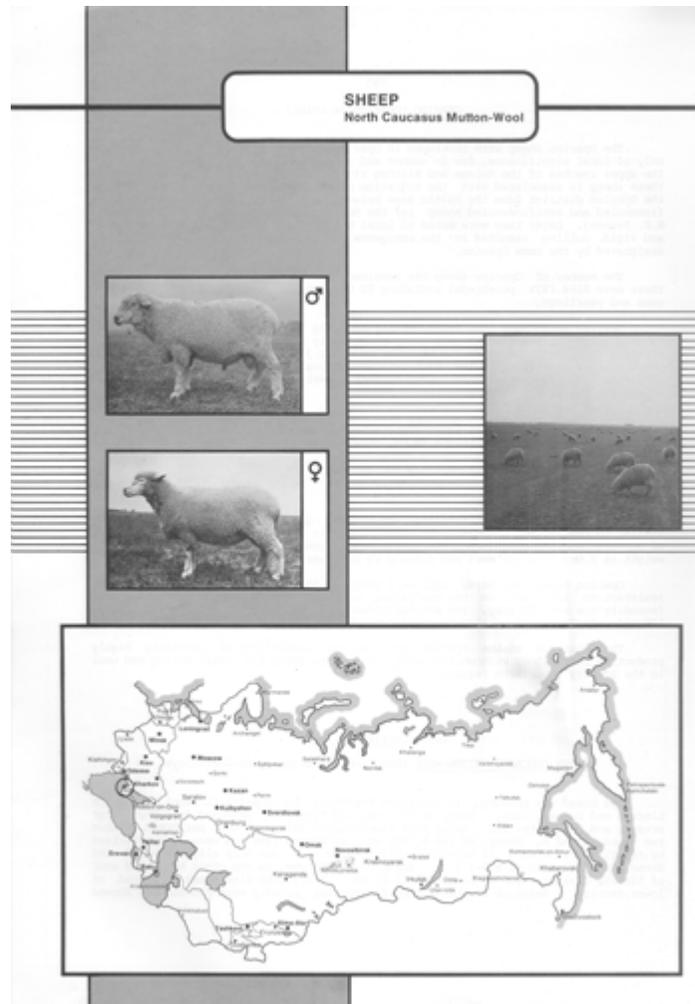
The average live weight of adult ewes is 45-50 kg and that of rams is 80-90 kg. Lambs at weaning weigh 18-21 kg. Withers height of adult sheep is 62 cm, oblique body length 66 cm, width of thighs 18 cm, chest depth 29 cm, and chest width 18 cm.

Sheep are predominantly white in colour. However, there are some whose head, legs or neck are greyish brown, chestnut, black or grey. Fleece covering is satisfactory.

The wool is uniform, semifine, of 50s-56s quality. In crimp the wool is similar to that of the Lincoln. The outer staple is close, rarely tippy. The length of one-year wool is 8.5-14 cm. The fleece has no kemp or coarse wool. Annual fleece weight is 2.0-3.5 kg for ewes and 3.5-5.0 kg for rams. Clean wool yield is 60-65%

Oparino sheep are hardy and well adapted to damp forest areas. They are resistant to foot rot in the conditions of excessive humidity. Survival and fecundity are satisfactory. The average number of lambs dropped per hundred ewes is 130-160. Mortality to weaning does not exceed 6%.

The existence of the Oparino confirms the possibility of obtaining highly productive local sheep with uniform wool and raising sheep for their mutton and wool in the country's northern regions:



(c) Corriedale type
NORTH CAUCASUS MUTTON-WOOL (Severo- Kavkazskaya
 myaso-sherstnaya)

The breed was produced in Stavropol territory by crossing finewool ewes with Lincoln and Romney rams. Sheep of the desired type were selected from the first crosses and bred inter se. Until 1951 breeding and selection were performed within two types, A and B. Sheep of the A type were by Romney rams and were characterized by relatively fine wool of 58s-60s quality. The wool was only slightly waved and dense, with a length of 8.5-9.5 cm. Sheep of the B type, on the other hand, had wool of 50s-56s quality, with a length of 10-11 cm. The lustre fleece was curly and of lower density. Research at the Moscow factory for primary wool processing showed that the wool of B-type sheep had better technological characteristics. Therefore, the breeding of A-type sheep stopped in 1952 and since then selection has been carried out only with regard to sheep of the B type, with the aim of improving their traits and increasing their numbers. Sheep of the desired type have a strong constitution and are large in size: withers height is 75.6 cm in rams and 70.2 cm in ewes. Meat characters are

well developed: the back and loin are wide; the chest is deep and wide and moderately prominent; the thighs are full. The head is broad and relatively short; the neck is thick and short. The legs are of medium length and strong. The set of the legs is correct. Both rams and ewes are predominantly polled.

The fleece has a tippy staple and is of medium density. The wool is white, and uniform in fineness both within the staple and over the body. Staple length is 12-13 cm; the wool is of 50s-56s quality, curly. The crimp is distinct along the whole staple length. Fleece weight of rams is 9.12 kg and that of ewes is 5.5-6.0 kg, with a clean wool yield of 55-58%.

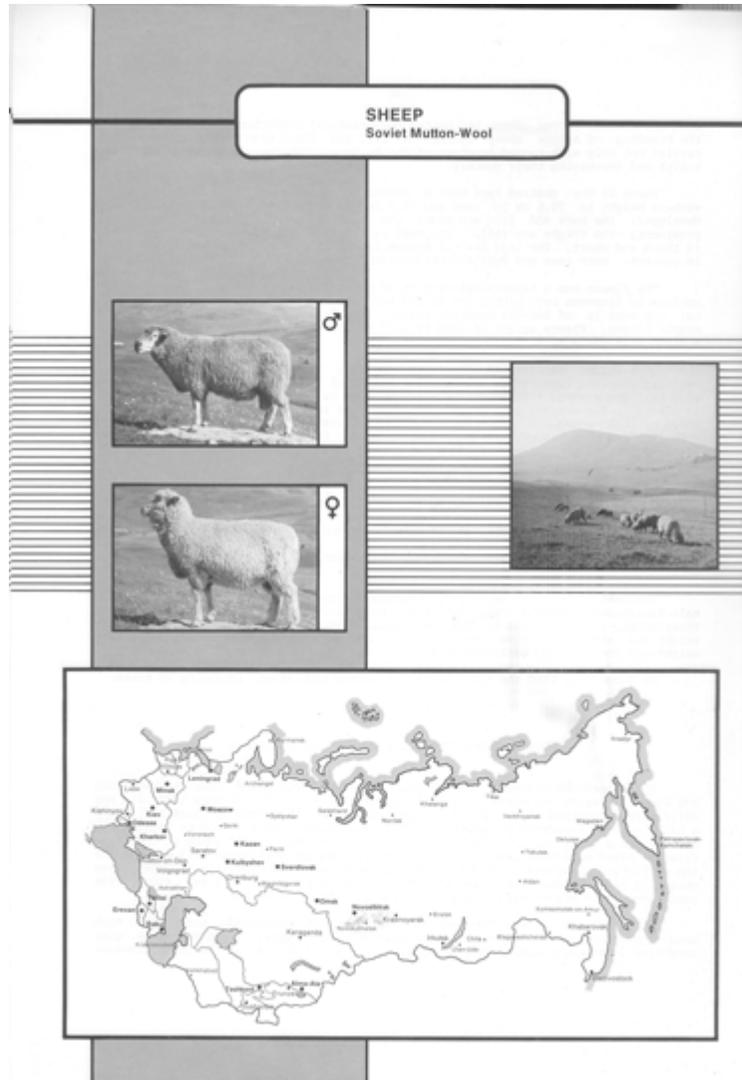
Live weight of rams is 90-100 kg and that of ewes 55-58 kg. Forty-five well-fed yearling ewes had an average live weight of 70.1 kg and forty yearling rams 85.1 kg. The maximum live weight of yearling ewes is 85 kg and that of yearling rams is 119 kg. The average live weight of adult rams is 150 and that of ewes 129 kg. Sheep of this breed are known for their good carcass traits. For example, young wethers which were range fattened on Sudan grass from June to September and also received concentrates, averaged 200 g daily weight gain. Their carcass weight at the age of 8 months was 21.4 kg; the carcass yield was 50.1%, and the meat content of the carcass 78-79%. Lambing rate is 120-130 lambs dropped per hundred ewes lambing.

The number of sheep of the North Caucasus Mutton-Wool breed has increased four-fold over the last 15 years. In 1980 there were 1 782 847 (21% purebreds) including 37 402 breeding rams, 25 116 other rams and 1 112 902 ewes and yearlings.

Sheep of the North Caucasus breed are raised in the North Caucasus and in Ukraine and Armenia.

The best flocks are at Vostok breeding centre in Stavropol territory and on Malo-Kabardinski breeding state farm in the Kabardino-Balkar ASSR. These flocks have three lines. Each line has its special traits: one is characterized by heavy fleece weight and satisfactory live weight, another by large size and satisfactory fleece weight and the third by early maturity.

On January 1, 1980 the State Flockbook listed 1100 sheep, including 90 sires.



SOVIET MUTTON-WOOL (Sovetskaya myaso-sherstnaya)

This breed was produced (as the Mountain Corriedale breed group) in mountain and foothill areas of North Caucasus during 1950-85. In January 1986 it was officially recognized as the Soviet Mutton-Wool breed. This area is characterized by a high level of humidity, continental climate and rough terrain. On most farms sheep are kept on a transhumance system. Until 1936 mainly coarsewooled sheep of the locakachai breed were kept there. Sheep of this breed are strong and well adapted to the difficult conditions of transhumance. However, their productivity is low: live weight is 32-38 kg and fleece weight (in two shearings) is 1.0-1.2 kg. Since 1936 local sheep were unsuccessfully mated to rams of finewooled breeds.

An expedition was sent to check the quality of the crossbreds, and in 1950 work began towards obtaining a breed of the meat and wool type. To achieve this goal crossbred finewooled ewes of varying quality were mated to rams of the North Caucasus Sheep of the desired type have a strong constitution and a well-developed frame. The body is barrel-like, with well-

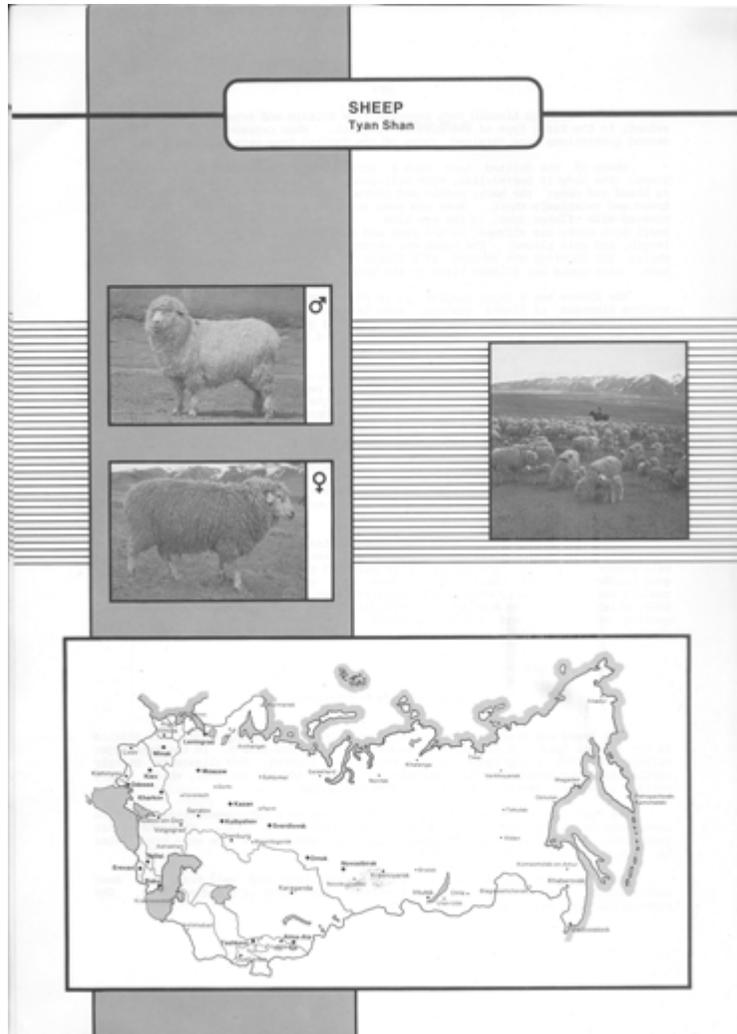
pronounced meat conformation. The breast is broad and deep; the back, saddle and sacrum are straight and broad. The head is broad and relatively short. Rams and ewes are predominantly hornless. The head is covered with fleece down to the eye-line. The face is covered with white hair; small dark spots are allowed on the nose and ears. The legs are strong, of medium length, and well placed. The hoofs are strong, dark-coloured or spotted, sometimes white. The forelegs are covered with fleece up to the knee, and hindlegs up to the hock. Dark spots are allowed close to the hoof. The fleece has a tippy staple; it is of medium density. The wool is white, of uniform fineness of 50-66s quality, with large, well-pronounced waves along the entire length of the staple. The belly covering is good or satisfactory. The fleece weight of rams is 7-9 kg and that of ewes is 3.5-4.0 kg; the clean wool yield is 60-65%.

The live weight of rams is 90-100 kg and that of ewes is 50-55 kg. The Soviet Mutton-Wool has vast potentialities. 300 well-fed ewes had an average live weight of 48.7 kg at the age of 12 months and 54.7 kg at the age of 18 months; the fleece weight was 6.15 kg, with 3.7 kg of clean wool. Sheep have good slaughter qualities. The live weight of 8-8.5-month-old lambs after feeding was 18.4 kg, the dressing yield was 49.2%, and the meat yield of the carcass 81.7%.

There were 610 000 head of Mountain Corriedale sheep at 1 January 1980.

The best flocks are on the breeding centres of Znamya Kommunizma, Oktyabr, 22nd CPSU Congress, and Lenin collective farms in the Karachaevo-Cherkess Autonomous Region and of the Rossia and Engels collective farms, and Spokoinenski state farm in Krasnodar territory.

There are seven lines, each with special traits of its own. Line 1053 is characterized by early maturity; line 9596 by a heavy fleece weight; line 2024 by a well-pronounced crimp; line 463 by large size and good fleece weight; line 3 by a good conformation and closed fleece, dense wool and white yolk; line 07482 by quality wool (uniformity, even and pronounced crimp, white yolk). The line of ram 6950, which comes from Australian Corriedales, is characterized by higher wool quality, white yolk, and a well-pronounced crimp along the entire length of the staple.



TYAN SHAN (Tyanshanskaya)

This breed was produced at the Tyan Shan Livestock Breeding Experiment Station in the central Tyan Shan mountains at an altitude of 2700-3000 m. In the Kara Kujer valley, where the sheep farms of the station are located, the climate is sharply continental, the average annual temperature is -1 C, and the rainfall, which occurs chiefly in summer, varies from 300 to 350 mm per annum.

The Tyan Shan breed was obtained by mating Précoce x fat-rumped crossbreds with semicoarse and semifine wool to Lincoln rams imported in 1950. When the first generation of crossbreds was obtained, animals of the desired type were bred inter se. The breed was recognized in 1966. Sheep of this breed have a strong constitution and well-pronounced meat conformation. Both rams and ewes are hornless. The chest is broad and deep. The back, saddle and sacrum are broad and even.

The wool is white, uniform within the staple, of 56-50s quality, and even over the body. The staple length is 12-13 cm; the fleece has a tippy staple.

The fleece weight of rams is 8.5-9.0 kg, and that of ewes 4-4.5 kg; the clean wool yield is 68-70%.

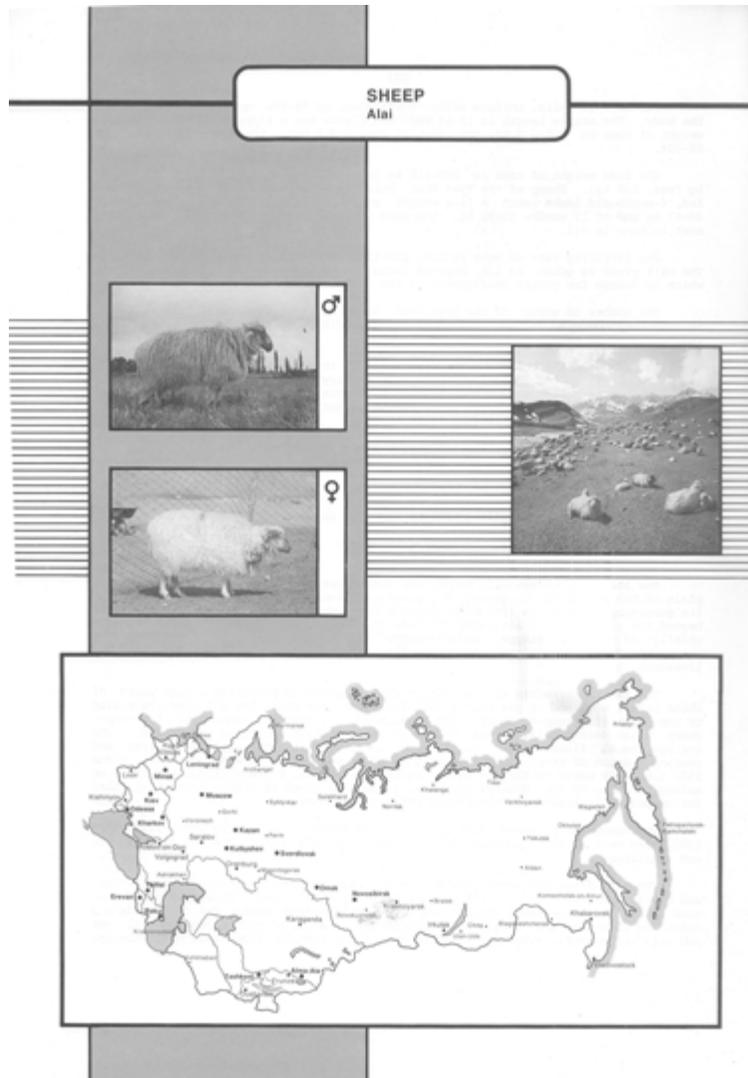
The live weight of rams is 100-110 kg (max. 150 kg) and that of ewes is 55-60 kg (max. 100 kg). Sheep of the Tyan Shan breed are early maturing. When adequately fed, 4-month-old lambs reach a live weight of 30-32 kg; at 7-8 months they weigh 40-43 kg and at 13 months 50-52 kg. The meat yield in lambs is 48%, and the ratio of meat to bone is 4:1.

The fertility rate of ewes is low, 110-115 lambs dropped per 100 ewes lambing. The milk yield is good: in 125 days of lactation ewes produce up to 125 kg of milk which is enough for proper development of the young.

The number of sheep of the Tyan Shan breed has increased rapidly since 1964. In 1980 they numbered 447 302 (29% purebred) including 1901 breeding rams, 6610 other rams and 326 138 ewes and yearlings.

According to the breed zoning plan sheep of the Tyan Shan breed are raised in Tyan Shan, Ak-Talin and Toguz-Torou districts of Naryn region of the Kirgiz SSR. The best flock is kept at the Tyan Shan Livestock Breeding Experiment Station: there are some 50 000 head and the average clean fleece weight is 2.6-2.8 kg. Sheep of this flock are purebred and linebreeding is employed.

The National Herdbook lists 165 sheep, including 12 rams.



III. SEMICOARSEWOOLED BREEDS

ALAI (Alaiskaya)

The Alai semicoarsewooled breed was formed between 1934 and 1981 in the Alai plain of Osh region of Kirgizia. The peculiar climate of the Alai plain is due to its geography: the plain lies at an average altitude of some 3000 m. The mountains beyond the plain lie at altitudes of 5000 to 7000 m. Native plants there consist chiefly of various steppe, meadow-steppe and meadow grasses, particularly of xerophytes and frost-resistant species. The pastures cannot provide enough feed for livestock. The task of breeders was to obtain sheep capable of producing a high yield of white carpet wool and to preserve at the same time the meat, fat and adaptive traits of the local fat-rumped sheep. The Alai breed is based on the local fat-rumped sheep, which were similar to the Hissar in terms of their meat and fat traits. The average annual fleece weight was 1.3-1.8 kg per head; the wool was coarse and contained a lot of kemp. Until 1940 local sheep were mated to Précoce rams; since 1952 some were mated to Sary-

Ja rams. Further selection, rigid culling, and inter se mating of sheep of the desired type have produced a stock of highly productive Alai fat-rumped semicoarsewooled sheep with white carpet wool.

The number of purebred Alai sheep has increased considerably since 1964. In 1980 there were 47 910 including 277 breeding rams, 870 other rams and 34 055 ewes and yearlings.

The Alai breed has high yields of meat, fat and wool, a strong constitution, and a well-developed frame. The head is slightly Roman-nosed. Ewes are polled but some of the rams have small horns. The neck is of medium length, the chest wide and deep, the back long and straight. The legs are strong, of medium length, well set and with rough hoofs. The rump is of medium size, somewhat sloping in most animals. The covering of the belly is good; the fleece is white with occasional coloured spots on the head and legs.

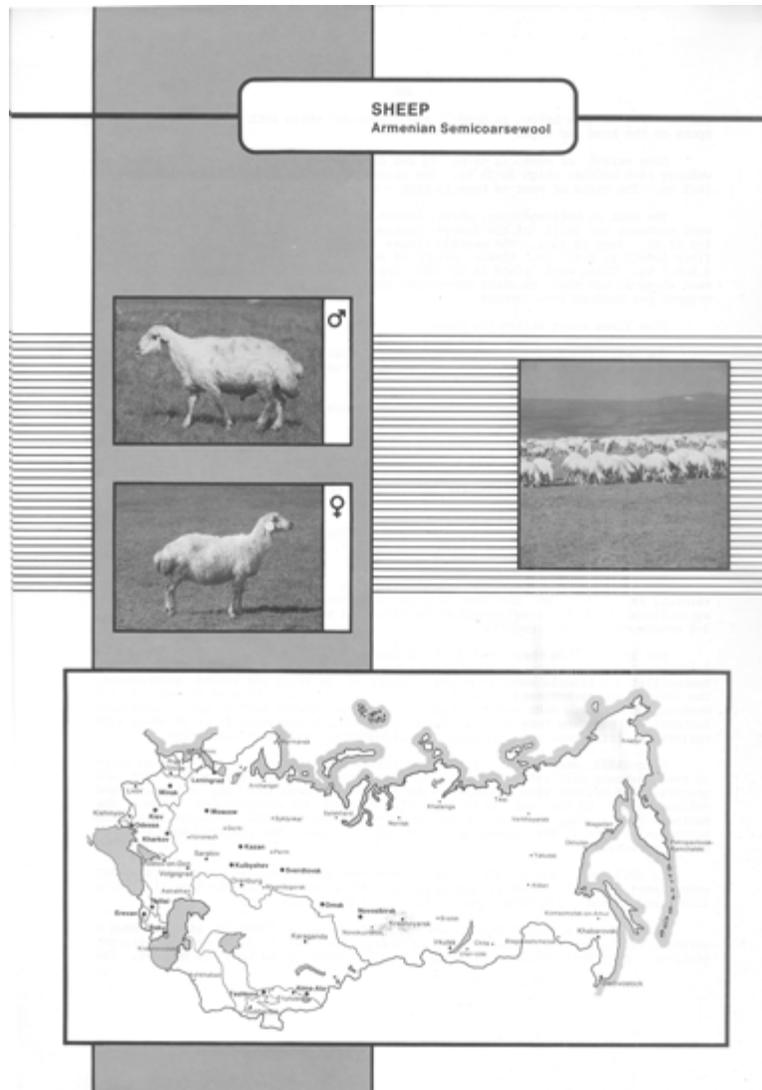
Live weight of ewes is 58-62 kg and that of rams is 95-105 kg. Lambs at weaning (4-5 months) weigh 30-35 kg. The carcass weight of 5 or 6-month-old lambs is 16.2 kg. The ratio of meat to bone is high - 6:1.

The wool is heterogeneous, white, lustrous and hanging in pointed locks. True wool accounts for 56.7% of the fleece, intermediate wool for 13.7% and guard hairs for 29.6% Kemp is rare. The average staple length is 17-30 cm and the average wool fibre length is 8-12 cm. Fleece weight of ewes is 2.5-3.0 kg and that of rams is 4.5-5.5 kg. Clean wool yield is 65-70%. The Alai breed has one peculiar feature: most sheep do not shed as other fat-rumped sheep do. Lambing rate is 105-106 lambs dropped per hundred ewes lambing.

Five lines exist within the breed.

The best flocks are raised on farms of Alai district in Osh region. The leading farms are the Kashka Suu experimental station, and Kyzyl Suu and Chon Alai state farms.

Further breeding is currently under way, aimed at improving precocity and increasing the wool clip.



ARMENIAN SEMICOARSEWOOL (Armyanskaya polugrubosherstnaya)

The Armenian Semicoursewool breed was developed between 1931 and 1983. At present it is raised in Martunin, Ararat, Azizbekov, Ekhegnadzor and Talin districts of Armenia.

The breed was developed in the mountains at altitudes of 1200-3500 m. The rainfall is 450-750 mm and the climate is continental. More than half the agricultural lands are rough mountain pastures. In winter sheep are kept in pens for 3-5 months and receive roughage.

The local Balbas breed was used as the maternal foundation stock.

Breeding followed two directions. On Aragats state farm, Balbas ewes were mated to Rambouillet and Lincoln rams producing crosses of the first and second generations. The latter were backcrossed to Balbas rams.

Prolonged selection of crosses of the desired type (i.e. with uniform semicourse white fleece and a large underwool content) and breeding them

inter se has resulted in a homogeneous flock of sheep with uniform constitutional and wool traits, designated by the name Aragats type. Since 1952, ewes of the coarsewooled Balbas breed at large sheep raising farms in the Martunin district were mated to rams from the Aragats farm and half and quarter-blood crosses were produced. The latter were bred inter se; selection and culling helped to fix the valuable traits of this semicoarsewooled sheep - the Martunin type. They have preserved the major constitutional, conformational and biological traits of the Balbas breed and, at the same time, produced more wool of higher quality.

In 1983 there were 12 465 of the Aragats type (including 315 breeding rams, 413 other rams, and 11 737 ewes and yearlings) and 30 924 of the Martunin type (including 1516 breeding rams, 3365 other rams and 26 143 ewes and yearlings).

Sheep of the Armenian semicoarsewool breed are rather large in size and have a strong constitution and a well-developed frame. The head is light with a straight profile. The chest is deep but insufficiently wide. The body is compact, the backline is straight and the rump is somewhat sloping. The legs are strong, of medium length, with hard hoofs. The tail is medium-sized, with two cushions of fat, and reaches the hocks.

Withers height of ewes is 65-69 cm and that of rams is 74-75 cm; height at rump is 67-69 cm and 74-75 cm, chest width 20-21 cm and 23-24 cm, chest depth 31-32 cm and 35-36 cm, oblique body length 65-67 cm and 71-77 cm, chest girth 90-93 cm and 99-101 cm and the cannon bone girth 8.0-8.5 cm and 9.8-10.0 cm respectively.

The average live weight of ewes is 55.0 kg (range 50-68 kg) and that of rams 90 kg (range 68-116 kg). Newborn lambs are strong; males weigh 3-4 kg and females 2.5-3.5 kg. Lambs show rapid weight gains and by the age of 5 months males weigh 28.5-33.5 kg and females 26.0-29.5 kg.

The fleece is heterogeneous, hanging in pointed locks, white in colour, of medium density and adequate lustre. The lock length in case of ewes is 14-20 cm, and wool fibre length is 10-14 cm. The true wool content is 40-60%. The diameter of true wool fibres is 21.0-26.5 μ m and that of intermediate and guard hair is 41.2-48.2 μ m. Kemps are occasionally found in individual sheep. The covering of the belly is good.

Fleece weight of ewes is about 3 kg (range 2.2-4.7 kg) and that of rams is 4.6 kg (range 3.2-7.0 kg). Yearling ewes produce 2.3-3.0 kg of wool and rams 2.5-3.5 kg. The clean wool yield is 69-74%.

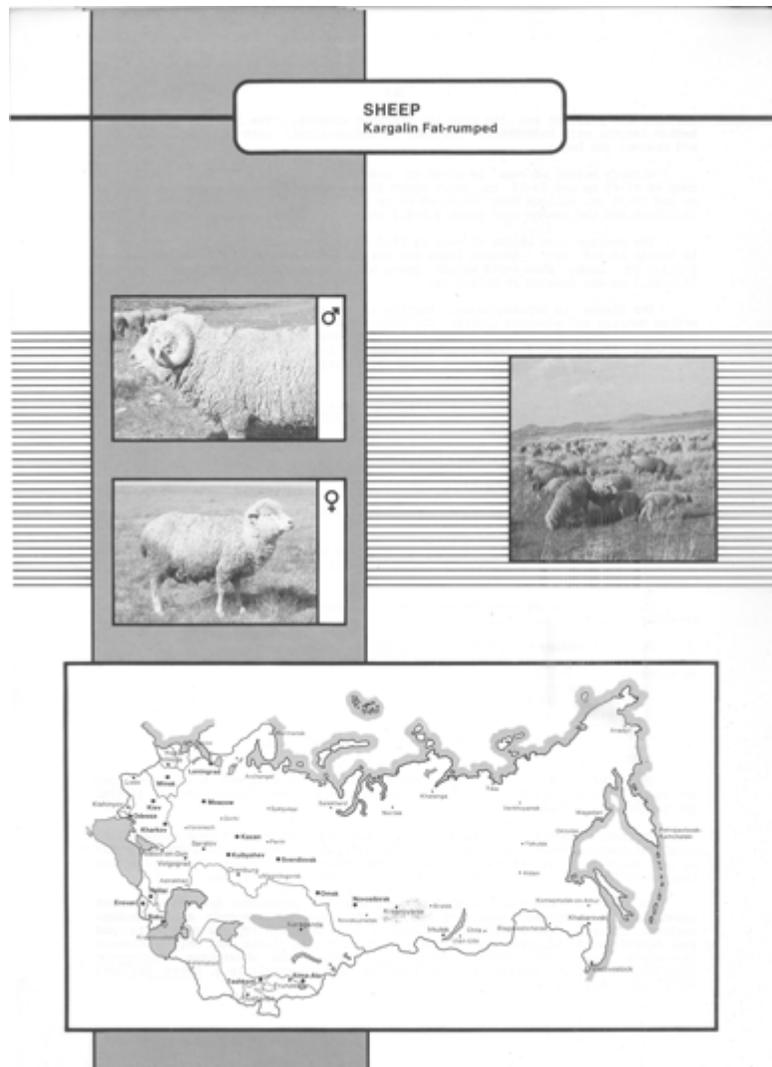
Milk yield is good - 100-120 kg. Ewes are usually milked for the first time when lambs reach the age of 45-60 days; each ewe produces 30-40 kg of marketable milk with 6% fat.

Lambing rate depends on the management and varies from 92 to 115 lambs dropped per hundred ewes lambing.

At breeding centres there are 4 lines within each type. Sheep of these lines have a fleece weight 13-15% higher and a body weight 6-8% higher than the average of the entire breed.

The best flocks of Armenian sheep are at Tsakar breeding centre and on Aragats breeding state farm.

Further breeding and selection are aimed at preserving the Aragats and Martunin types and using them to improve the breeding and productive traits of Armenian sheep in general.



KARGALIN FAT-RUMPED (Kargalinskije kurdyuchnye ovtsi)

These sheep, of the mutton-fat type, have semicoarse wool and a well-developed fat rump; they are zoned for breeding in the desert and semi-desert areas of central and southeastern Kazakhstan.

The breed began to take shape in 1931. The foundation stock were crosses from local fat-rumped ewes and Edilbaev rams. The live weight of crossbred ewes was 66.7 kg and the fleece weight was 2.9 kg. They were mated to Sary-Ja and Degeres semifinewooled rams. Crosses of the desired type were bred inter se.

In order to obtain a large stock of Kargalin sheep the breeding work was transferred from Mynbaev experiment station to farms in Karaganda and Jeskazgan regions. The soil and climatic conditions of this area are typical of deserts and semi-deserts with scarce stand of grass. Major forage plants are white wormwood (Artemisia), prostrate cypress (Kochia prostrata), and wheatgrass (Agropyron fragile), as well as legumes (e.g. Astragalus) and ephemerals (e.g. Carex physodes and Secale segetale).

In these conditions a breed group of fat-rumped sheep was obtained, Sheep of this breed group can cover long distances and are good grazers.

In 1974 the stock declined considerably but timely measures increased their numbers 7.3 times. In 1980 there were 110 475 including 2467 breeding rams, 1381 other rams and 80 694 ewes and yearlings.

Kargalin sheep have a strong constitution, a solid and well-developed frame and a good conformation. The head is long, of medium size; the neck is short and thick; the body is long and barrel-shaped with correctly-set legs; the back and loin are level; the rump is slightly sloping; the chest is wide, with a prominent brisket; the rump is medium-sized.

Most sheep have semicoarse wool, satisfactory fleece weight and high meat and fat production. Live weight of adult rams is 105-110 kg and fleece weight is 4.86 kg (max. 6.0 kg). Live weight of ewes is 60-64 kg and fleece weight is 2.8-3.1 kg (max. 5.0-5.4 kg). The clean wool yield is 67-69% for rams and 62-64% for adult ewes.

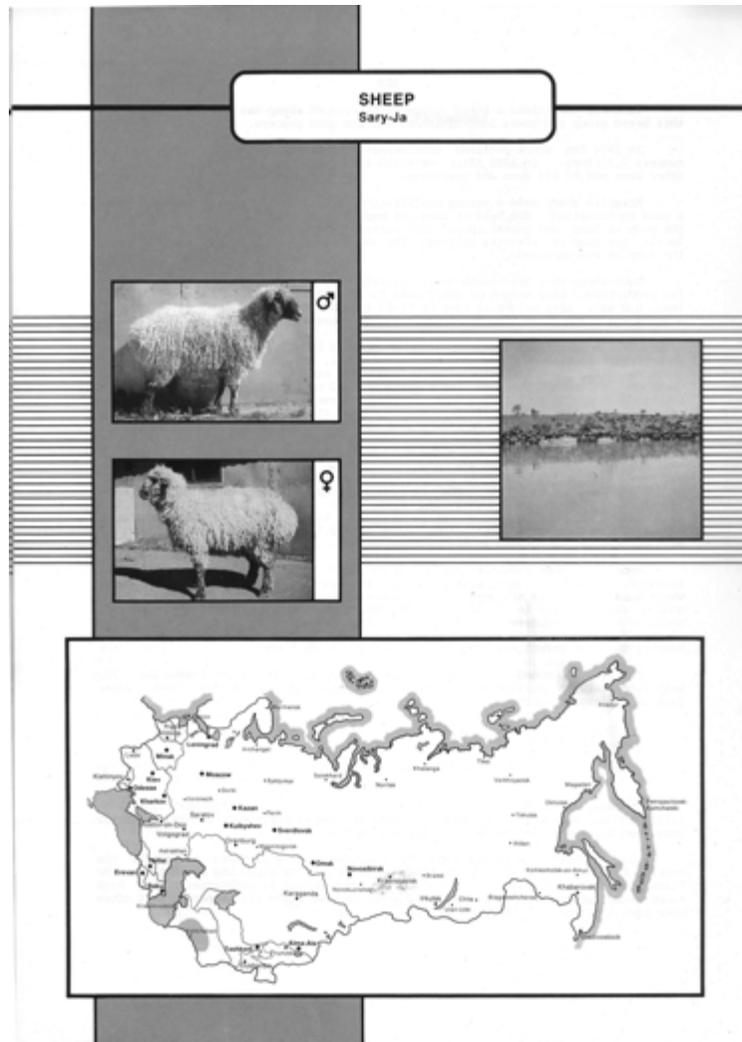
The fleece of Kargalin sheep hangs in pointed locks. The locks consist mainly of intermediate fibres. True wool accounts for 40%, intermediate hair for 50-55% and guard hairs for the rest. The staple length of rams is 23 cm and the wool layer thickness is 14 cm; for ewes the figures are 20 cm and 11 cm respectively. The average diameter of wool fibres from the typical ewe's side is 27.3 μ m. The wool is relatively uniform. The coefficient of unevenness of fibres in case of ewes is 34.3% with a range from 27.8 to 45.2% (acceptable variations are 60-66%).

Kargalin sheep mature very early and usually drop 105 to 112 lambs per hundred ewes lambing. Newborn lambs are large (males weigh 4.5-5.5 kg and females 4-5 kg) and have rapid weight gains. At weaning (4-4.5 months) the live weight of ram lambs is 37-39 kg and that of ewe lambs is 35.0-36.5 kg with an average daily gain of 260-287 g and 250-263 g respectively. Lambs graze well and rapidly put on weight. At weaning the carcass weight of ram lambs is 17.9 kg representing a carcass yield of 49.3%; at the age of 7-8 months the figures are 23.0 kg and 53.1% respectively. The meat content of the carcass is 80% or more.

Among the most valuable traits of Kargalin sheep are their constitutional strength, high production of mutton and fat, carcass traits, early maturity of lambs which result from the milkiness of the ewes, ability to cover long distances, and good grazing ability in desert and semi-desert conditions.

Due to these traits Kargalin rams are successfully used for grading up local fat-rumped ewes. Some 40% of one-year-old first-cross ewes have semicoarse wool; crossbred ewes are 14.3% heavier than the parent ewes and their wool clip is 50% higher.

The breed is zoned for breeding in the central regions of the Kazakh SSR. The best flocks are on Nurinski state farm in Karaganda region, and on Ulutanski state farm in Jezkazgan region.



SARY-JA (Saradzhinskaya)

The Sary-Ja is one of the best fat-rumped breeds of the mutton-fat type. It originated in southeast Turkmenia where local fat-rumped sheep with a heavy undercoat have been bred inter se and selected for a long time. Sary-Ja sheep are raised in sandy pastures on the southern borders of the central Kara-Kum desert and on the plain adjacent to the Kopet Dag mountains. The climate there is sharply continental. The arid desert is characterized by high summer temperatures and severe winter frosts. In summer the air temperature is often more than 40°C and in winter it drops below -20°C.

The relief of the southern borders of the Kara-Kum desert is hilly, with low mountain ridges. Pastures are covered with Haloxylon and Carex. They are poor and overgrazed. Therefore carrying capacity is only 7-13 hectares per head. There are occasional plots of land which are covered predominantly with sedge and various annual herbs. These areas provide good year-long pasturage.

The plain, which is adjacent to the Kara-Kum desert and 5-20 km wide, is covered mainly with sedge (*Carex*), bluegrass (*Poa*) and, occasionally, with mugwort (*Artemisia*). When the season is favourable haymaking is possible and bluegrass hay, which sheep like, is made.

The Sary-Ja is a range breed; sheep are kept on pasture throughout the year. Supplemental feeding is given only to weak sheep and rams during the pre-mating and mating periods. Emergency supply of roughages and concentrates are kept as an insurance against heavy snowfalls and ice-covered grazing.

Since 1950, the Sary-Ja breed has been constantly improved by mating ewes to Degeres rams with the aim of increasing the wool clip and improving the quality of wool while preserving the characteristic features of the Sary-Ja.

At present Sary-Ja sheep are raised in the Turkmen (360 000), Uzbek (218 000) and Kazakh SSRs (200 000). Smaller numbers (27 500) are raised in various regions of the Russian Federation adjacent to the Central Asian republics.

The number of Sary-Ja sheep has more than doubled over the last fifteen years. In 1980 there were 807 952 (68% purebreds) including 24 389 breeding rams, 25 319 other rams and 478 991 ewes and yearlings.

The present-day Sary-Ja sheep have a strong constitution, solid bone and a fat tail. Ewes are usually hornless; some 3-4% of rams have horns, usually scurs. The withers are broad, the back long and broad, and the chest deep. The legs are of medium length, correctly set; the rump is often sloping. A considerable portion of Sary-Ja sheep have defects in conformation: neck not smoothly joined to shoulders, narrow and sharp shoulders, sloping rump, narrow chest, cow-hocked hindlegs.

The live weight of adult rams is 80-90 kg and that of adult ewes is 55-60 kg. The rams exhibited at the Ashkhabad autumn show exceeded 100 kg.

Sheep mature early. When fed on desert pastures lambs have an average daily pre-weaning weight gain up to 200 g. The carcass weight of Sary-Ja wethers, including internal fat and fat rump, is 59% of the live weight.

The Sary-Ja produces more wool of relatively better quality than other fat-rumped breeds. Two shearings per year produce 4-5 kg of wool from rams and 3.0-4.0 kg from ewes, with a clean wool yield of 55-60%. The wool is generally white but intermediate fibres in some sheep (0.2-2.7%) are pigmented (Artykov, 1979). The fleece consists of two layers: long fine true-wool fibres (75-80%) and intermediate fibres (13-15%) with some guard hairs (up to 6%). The average staple length is 17 cm and that of wool is 19 cm. The diameter of the true wool fibres is 19μ , that of intermediate fibres 37μ and of guard hair 53μ .

Newborn lambs can be of different colours. By the age of 2-3 months they acquire a greyish colour and the wool of yearlings is almost white but the head and legs remain dark.

Lambing rate is 100-108 lambs dropped per hundred ewes lambing.

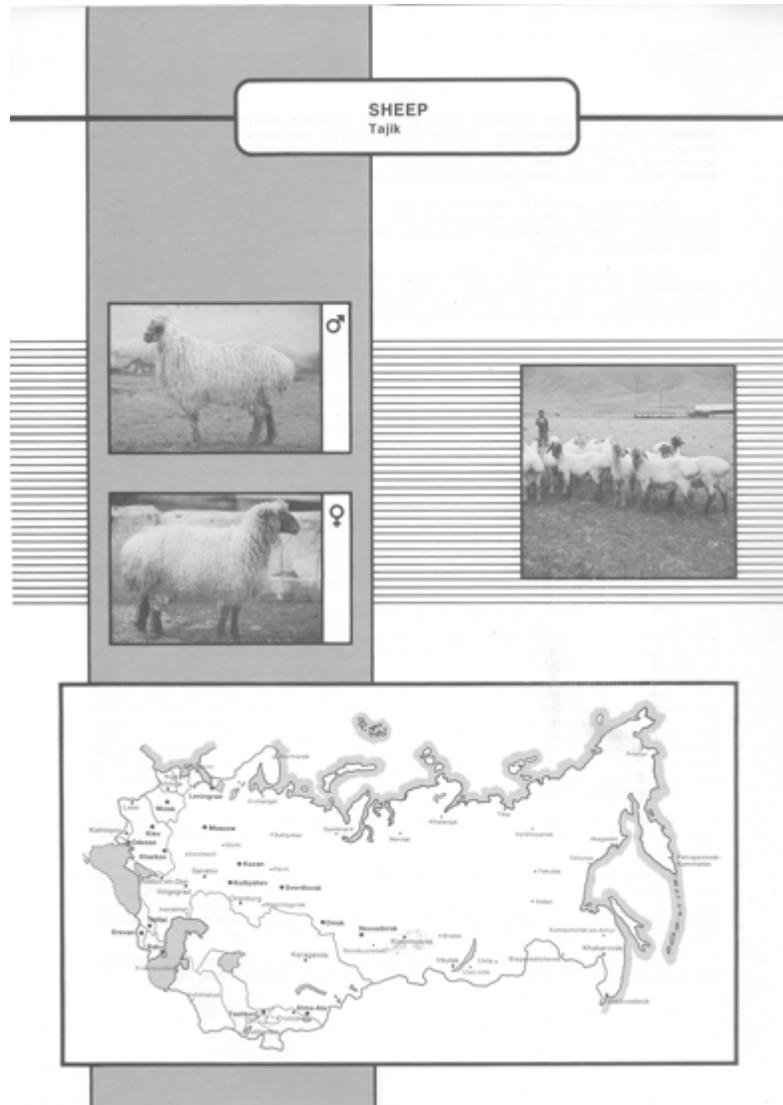
Newborn lambs are adequate in size: the average birth weight of ram lambs is 5.3 kg and that of ewe lambs is 5.0 kg. By the age of 5 months they reach 33-37 and 26-32 kg respectively. However, after weaning their growth rates slow down due to scarcity of pasture and by the age of one year rams weigh 52 kg and ewes 43 kg.

Some authors believe that the breed has three types, i.e. wool, wool-mutton, and mutton-wool which differ in appearance, productivity, and wool quality.

There is a variety called the Ashkhabad known for higher wool and meat production: the fleece weight is 0.32-1.32 kg higher and the live weight is 5-7 kg heavier than in other sheep.

The best flocks of Sary-Ja sheep are on Turkmenistan Soviet and Forty Years of the USSR collective farms in the Turkmen SSR. These farms produce highly productive sheep which are used as the breeding stock. The State Flockbook lists only six sires.

Sary-Ja breeding rams are exported to other republics of Central Asia, where they are successfully used for improving the wool quality of local coarsewooled breeds. Sary-Ja rams were used in developing the Tajik and Alai breeds and the Kargalin breed group. In addition sheep of this breed are used in Mongolia to improve the wool quality of the local coarsewooled sheep.



TAJIK (Tadzhikskaya)

The Tajik semicoarsewooled breed was produced during 1947-63 on an experimental farm of the Tajik Agricultural Research Institute. The initial task was to improve the quality and quantity of wool from local sheep of the Hissar breed and preserve at the same time such valuable traits as the strong constitution, size, early maturity and ability to deposit large quantities of fat in the rump.

To obtain a new breed Hissar and crossbred Hissar-Lincoln ewes were used. The former were mated to Sary-Ja rams, and the latter to halfbred Sary-Ja x Hissar rams. Since sheep of the initial breeds differed greatly in productivity, the first generation was rather heterogeneous. Later, rigid culling and breeding inter se of a small group of animals, which were very close to the desired type, produced a flock of sheep which combine the valuable traits of the initial breeds. Tajik sheep have inherited from the Hissar high meat and fat productivity, and from the Sary-Ja, a heavy fleece

weight and good quality semicoarse wool. The Lincoln was also instrumental in positively affecting the quantity and quality of wool. In the process of selection and culling the feeding and management conditions were considerably improved. In addition to range fodder, sheep received annually some 100 kg of roughage, 200-250 kg of silage, and 40-50 kg of concentrates per head. Moreover, since mating and lambing began 2-2.5 months ahead of the usual periods, sheep stayed longer on good summer ranges. The latter factor contributed to a better fattening by grazing and more effective utilization of both summer and winter ranges.

The number of sheep of the Tajik breed has increased by 50% since 1964. In 1980 the total was 126 470 (78% purebred) including 4552 breeding rams 25 319 other rams and 75 435 ewes and yearlings.

Tajik sheep are sufficiently large in size; they have a well-developed frame, strong constitution, and well-pronounced mutton and fat conformation. The head is light, long and Roman-nosed. Rams are horned and ewes polled. The neck is relatively long and muscular. The chest is broad and deep; the back and sacrum are broad. The legs are long and correctly set; the hoofs are strong. Sheep have a well-developed, tight or somewhat loose, broad rump, which is typical of Hissar sheep. The rump's girth is 97 cm in ewes and 111 cm in rams; it is 26 and 33 cm long respectively.

The live weight of adult ewes is 70 kg (range 56-124 kg) and that of rams is 120 kg (range 110-139 kg).

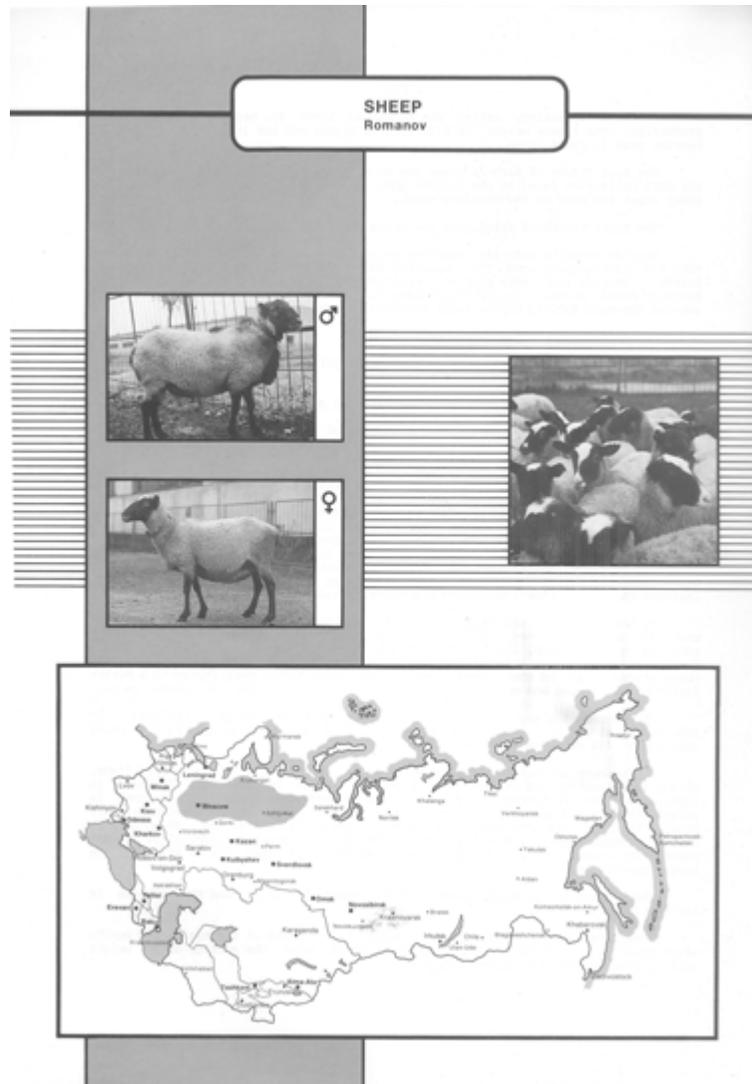
Sheep are characterized by a high growth rate. Lambs at the age of 4-5 months weigh 42-45 kg or 56% of the live weight of adult ewes. The average daily weight gain of young lambs kept in sheds is 200-210 g.

The wool is not uniform, thread-like in texture, white or light-coloured, sufficiently dense, elastic, and slightly curved. It consists mainly of wool fibres (some 75%) and intermediate hairs (21-22%). The rest (3-4%) is accounted for by guard hair. Kemp is absent. The average fineness of true wool is 20-22 μ , and the length 6-15 cm; the corresponding figures for the intermediate hair are 39-40 μ and 12-20 cm, and for the guard hair 60-62 μ and 14-20 cm. The covering hair on the head, ears and legs is tan or reddish brown. The fleece weight (in two shearings) is 2.5-2.6 kg for ewes and 3.5-4.0 kg for rams; the clean wool yield is 69-72%. The shearing of lambs produces 1.4-1.5 kg of wool felt.

The fertility rate of ewes is relatively low, 105-106 lambs dropped per hundred ewes lambing.

The best flocks of Tajik sheep are kept at Dagan-Kiikskoe breeding farm and Kalinin state farm in the Tajik SSR.

Further selection of the breed is aimed at improving growth rate, fleece weight and wool quality while at the same time preserving the sheep's good adaptability to local conditions.



IV. COARSEWOOLED BREEDS

1. Pelt Breeds

ROMANOV (Romanovskaya)

This breed of the sheepskin and mutton type emerged under the conditions of subsistence economy in the Tutaev district of the Yaroslavl region. The breed appeared at the end of the 17th century and written sources first mention it in 1802.

Northern Short-tailed sheep have been raised from time immemorial in northern, northwestern, and some central regions of Russia. They were also raised throughout the extreme north of Europe. Most successful in improving their sheep, however, were peasants of Yaroslavl region.

The research of Lobashev (1954) has confirmed the opinion of Kuleshov (1925) and Ivanov (1935) concerning the origin of the Romanov breed from the Northern Short-tailed sheep. Selection has resulted in a unique breed of sheep with excellent pelt characteristics and unsurpassed prolificacy. As a

rule Romanov sheep drop 2 to 3 lambs (up to 9) per lambing. Ewes may lamb twice a year if the feeding and management are good. Cases have been recorded in which a ewe produced up to 14 lambs in two lambings. Romanov sheep are raised in more than 30 regions of the Russian Federation. The largest numbers are kept in Yaroslavl, Ivanovo, Kostroma, Vologda, Archangel, Kalinin, Vladimir, Perm, Sverdlovsk, Novgorod, Smolensk and Kirov regions and in the Udmurt and Komi ASSRs. Good breeding flocks of Romanov sheep are also raised in Byelorussia. The number of Romanov sheep has remained fairly steady over the last fifteen years. In 1980 the total was 523 008 (89% purebreds) including 9951 breeding rams, 5054 other rams and 290 657 ewes and yearlings. Romanov sheep are relatively small in size. There are three types within the breed: coarse, fine and normal or standard. Sheep of the first type are characterized by coarse conformation, well-developed horns in rams and small horns in ewes. The wool is dark in colour due to a large guard-hair content (the ratio of guard hair to true wool fibres is more than 1:4); guard hair is much longer than wool. Locks are almost straight and form a mane in rams. The skin is thick and coarse. Sheep of the fine type have fine bone and the body is narrow. Both rams and ewes are polled. The fleece contains a high proportion of true wool fibres - 10-12 times as much as guard hair. The wool is always longer than the guard hair. The skin is thin. Pelts are attractive in appearance, light blue in colour; however they do not wear well since the wool soon gets felted. Sheep of the standard type have a strong constitution and a barrel-shaped body on long legs. The head is not large, clean-cut, and Roman nosed. The head is black, with a wide white stripe. Sheep are horned or polled. The (true) wool content by weight is twice as great as that of guard hair. In sheep of this type the wool is always longer than the guard hair. Due to a good wool-hair ratio (4-10:1 in fibre numbers), the wool does not get felted and has a nice grey colour with a shade of blue. The best skins are obtained from lambs of 4-6 months of age. Lambs are usually slaughtered at the age of 8-9 months when, after shearing of lamb's wool, guard hair has grown 2.4-3.0 cm and wool 4.6 cm. The live weight of ewes is 45-50 kg and that of rams is 55-80 kg. The annual fleece weight in 3 or 4 shearings is 2.0-2.5 kg for rams and 1.5-1.8 kg for ewes. Sheep of the standard type have better productive traits (see Table 4.2). Romanov sheep have some weak points in conformation, e.g. sharp shoulders, narrow chest, sway back, narrow and sloping rump and legs too close together.

Table 4.2 PRODUCTION OF ROMANOV EWES OF THE VARIOUS TYPES

Trait	Type		
	Standard	Coarse	Fine
Live weight (kg)	42.8	42.4	37.7
Fleece weight (kg)	1.36	1.49	0.99
Litter size	2.24	2.04	1.92
Birth weight of twins (kg)	3.08	3.15	2.70
Milk yield of ewes with twins in 20 days (kg)	33.7	22.0	25.0

Unlike sheep of other breeds, the wool of typical Romanov sheep consists only of guard hairs and true wool. The hair is short and black, and the wool is long and white. In all coarsewooled breeds follicles form in 3 or 4 stages. The formation of hair follicles in Romanov sheep has its own peculiarities (Panin, 1963). First the follicles producing guard hair are formed. Then, after a pause, wool-producing follicles emerge. In other words, follicles form in only two stages.

Romanov sheep are known for their exceptional prolificacy: in a total of 110 000 lambings, 20.2% of ewes gave singles, 51.3% twins, 24.2% triplets and 4.3% four lambs or more. The average number of lambs dropped per lambing was 2.15 (Korenev, 1964). The best shepherds obtain 250-300 lambs per hundred ewes lambing.

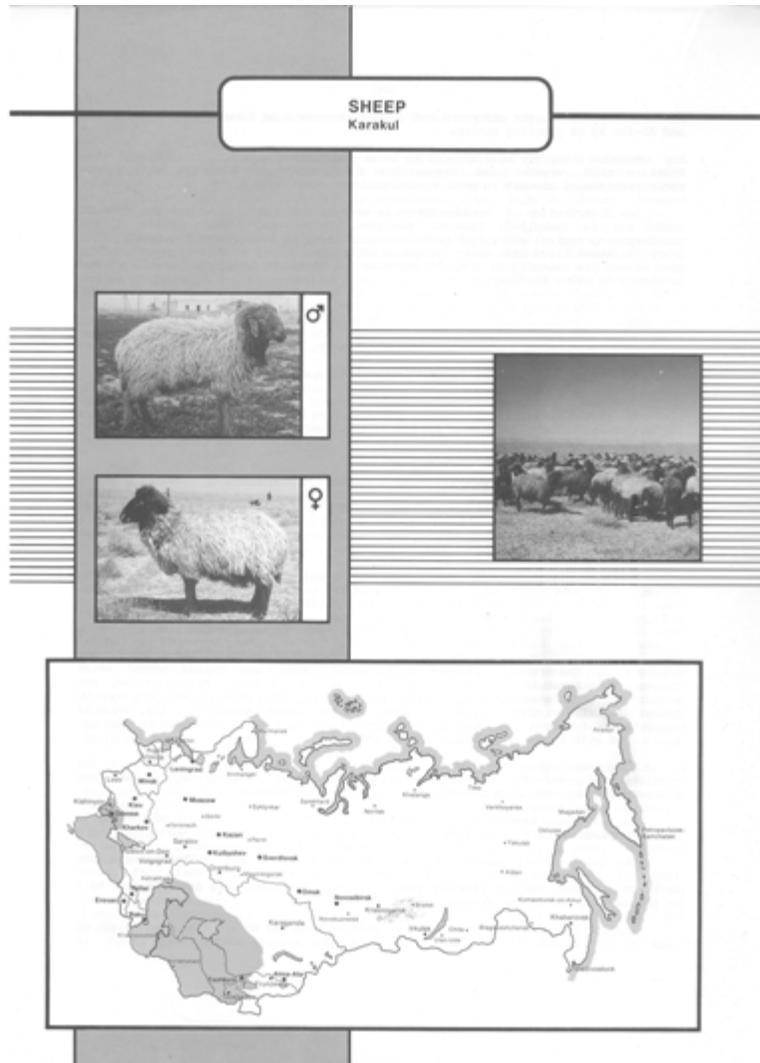
Selection for fecundity in Romanov sheep has eliminated the seasonal character of oestrus. Therefore, sheep can come into heat at any time of the year. Pregnancy lasts 140-150 days, i.e. it is shorter than in other breeds. Milk yield of Romanov ewes is usually high. Well-fed ewes produce 140-150 kg in 100 days of lactation; the best ewes produce 200-230 kg. The live weight of lambs at weaning (100-120 days) is 16 kg and at 8-9 months it is 35-40 kg. Ewes are mated at the age of 14-18 months when their live weight is 38-40 kg.

On many farms, the offspring of one ewe produce 2 or 3 high-quality lambskins and 80-100 kg of yearling mutton.

Romanov sheep are well adapted to local feeding and climatic conditions; they tolerate cold weather and temperature fluctuations. Dampness and strong concentrations of ammonia in pens are ruinous for them.

The distribution of Romanov sheep is wide. The best flocks and the largest number are in Yaroslavl, Ivanovo, Kostroma, -Kalinin and other regions of the northwestern, central and Volga-Vyatka economic areas of the Russian Federation. The State Flockbook lists 2481 sheep including 127 sires.

Sheep of this breed are widely used abroad for crossing in order to increase out-of-season breeding, prolificacy and precocity in other breeds.



2. Fur Breeds KARAKUL (Karakulskaya)

The Karakul breed is the leading fur-producing breed. Karakul sheep are raised in the Uzbek, Turkmen, Tajik and Kazakh SSRs, in parts of Moldavia and in the south of the Ukraine. In the latter two regions Karakul sheep are not of decisive importance.

There are various views concerning the origin of the Karakul. Two of them are of particular interest. Proponents of the first theory evoke the studies of Young (USA) and their own experiments to substantiate the view that the Karakul breed developed recently from crossing a long-tailed black coarsewooled sheep from Bukhara (the so-called Danadara), with Afghani and local fat-rumped sheep. The former cross gave grey, and the latter black, Danadara sheep.

Kuleshov (1947) believed that the Karakul breed emerged through centuries-long selection of lambs on the basis of the curl in the birth coat.' Ivanov (1964) thought that the most realistic is Adage's' theory that Karakul

sheep appeared many centuries B.C. by mutations for fat tail and curly lamb coat. Professor Durst's excavations at Anau in the vicinity of Ashkhabad unearthed the remnants of an ancient sheep, which is similar to the Karakul. It is believed that Karakul sheep appeared in Central Asia in the 8th century when the territory of Turkestan (Bukhara, Khiva, etc.) was conquered by the Arabs. In Uzbekistan, Karakul sheep are called "Arabi" which suggests that Karakuls are related to Arab sheep. At the same time Ivanov does not reject the view that present-day Karakul sheep are not the pure fur sheep brought by Arabs. He believes that they were crossed with fat-rumped sheep. This hypothesis is supported by Ivanov's data showing that the Karakul tail shape recurs in crosses of fat-rumped with long-tailed or fat-tailed sheep. The constitution and productive traits of Karakul sheep were shaped in the conditions of year-long extensive husbandry and a dry, hot climate. They are characterized by endurance and adaptability to life in deserts. Karakul sheep have long broad tails with a lot of fat. The tip of the tail, of the same colour as the newborn lamb.

Karakul sheep vary in constitution, conformation and wool. The live weight of rams is 60-70 kg and that of ewes is 45-50 kg. The average annual fleece weight is 2.5-2.6 kg; when fed properly, sheep can produce 3.0-3.5 kg of wool per head. Three constitutional types are distinguished within the breed, regardless, of the lamb's coat colour: strong, coarse, and fine.

Sheep of the strong type have a spare frame. The skin is thin and firm. The fleece consists of guard hair of medium thickness and of curly wool. Locks are silky and covered with yolk. The fleece weight is higher than in sheep of the fine type and lower than in sheep of the coarse type. Sheep of the strong type produce the lambskins of the most valuable Persian lamb type. The lambskin is lustrous, silky and beautifully patterned. Sheep of this type are hardy and agile, they can effectively utilize desert plants and are the most desirable for breeding.

In sheep of the coarse type (*Ak-gol*), the head, legs and belly are poorly covered with wool. The skin is thick, often porous. The fleece is coarse and contains a lot of guard hair; the true wool is short and thin. The locks are long and curly.

Sheep of the fine type are divided into *nazykh* and *kyryk*. In general they have a fine, refined or even overdeveloped frame, and a narrow body. The head is fine, with elongated facial bones. The skin is thin. The wool in general consists of true wool and intermediate fibres, with in length it is slightly longer than the true wool. The fleece is often felted. Sheep of the fine type are not suited to range keeping in winter; they are less sought after. This is particularly true in the case of the *kyryk* sub-type.

Karakul sheep are not prolific; the average number of lambs dropped per hundred ewes is 110. This stimulated the scientists in Askania Nova to develop a new type of Karakul sheep with a lambing rate of 170-180 lambs per hundred ewes. It was obtained by mating Karakul ewes to Romanov rams and followed by rigid selection of sheep of the desired type on the basis of their prolificacy and the quality of fur. Sheep of the desired type were then bred inter se.

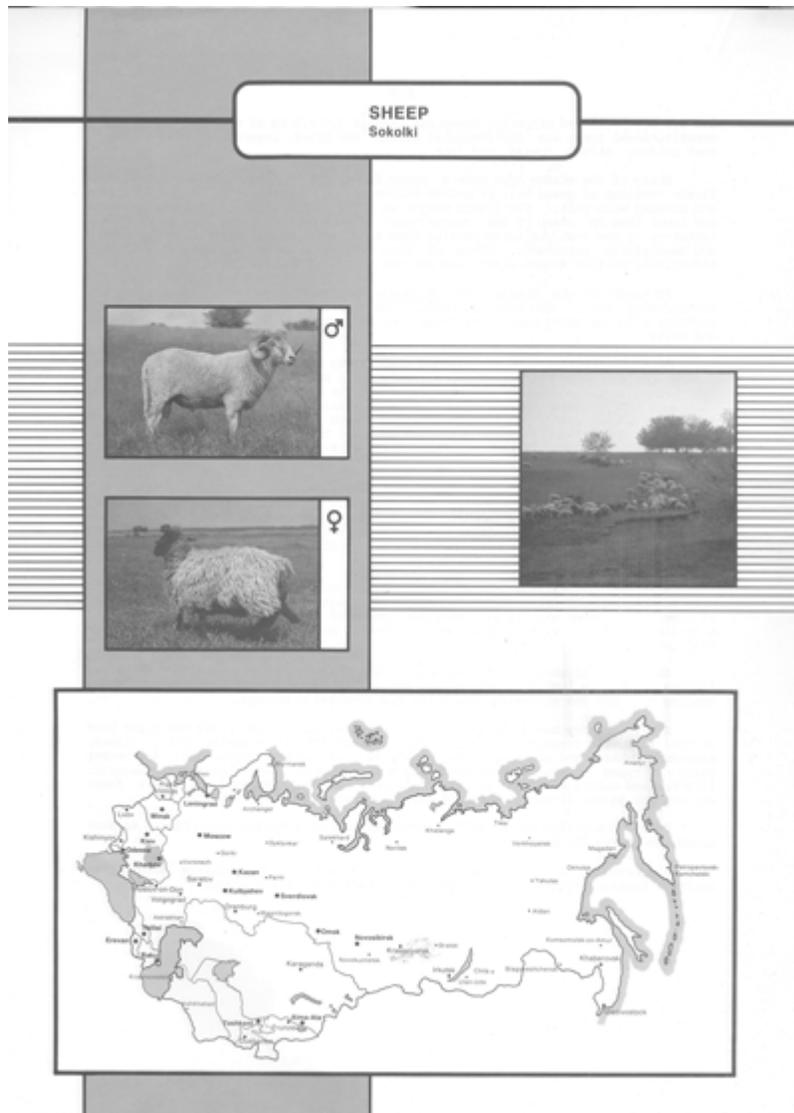
Milk yield of Karakul sheep is not high. However, since more than half the ewes are relieved of their lambs when they are slaughtered for their skins at the age of three days sheep milk is an important source of earnings for

Karakul breeders. According to Averyanov, milking of ewes in Central Asia produces 25-30 kg of milk per head, with 7-8% fat.

The number of sheep of the Karakul breed has remained constant over the last fifteen years. In 1980 the total was 12 431 977 (96% purebreds) including 375 047 breeding rams 257 765 other rams and 8 582 464 ewes and yearlings.

There are many breeding strains. For example, strains of black sheep are bred at the following breeding centres: Ravnina and Uch Aji (Turkmen SSR), Nizhan, Kara-Kum, Mubarek and Kenimekh (Uzbek SSR), and Zadarinski (Kazakh SSR). In recent years new types of coloured and grey Karakul sheep have been obtained at Gagarin, Kara-Kum and Nurata breeding centres, on Uzbekistan and Communism collective farms and at Ayak Agitma livestock breeding experiment station in the Uzbek SSR. On 1 January 1980 the State Flockbook listed 6739 superior sheep of the Karakul breed, including 888 sires.

All breeding farms use pure breeding, with positive and negative assortative mating. Karakul sheep are widely used for improving other fur breeds.



SOKOLKI (Sokolskaya)

The breed belongs to the fur-milk type. It was produced by selection for fur qualities of local breeds of the fur-milk type. The Karakul was used in improvement.

According to the breed regionalization plan this breed is raised mainly in Poltava region and some districts of Dnepropetrovsk, Cherkassy, and Kharkov regions of the Ukraine. One should mention particularly Kremenchug district of Poltava region where there is the village of Sokolki after which the breed is named.

Grey lambskins are the main product of the breed. Although Sokolki lambskins are somewhat inferior to the Karakul, they are still valued for their beautiful colour which varies from light to bluish grey or steel. A few animals are black.

Sokolki sheep are small in size, have a harmonious conformation and a long tail free of fat. The live weight of rams is 60-70 kg and that of ewes is

42-46 kg. Meat production is adequate provided sheep are properly fed. The average daily weight gain in adult sheep (ewes and wethers) fed both in confinement and on pasture for six weeks in October and November was 110 g. At the end of fattening the live weight of wethers was 56.8 kg and that of ewes 47.8 kg. The average carcass weight of ewes was 22 kg and that of wethers 26 kg with a slaughter yield of 46.0 and 47.1% respectively. The wool clip from rams is 3-3.5 kg (max. 4.8 kg) and that from ewes is 2-2.5 kg. The wool is coarse and of various shades of grey.

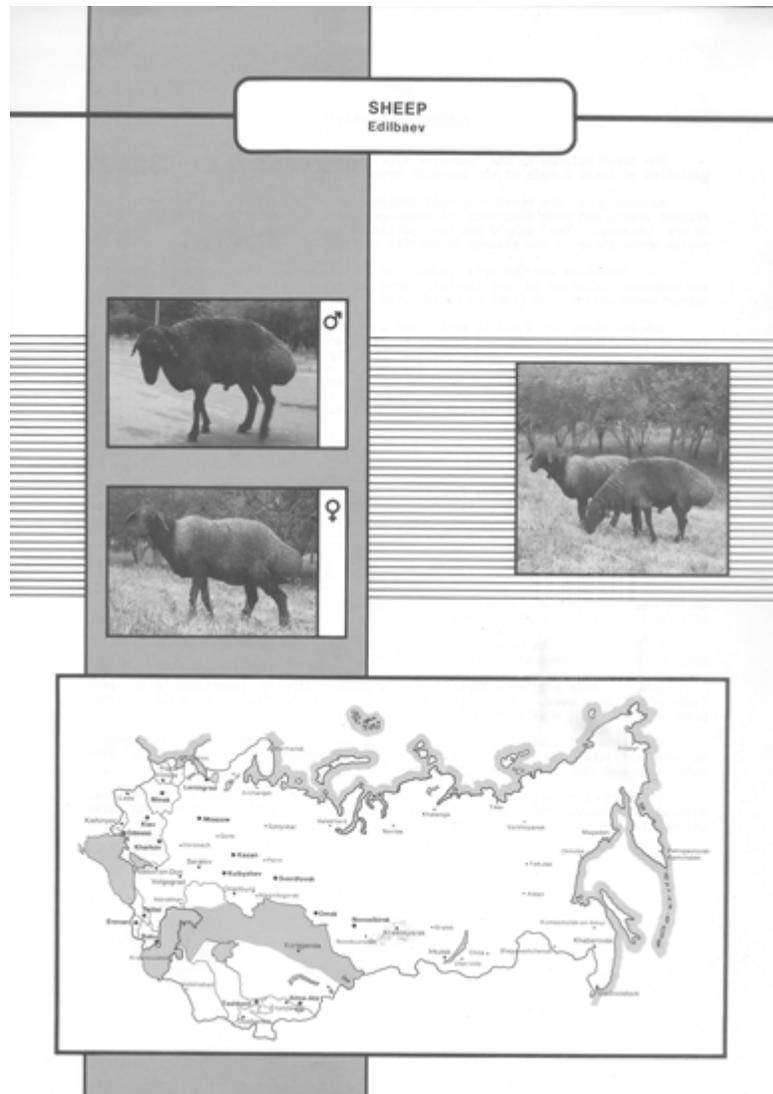
Sokolki sheep are bred pure using positive and negative assortative mating on the basis of colour. Since grey lambskins are valued more highly than other colours, both grey and black ewes are mated to grey rams in order to ensure the maximum numbers of grey lambs. The quality of grey lambskin obtained by mating grey to grey is much higher. However, some of the lambs are born so weak that at the age of three to four months some 25% of lambs (the homozygotes) die of chronic tympanitis. Therefore some experts recommend that heterozygous grey lambs be produced since they do not suffer from tympanitis. In order to obtain such lambs black ewes are mated to grey rams (in this case 51.3% of the offspring are grey) or grey ewes to black rams. Mating black to black or grey to grey is supposed to be used on breeding farms for elite and the best first-grade ewes.

Within the Sokolki breed there are 5 sire lines. Of interest are the crosses obtained by mating ewes of different colour to rams of individual strains.

Sokolki sheep are very fertile: they produce 125-135 (sometimes up to 160) lambs per hundred ewes. Milk yield of ewes is good: ewes not feeding their lambs produce 60-75 kg of milk in a lactation of 4.5 months.

The number of Sokolki sheep has increased slightly over the last fifteen years. In 1980 the total was 190 428 (88% purebreds) including 5861 breeding rams, 4973 other rams and 140 795 ewes and yearlings.

The best flocks of Sokolki sheep are on Iskra, Pobeda, 21st CPSU Congress, 'Kotovskii and Znamya Kommunizma collective farms in Poltava region. Commercial farms which raise Sokolki sheep occasionally use Karakul rams.



3. Mutton-Fat Breeds EDILBAEV (Edilbaevskaya)

This is a coarse-wooled breed of the mutton-fat type. It was obtained in the 19th century by mating Kazakh fat-rumped ewes to coarsewooled rams from Astrakhan. During this process animals most suited to the natural and climatic conditions of nomadic sheep husbandry were selected. Sheep of this breed can stand severe winter frosts and summer droughts. They can easily cover long distances and, due to their morphological and physiological features, graze well on scarce coarse pastures. According to the breed regionalization plan Edilbaev sheep are raised in Karaganda, Guryev, Aktyubinsk, Semipalatinsk, Kustanai, Uralsk, Jezgazan and Pavlodar regions of Kazakhstan. Edilbaev sheep have a strong constitution, a good conformation and a well-developed fat rump. In terms of their meat and fat traits they are inferior only to the Hissar. Both rams and ewes are polled. Withers height is 75-84 cm

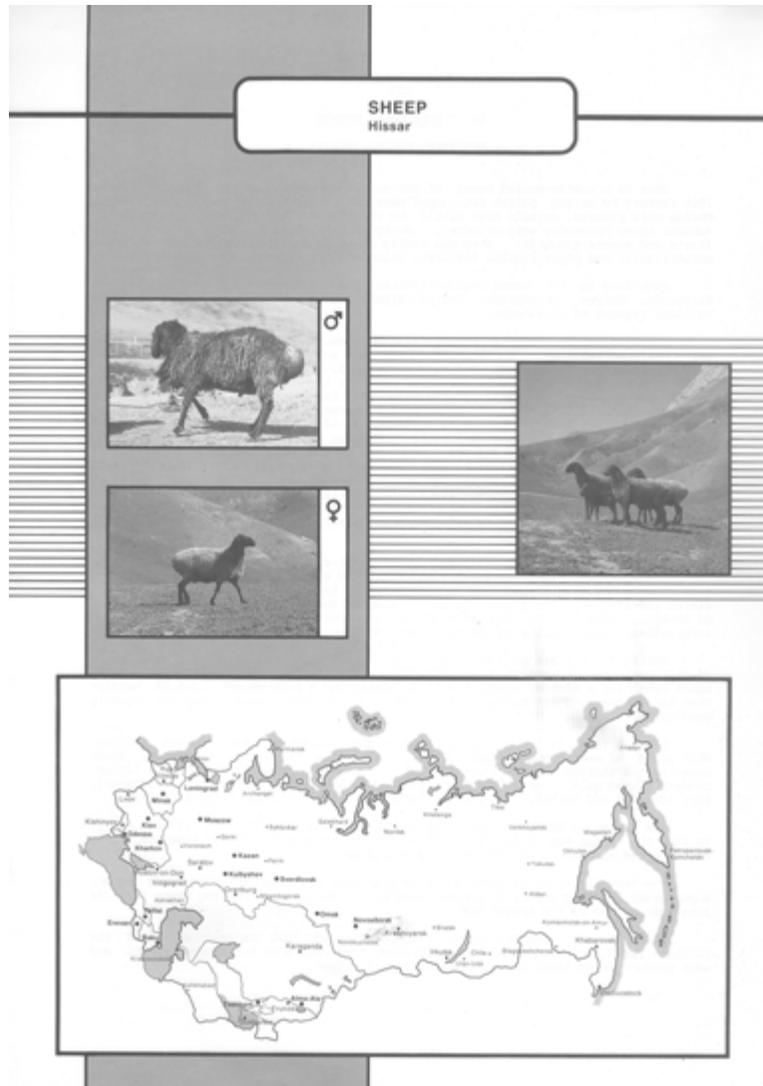
and chest girth is 97-106 cm. Live weight of rams is 110-120 kg (max. 150-160 kg) and that of ewes is 65-70 kg (max. 90-100 kg). They have a rapid growth rate and are early maturing. Birth weight of males is 6.0 kg and that of females is 5.2-5.3 kg. Weaning weight (at 4.0-4.5 months) is 40-45 and 35-40 kg respectively. At the age of 18 months rams weigh 80 kg and ewes 65 kg. Carcass weight at the age of 4 months is 20-24 kg and rump weight is 3-4 kg. According to the data compiled by the former Temir experimental station (Kazakh SSR), the live weight of Edilbaev lambs on good pasture was 17.7 kg at the age of one month, 28.7 at two, 35.8 at three, 42.4 at four, and 43.5 kg at six months. The average daily gain was 195 g and the maximum 253 g. This shows the extreme precocity of the breed. The carcass weight of fat adult wethers may reach 40-45 kg and the rump fat may weigh as much as 12-14 kg. The meat and fat yield is 50-55%. Edilbaev sheep surpass other coarsewooled fat-rumped breeds in wool production. The average fleece weight is 3.0-3.5 kg (max. 5.0 kg) for rams and 2.3-2.6 kg for ewes. The wool is not uniform and consists of true wool (52-56%), intermediate fibres (16-19%), and guard hair (24-28%). Kemp is found only in a very small number of sheep. According to laboratory data, the wool fineness is 18.0 μ , that of intermediate fibres 33.1 μ and of guard hair 59.5 μ .

Edilbaev sheep are predominantly black or tan; they may also be brown. Sheep of different colours differ in productivity. For example, it has been shown that black ewes have a fleece weight 7.5-11.8% higher and a live weight 2.2-6.9% heavier than tan sheep. Their carcass traits are also better. Brown sheep are equally productive.

Lambing rate is low - only 110-120 lambs dropped per hundred ewes lambing. Milk yield of ewes is sufficiently high. According to data of the former Temir experimental station, ewes average 150-155 litres with a range of 124.8-184.3 litres. Commercialized milk is used for production of airan (sour milk), primchik (cheese), kurt (cheese) and butter. The average fat content is 5.8% with a range of 3-9%.

The number of Edilbaev sheep has nearly doubled over the last fifteen years. In 1980 the total was 5 256 059 (46% purebreds) including 137 798 breeding rams, 22 269 other rams and 3 707 411 ewes and yearlings. The best flocks of this breed are on Brklinski breeding centre in Urals region, Suyundukski breeding centre in Guryev region, and Sarysuiski breeding state farm in Jezgazgan region of the Kazakh SSR.

On 1 January 1980 the State Flockbook listed 5182 superior sheep of the Edilbaev breed including 4582 rams. Edilbaev rams are used for improving wool and meat production of local breeds of the mutton-fat type.



HISSAR (Gissarskaya)

This is a coarsewooled fat-rumped breed of the mutton-fat type. It was obtained by selection in the conditions of year-long range husbandry in Tajikistan and was bred by Uzbek tribes which migrated there with their sheep flocks in the 13th-14th centuries. Sheep of this breed are raised in the centre of the Tajik SSR (Karagach, Dushanbe, Faizabad, Kulyab, Kurgan-Tyube) and in the foothills and mountains of Surkhandarya and Kashkadarya regions of the Uzbek SSR (Baisun, Denau, Sariasia, Shurchi, Sherabad). As Ivanov points out, Hissar sheep are an isolated race of fat-rumped sheep. They were extensively studied for the first time by an expedition of the Moscow Zootechnical Institute during 1921-28, headed by S.G. Azarov. Azarov believed that the isolation took place due to the remoteness and the natural, historic, and economic peculiarities of the areas (the Lokai plain, for example), where Hissar sheep are raised. Hissar sheep are not only the largest of the fat-rumped breeds, but they are larger than the Lincoln, the biggest European sheep. Withers height of ewes

is 75-80 cm and that of rams is 80-85 cm. Oblique body length is 75 and 85 cm and depth of chest is 34 and 35.5 respectively.

Sheep of this breed have a strong and sound frame, a long, broad and deep body and a well-developed elevated rump where the reserve fat is deposited. The fat serves as an insurance against seasonal fluctuations in forage supplies. In ewes the rump is some 40 cm long and 29 cm wide; in rams, the respective figures are 48 cm and 40 cm. The head is massive and Roman-nosed; the ears are long and pendent. The neck is short and thick. Ewes are polled but some rams have small horns. Hissar sheep are well adapted to local environmental conditions and are easily able to cover the long distances (400-500 km) from winter quarters to high-altitude summer ranges. When pastured on alpine and sub-alpine ranges, Hissar sheep graze well and deposit large quantities of fat in the rump.

The live weight of rams is 130-140 kg (max. 180-190 kg) and that of ewes is 70-80 kg (max. 100-120 kg). The carcass weight of adult sheep is 58-60% of their live weight. The young mature very early: during the first 2-3 months they gain at the rate of 500-600 g a day. At weaning ram lambs weigh 47-50 kg and ewe lambs 46-48 kg. On pasture, wethers on the Hissar breeding farm in the Tajik SSR had a live weight of 128 kg and a carcass weight of 87 kg. The rump weighed 23 kg. Individual wethers produced up to 64 kg of fat.

At the same time Hissar sheep produce very little wool and it is the coarsest among all varieties of fat-rumped sheep. The average fleece weight is 1.3-1.6 kg for rams and 1.0-1.4 kg for ewes. The wool contains a lot of guard hair and kemp -18-34% in ewes and 11-24% in rams. The wool is used mainly for felt production. Hissar sheep are dark tan or black in colour. Lambing rate is low - 110-115 lambs dropped per hundred ewes lambing. Milk yield is sufficiently high - 1.8-2.3 kg per day. According to Farsykhonov, the milk yield per ewe is 100-120 litres in a 2-month lactation.

The number of Hissar sheep has declined somewhat over the last fifteen years. In 1980 the total was 478 290 (97% purebreds) including 14 163 breeding rams, 11 617 rams and 275 668 ewes and yearlings.

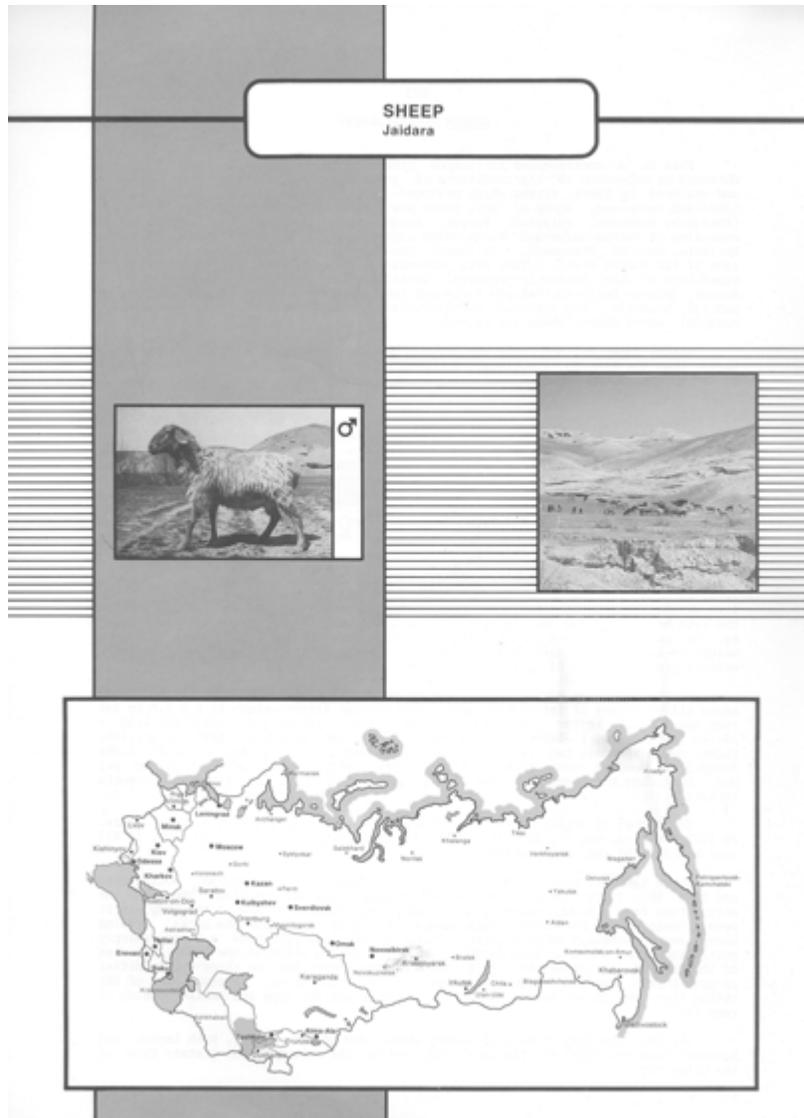
Three types of Hissar sheep are currently distinguished: mutton, mutton-fat, and fat; they differ in conformation and in rump size and position. Sheep of the mutton type have a tight, scarcely noticeable rump which is hidden in the body, as it were. Sheep of the mutton-fat type have a large rump level with the back; grazing sheep have a somewhat bulging rump. Sheep of the fat type have a large sharply protruding rump, which in some animals is as big as one third of the body. Studies of the Uzbek Institute of Livestock Breeding have shown that the three types differ in growth rate, carcass traits and composition of weight gains. Grazing sheep of the mutton type have larger weight gains than sheep of the fat type and smaller yields of rump fat.

The best breeding flocks of Hissar sheep are on the Hissar, Rokh Lenin, and Komsomol breeding farms of the Tajik SSR, and on the Baisun breeding state farm of the Uzbek SSR.

The leading flock of the Hissar breeding centre has four lines. The first line combines all the best traits of the breed. One of the branches of this line is bred on Rokhi Lenin breeding centre in Hissar district. The second strain is characterized by earlier maturity and a higher lamb crop at weaning. Lambs of this strain are also heavier. The third strain is

characterized by prolificacy. The fourth strain was established in 1979 on the basis of well-pronounced meat conformation.

On 1 January 1980 the State Flockbook listed 25 ewes of the Hissar breed. In recent years, along with pure breeding, in some flocks, particularly in commercial ones, Hissar ewes are mated to rams of other breeds, in order to improve the wool. Hissar sheep are widely used for improving early maturity and meat and fat traits of other breeds of the same type.



JAIDARA (Dzhaidara)

This is a local fat-rumped breed of the mutton-fat type. According to the breed regionalization plan, the breed is raised in all districts of Uzbekistan except the western desert and semi-desert or mountain areas where the Karakul and Hissar breeds are raised. This breed has also gained wide popularity in northern Tajikistan (Aini, Penjikent, Ura-Tyube, Ganchi and Nau regions).

In these areas sheep are kept on pastures in the foothills and at high altitudes except for a short period of confinement in winter. Winter and spring ranges lie at a height of 2000-2500 m and summer and autumn pastures at 2500-4000 m above sea level. Native plants on meadow lands include foxtail (*Alopecurus*), bromegrass (*Bromopsis*), fescue (*Festuca*), hairgrass (*Koeleria*), cocksfoot (*Dactylis glomerata*), bluegrass (*Poa*), vetch (*Vicia*), mugwort (*Artemisia*) and small shrubs. The climate is continental, with temperature fluctuations from -15 C to +30 C. The environmental

conditions and centuries-old experience of the local people have determined the boundaries of the area where sheep of this breed are currently raised.

The number of Jaidara sheep has declined slightly over the last fifteen years. In 1980 the total was 876 458 (96% purebreds) including 34 111 breeding rams, 40 779 other rams and 496 506 ewes and yearlings.

The distinctive features of the breed are the short legs and the elongated body which somehow predetermine their good ability to graze. Jaidara sheep are large in size and have a sound frame and proportional conformation. Most sheep are slightly Roman-nosed, with a long head and long ears. Both sexes are polled. The neck is short and straight, sufficiently thick. The shoulders are broad; the back is usually straight, broad and strong; the hindquarters are also wide and slightly sloping. The chest is wide and deep; the fat rump is broad and prominent; in some sheep it is somewhat pendent. The legs are strong and correctly set with tough hoofs. The wool cover is complete. Sheep are black (65-68%), tan (24-26%), grey or brown of various shades.

According to the data of the Uzbek Livestock Research Institute, Jaidara sheep measure 76.3 cm high at withers (range 68-84 cm) and 80.8 cm long from shoulder to base of tail (range 73-88 cm). Chest girth is 96.2 cm (range 87-107 cm) and width of thighs is 21.1 cm (range 18-24 cm). Jaidara sheep mature at a rather early age. They almost stop growing by the age of 2.5 years. Individual sheep reach the live weight and size of adults by the age of 18 months. Changes in the live weight of Jaidara sheep are given in Table 4.3

Table 4.3 CHANGES IN LIVE WEIGHT OF JAIDARA SHEEP (KG)

Age group	Rams		Ewes	
	Average	Range	Average	Range
Newborn lambs	5.6	3.5-9.0	5.2	3.5-7.5
4 months	44.0	36-64	41.3	30-56
18 months	88.0	64-90	66.3	42-80
Adults	105.0	95-128	73.6	60-84

Jaidara sheep have a high production of mutton and fat. The average live weight of wethers at the age of 18 months is 80 kg; the carcass weight is 45 kg or 55% of the live weight (range 52-56%). The fat yield is 22% of the carcass weight of adult sheep and 10-15% in lambs.

The wool of Jaidara sheep lacks uniformity; it is sufficiently dense and soft. It consists of true wool (46-61%), intermediate fibres (7-18%), guard hair (21-26%) and kemp (9-16%). The wool of adult sheep is straight and hangs in pointed locks which are 8-11 cm long. The clean wool yield is 56-60%. The annual fleece weight of ewes is 2.0-2.5 kg (range 1.2-5.0 kg) and that of rams is 2.8-3.5 kg (range 2.2-6.0 kg). The wool is used mainly for coarse cloth, felt and felt boots, and other home-made items.

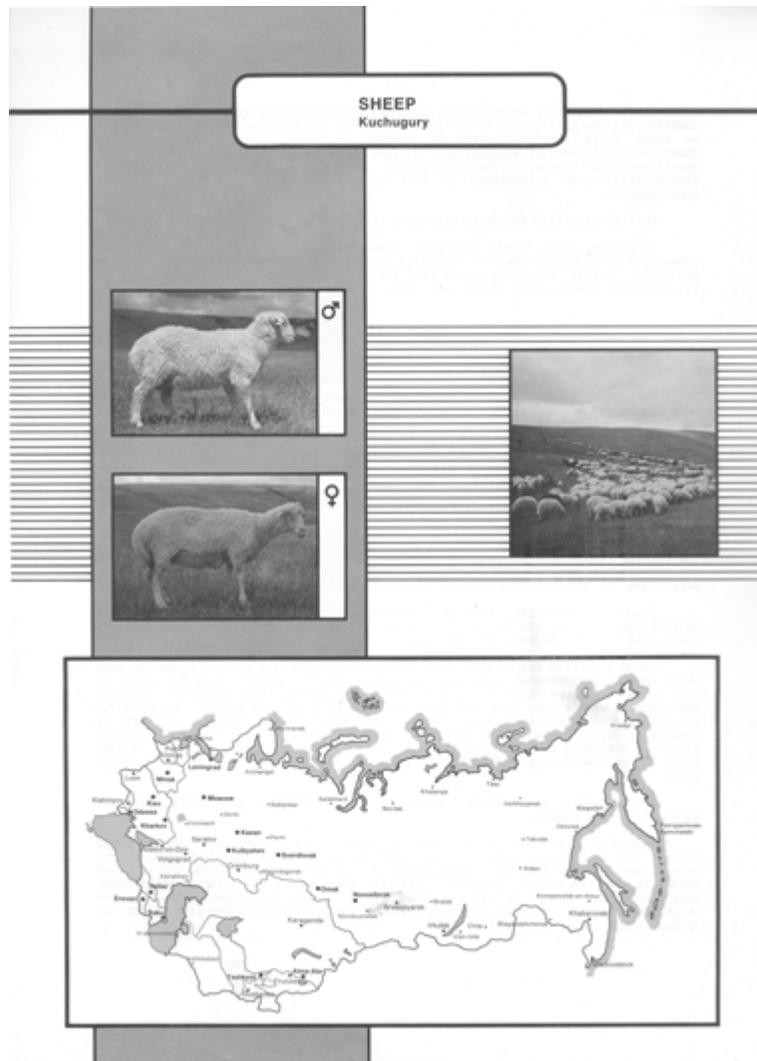
The combined thickness of the skin and papillary layer in Jaidara sheep is higher and the number of hair follicles per unit area is less than in the Lincoln and Merino. Collagen fibres form a dense, predominantly horizontal pattern.

Investigation of polymorphic systems in Jaidara sheep revealed 8 transferrin alleles and 2 alleles each of pre-albumin and post-albumin. Ewes and lambs

with transferrin of the AB type and FS carbonic anhydrase had higher live weight, body length and fleece weight.

The Jaidara breed is well known for hardiness and has great commercial value. Sheep of this breed can subsist on natural pastures almost throughout the year. They are able to graze well and deposit extra fat in the rump. These traits are particularly important for improving other breeds of the same type.

The most productive flocks are raised in Kara-Kalpak, Gallyaaral, and Zaamin districts of Samarkand region and Khovast district of Tashkent region of the Uzbek SSR, and also in some districts of Leninabad region of the Tajik SSR. The best breeding flocks are on Yangi-Dekhkan and Chkalov collective farms in Samarkand region.



4. Mutton-Wool Coarsewooled Breeds KUCHUGURY (Kuchugurovskaya)

Kuchugury sheep originated in the village of Kuchugury and adjacent localities of Nizhnedevitsk district of Voronezh region in the second half of the 19th century. Sheep of this breed have uniform coarse wool. They were produced by mating local long-thin-tailed ewes with large Voloshian rams which were raised at that time in the Don and Caspian steppes. M.F. Ivanov, who visited Kuchugury in 1916, states that the blood of some improved breed was added to these crosses. This view is supported by the breed's relative precocity, waviness of wool and improved conformation. Among other factors in the development of this breed, were good feeding and management on peasant farms, careful selection for size, and high prices for breeding animals.

According to the breed regionalization plan, the best and largest flocks of Kuchugury sheep are raised on state and collective farms of Voronezh and Kursk regions.

The stock of this breed has declined to almost one tenth of its numbers in 1964. In 1980 the total was only 7816 (all purebreds) including 68 breeding rams, 76 other rams and 6381 ewes and yearlings.

Kuchugury sheep have a strong constitution, a lively temperament, and good agility. The frame is solid and well developed. They have long fat tails. Both rams and ewes are predominantly hornless; only 10% have horns. The head is densely covered with curly wool. The body is of regular shape, although a large and heavy tail tends to raise the hindquarters. The shoulders, back and loin are wide. The legs are correctly set, strong and woolled almost down to the hoofs. The tail is long; at its root there is a broad flat pad of fat which gradually narrows to the tip. The fat tail weighs 15-18 kg.

The average live weight of ewes is 55 kg (range 40-79 kg) and that of rams is 73 kg (range 49-100 kg). The maximum live weight of ewes is 80 kg and that of rams is 145 kg. Lambs grow rapidly and by the age of 6 months weigh 32-37 kg. Sheep continue to grow to the age of 3.5 to 4 years.

About 70% are black and 30% white. Most black sheep have a white spot on the head.

Ewes are usually shorn twice a year. Rams are shorn once a year, in spring. The fleece weight data are given in Table 4.4

Table 4.4 FLEECE WEIGHT OF KUCHUGURY SHEEP (KG)

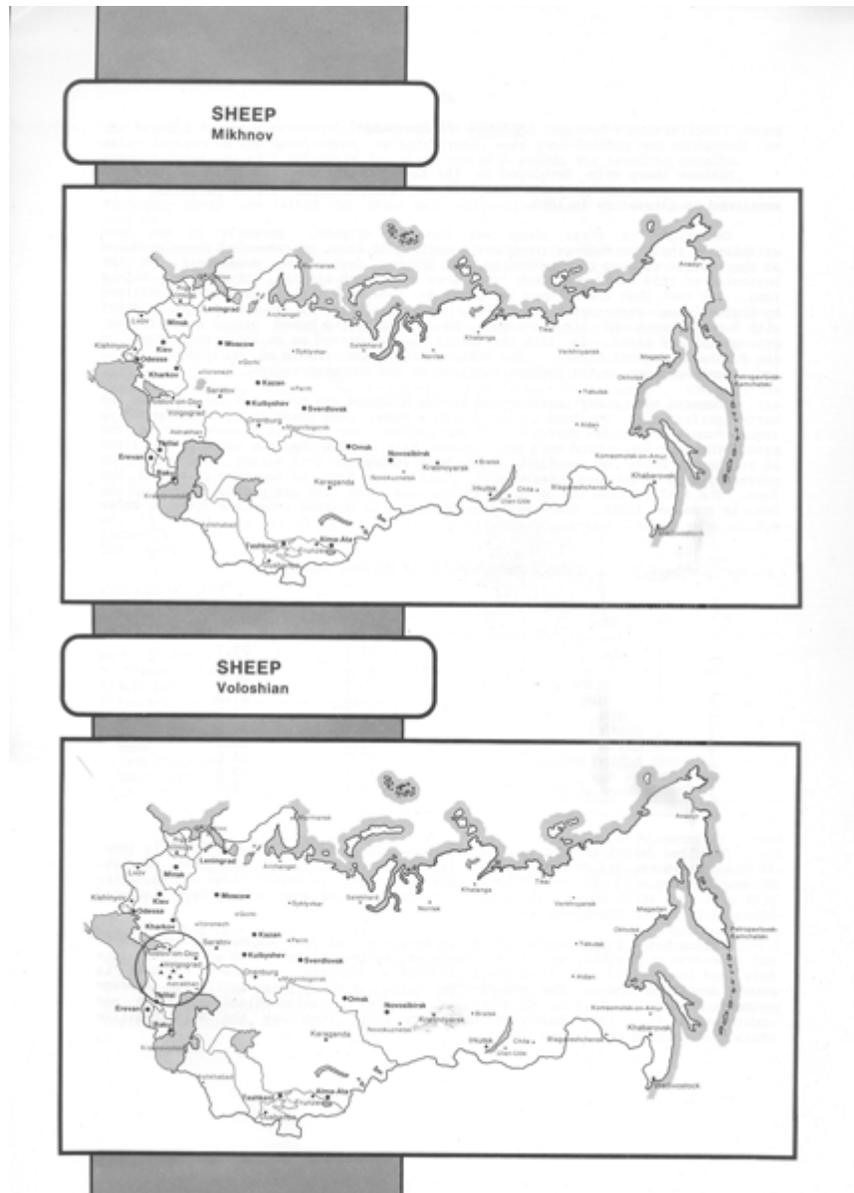
Category	Average	Range
Breeding rams	5.0	4.6-6.5
Yearling rams	2.7	2.2-4.5
Ewes	2.3	1.8-4.5
Yearling ewes	2.5	1.6-4.2
Lambs (hogs)	1.5	0.6-2.2

True wool fibres account for 86-92% of the ewe's wool. The diameter of guard hair is usually 57-62 μ and that of true wool is 21-33 μ . The annual length of guard hair is 33 cm, and that of true wool is 12 cm. The fleece hangs in wavy corkscrew-like locks. The clean wool yield is about 70%. The wool is used for worsted spinning and coarse carpets.

Lambing rate is 120-130 lambs dropped per hundred ewes lambing.

Barenness does not exceed 2-3%. Newborn lambs are strong and active with a live weight of 4.2-4.9 kg.

Most of the Kuchugury sheep are raised on breeding farms of Nizhnedevitsk district of Voronezh region. Breeding rams are successfully used for improving coarsewooled breeds in other areas.



MIKHNOV (Mikhnovskaya)

Mikhnov sheep were developed in the former Ostrogozhsk district of Voronezh region, now Ostrogozhsk, Liski and Evdakov districts. These sheep were first mentioned in literature in 1880.

The origin of these sheep was long in dispute. Recently it has been established that the Mikhnov sheep are a variety of local coarsewooled sheep produced as the result of long-term selection and improved feeding and management. At the beginning of this century Mikhnov ewes were mated with Lincoln, Cotswold and Oxford rams. The fact that the Mikhnov sheep are an independent fixed variety is confirmed by their fleece structure. Since 1936, nearly all Mikhnov ewes have been crossed with Romney Marsh and Lincoln rams. As a result two breed groups were formed: Ostrogozhsk and Liski. In 1975 the latter was recognized as an

intra-breed type of the Russian Longwool breed. The Mikhnov sheep now remain as purebreds only on individual holdings in the Evdakov district of the Voronezh region.

Compared with other coarsewooled breeds Mikhnovs are noted for larger size and better performance. The head is broad with a Roman nose which is more pronounced in rams. Rams have coiled horns; ewes are polled. The head is fleeced down to the eyes. The face is covered with short glossy hair of dark chestnut colour; sometimes it is nearly black or speckled. The body stands on thin strong legs which are correctly set. They are covered with short glossy hair of the same colour as the face. The tail is thin and up to 35-49 cm long. The ribs are poorly sprung and the bone is somewhat light. The average measurements of Mikhnov sheep are given in Table 4.5

Table 4.5 AVERAGE MEASUREMENTS OF MIKHNOW SHEEP (CM)

Measurements	Rams	Ewes
Head length	24.3	22.7
Head width	12.4	11.4
Height at withers	70.4	66.7
Height at rump	71.8	67.2
Body length	76.1	71.2
Chest depth	34.1	31.9
Chest girth	91.5	84.5
Width behind shoulders	20.7	18.8
Width at hip	17.8	17.8
Cannon bone girth	9.8	8.7

The live weight of rams is 75-85 kg (max. 108 kg), that of ewes 52-66 kg (max. 78 kg). Birth weight of healthy lambs is 3.5 kg for males and 3.3 kg for females. At weaning they weigh 20 and 19 kg respectively. Skin is rather dense and elastic, pink over the whole body. The fleece is white; some animals may have isolated coloured fibres on the hindquarters.

Fleece has a tippy staple of medium fineness. Staples are made of long (7-10 cm) undercoat with fibres of 26-28 μ diameter, rather coarse (40-50 μ intermediate hair, and long (15-17 cm) guard hairs of 60-65 μ diameter.

Medulla in the last is poorly developed and at the end of the staple it disappears entirely. Average proportion of guard hair is 41.3% of the total wool, intermediate hair 14.1% and undercoat 44.6%. Long undercoat and thin outer coat are the main positive characteristics of the Mikhnov sheep. Annual fleece weight of rams is 4.8-5.5 kg (max. 7.0), that of ewes 4.0-4.7 kg (max. 6.0 kg). The autumn shearing gives 20% less than the spring one. The clean wool yield is 60-70%. The lamb's fleece weight is 0.8-1.5 kg.

Wool is mainly semicoarse. According to the Central Wool Research Institute only 22% of wool is graded as coarse; the rest is considered semicoarse. Fleece is even in fineness. Most fleece is sorted into two grades.

The fresh pelts account for 6-7% of body weight. Fur quality is good. They make good sheepskins. Mikhnovs fatten well for 1-1.5 months without any supplementary feeding. At slaughter the animals yield carcasses evenly covered with fat and with a lot of suet. On test slaughter 5-6-year-old ewes of 53.1 kg live weight (after fasting) had an average slaughter weight of 26.6

kg and dressing yield of 50.2%. Of these carcasses 55.4% were graded prime and 32% choice. The meat and fat content was 82% and the bone 18%.

Mikhnov sheep, because of their high wool quality, good pelts, and low requirements in feed and management conditions, are used for grading-up coarsewooled sheep with low productivity.

VOLOSHIAN (Voloshskaya)

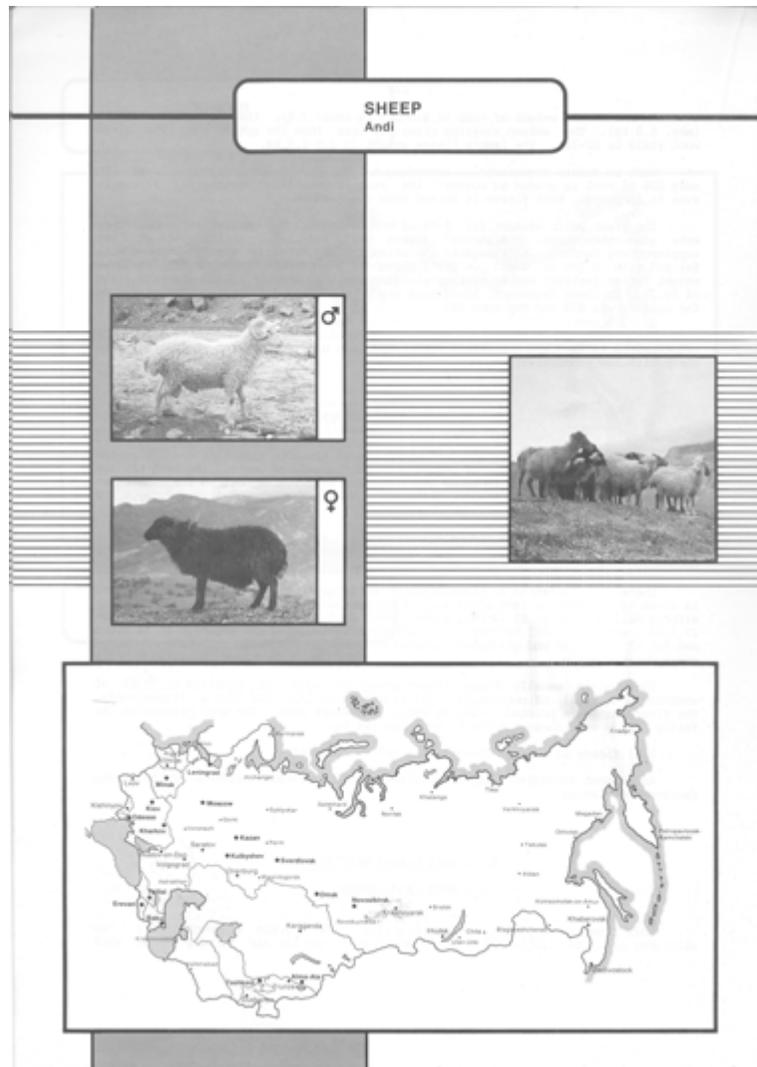
At the end of the 19th and the beginning of the 20th centuries the Voloshian breed was kept in many parts of Russia and was considered one of the best of the coarsewooled breeds. After thorough investigation M.F. Ivanov divided the Voloshian sheep into several types: Steppe, Trans-Don, Voronezh (Nizhnedevitsk), Pynny, and longwool crosses.

The purest type is the Steppe Voloshian which was raised in the North Caucasus and Lower Volga areas. There they were the base for developing finewool sheep husbandry.

The Steppe Voloshian is characterized by large size: the live weight of ewes is 43-46 kg and that of rams 60-80 kg. Body measurements are as follows: height at withers 61.2 cm (range 61-74 cm), chest girth 85.0 cm, chest depth 29.3 cm (range 27.3-51.5 cm). The tail is very long, occasionally touching the ground; it is broad and fat at the base and gradually narrows to the tip. Sometimes it is narrow and sways during mating.

The wool is usually white; black sheep are rare. It consists of 78.6% of undercoat and 21.4% of outercoat; the fineness is 23.1 and 56.3 *m* respectively. The fleece hangs in pointed locks on which crimps are seen. The wool production is fairly high - ewes shear 2.5-3.0 kg and rams 3-4 kg. Prolificacy is good - 120-130 lambs per ewe lambing.

At present Voloshian sheep are raised on the individual holdings of the North Caucasus population.



5. Mutton-Wool-Milk Breeds ANDI (Andiiskaya)

This breed is bred in northern Dagestan. The terrain is mountainous; the altitudes are high (2000-3500 m above sea level) and the air is very humid, with sharp temperature variations during the day. The Andi breed is well suited to the local conditions and year-long range husbandry; sheep of this breed are capable of covering long distances in the mountains.

Andi sheep have a broad chest, long and low-set body, and strong legs with tough hoofs. Both rams and ewes are horned. The tail consists of a large fatty cushion and shield-like appendage which covers the smooth surface of the fat cushion. The length of the fatty pad is 19 cm and the width is 18 cm. Sheep are relatively small in size: withers height is 53-60 cm. Live weight of ewes is 35-40 kg (max. 50 kg), and that of rams is 50-55 kg (max. 60-65 kg). Yearling rams weigh 32-48 kg, yearling ewes 26-29 kg. Andi sheep do not mature early but they have good meat traits and the lamb's meat is

particularly valued. The yield of choice cuts (grade I and II) is the same as in sheep of mutton breeds. The carcass yield of meat and fat is 50-57%.

Andi sheep are black or white. The spring wool contains 40-41% of true wool fibres, the autumn wool 37-38%. The corresponding figures for guard hair are 59-60 and 62-63%. Kemp is not present. The staple length is 20-24 cm. The difference in fineness between guard hair and undercoat is not great; therefore the wool has a more or less uniform look. The wool of white sheep is used for the production of coarse cloths, and that of black sheep is used for felt boots, very light and watertight. Sheepskins are used for coats and hats.

The annual fleece weight of adult rams is 2.5-2.6 kg; it is 1.9-2.0 kg for ewes. Yearling rams and ewes produce 1.8-2.0 and 1.6-1.7 kg respectively.

The clean wool yield is 58-67% in spring and up to 75-80% in autumn.

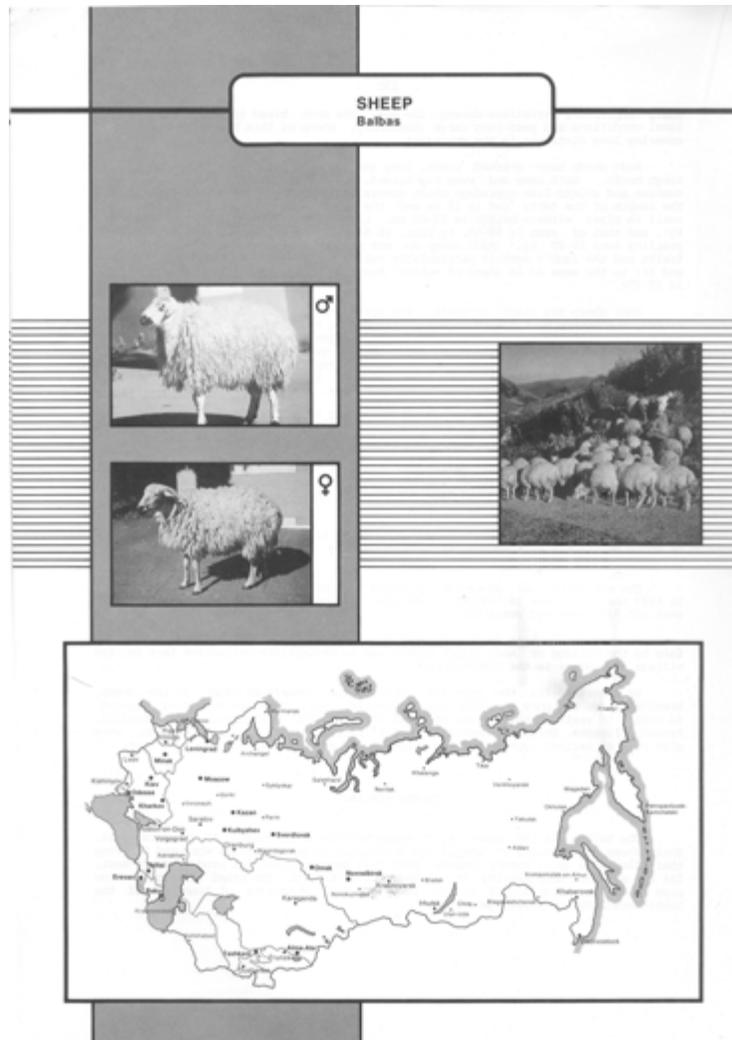
The lamb's fleece is of particular interest: some 70% of it does not hang in pointed locks but has a tippy staple. The average diameter of this wool is 28.5-30.6 μ , the length of guard hair is 13-22 cm and of true wool 6.0-9.8 cm. The clean wool yield is 82.8-85.7%.

Milk yield is satisfactory; ewes produce up to 70 kg per lactation (150 days), of which marketable milk amounts to 30 kg. Lambing rate is not high - 105-110 lambs per hundred ewes lambing.

The number of Andi sheep has increased slightly over the last fifteen years. In 1980 the total was 16 739 (96% purebreds) including 57 breeding rams, 271 other rams and 9336 ewes and yearlings.

At present the best flocks of Andi sheep are raised on Orjonikidze collective farm in the village of Andi (black sheep) and on Orjonikidze collective farm in the village of Argvani in the Dagestan ASSR.

In order to fix the type and preserve the commercial value of the sheep, breeding farms use pure breeding and inbreeding; new bloodlines are being created. In order to restore the stocks of Andi sheep in the designated areas (Botlikh, Kazbek, Tlyarota, Untsukul, Gumbet and other districts) of the Dagestan ASSR, ewes with wool of various types are being graded to purebred white or black Andi rams.



BALBAS (Balbas)

The Balbas is the most valued coarsewooled breed raised in Transcaucasia. These sheep were brought to Armenia and Azerbaijan by nomadic Kurds who used to bring their flocks to local summer ranges. They have been selected for production of meat, fat and milk and adaptability to transhumance husbandry. The breed regionalization plan zones the breeding of Balbas sheep in some districts of Armenia and the Nakhichevan ASSR of Azerbaijan.

Sheep are kept on mountain pastures for 220-255 days and they spend 110-145 winter days in confinement. This pattern has always been the most rational one and will continue to be so in the future.

Numbers have increased considerably since 1964 and in 1980 stood at 355 331 (95% purebred) including 11 652 breeding rams, 3783 other rams and 211 660 ewes and yearlings. Out of the total population 227 500 are in Armenia and 127 800 in Azerbaijan.

Balbas sheep have a strong constitution and ample bone. They are rather large in size and are known for their weight, pronounced meat traits, satisfactory wool production and fertility.

Both rams and ewes are hornless; horned rams occur occasionally. The head is medium-sized, with a straight profile; rams are slightly Roman-nosed. Ears are long. The neck and the body are slightly elongated. The back is level and straight. The chest is deep, sufficiently wide and full. The rump is somewhat sloping. The udder is well developed. Sheep are well legged; the legs are strong, muscular, with tough hoofs. The tail is of medium size and consists of two pads, a larger lower and a smaller upper one; it hangs below the hocks. The colour is predominantly white, with dark spots on face, ears, and lower limbs. Balbas sheep in the Nakhichevan ASSR have shorter legs and a longer body than their Armenian relatives. The Balbas are the largest among all local Transcaucasian breeds, not only in terms of their live weight but also in size. The average live weight of rams is 83.9 kg (range 65-105 kg). The average live weight of elite rams used at state breeding stations may reach 102 kg and that of Grade one rams is 75.6-79.2 kg. The average live weight of breeding ewes is 55-58 kg in autumn and 50-53 kg in spring. The tail fat weighs 10-12 kg in rams and 5-6 kg in ewes.

Newborn lambs weigh 3.5-4.3 kg; at weaning (4-4.5 months) males weigh 25.2 kg and females 23.3 kg. The average daily gain during suckling is 160 g for males and 148 g for females. The carcass yield is 50-62% and the yield of choice cuts is 83-85%. Meat yield is 80-84% of the carcass weight. Balbas sheep are known for their good milk yield: the average per lactation is 100 kg (range 85-130 kg). The yield of marketable milk in the shorter lactation period of 80-90 days is 30-35 kg. Sheep in the Nakhichevan ASSR have a higher milk yield; they produce 68-80 kg per ewe.

The average fleece weight of purebred elite rams is 3.5 kg; it is 2.5 kg for first-grade rams, and 2.4 and 1.9 kg for elite and first-grade ewes respectively. The average fleece weight in ordinary flocks ranges from 1.2 to 2.2 kg per head. Breeding rams used at state breeding stations have higher fleece weights (3.6-4.1 kg). The fleece weight of Balbas sheep registered in Volume I of the State Flockbook was 3.2 for rams (range 2.6-5.0 kg) and 2.7 kg for ewes (range 2.2-4.5 kg).

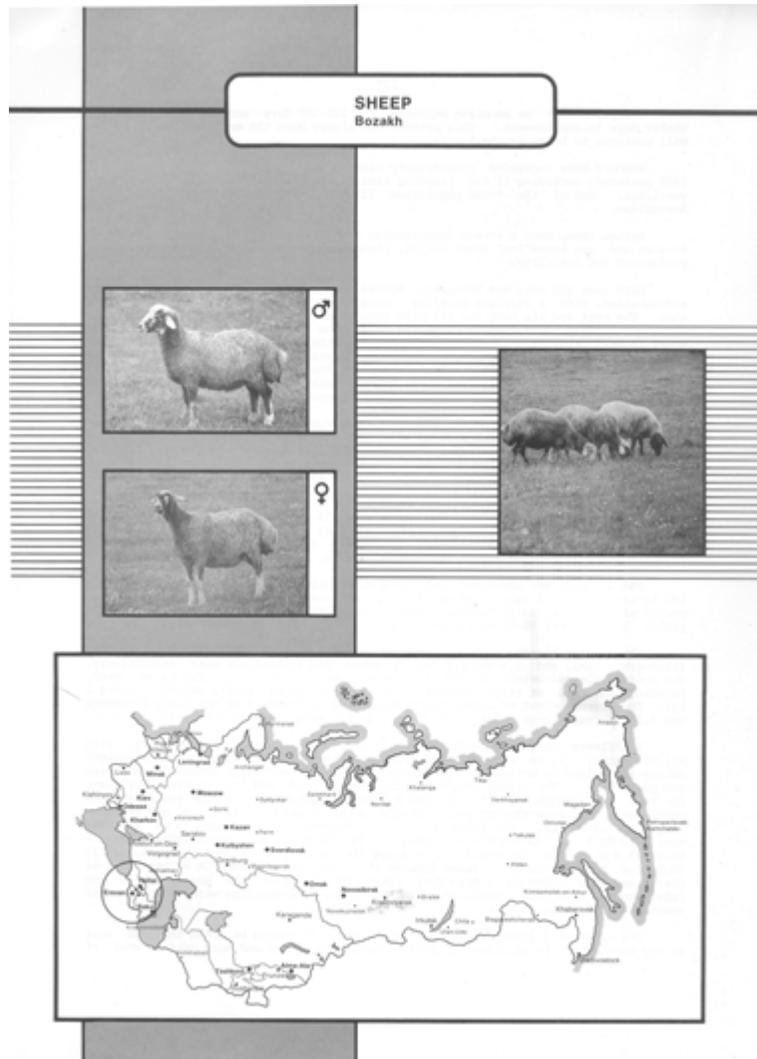
The fleece hangs in pointed locks. The wool is white or light grey, with slight lustre. It is suitable for worsted spinning and is widely used in carpet making and valued by artisans. The fleece consists of true wool, intermediate fibres and guard hair. The staple length is 18.0 cm for ewes and 13.5 cm for yearlings; the true wool length is 12.1 cm and 9.8 cm respectively. Sheep raised in the Nakhichevan ASSR have shorter wool. Staple length in ewes is 13-17 cm, and the wool length is 7.5-8.5 cm. The fibre fineness in Armenian Balbas sheep is as follows: wool 27.0-32.9 μ intermediate fibres - 39.7-53.6 μ and short guard hair - 53.5-109.4 μ . The corresponding figures for Azerbaijan Balbas are 21.1-23.7, 33.8-36.6, and 51.6-58.5 μ . These figures show that the undercoat in Balbas sheep is coarse and very close to intermediate fibres in fineness. The guard hair on the other hand is thin thus producing greater evenness in comparison with wool of other coarsewooled breeds.

The clean wool yield varies from 50 to 65%. It should be noted that the wool is dry because of the shortage of yolk. Sheep with evenner and more uniform

wool of better quality have yolk of a yellow colour. Sheep with uneven and non-uniform wool have kemps.

Lambing rate is 100-102 lambs dropped per hundred ewes lambing but in the best flocks the figure is 110-115.

As a highly productive breed, which is well adapted to local conditions, the Balbas is used for improving productivity, particularly of meat, in other coarsewooled Transcaucasian breeds.



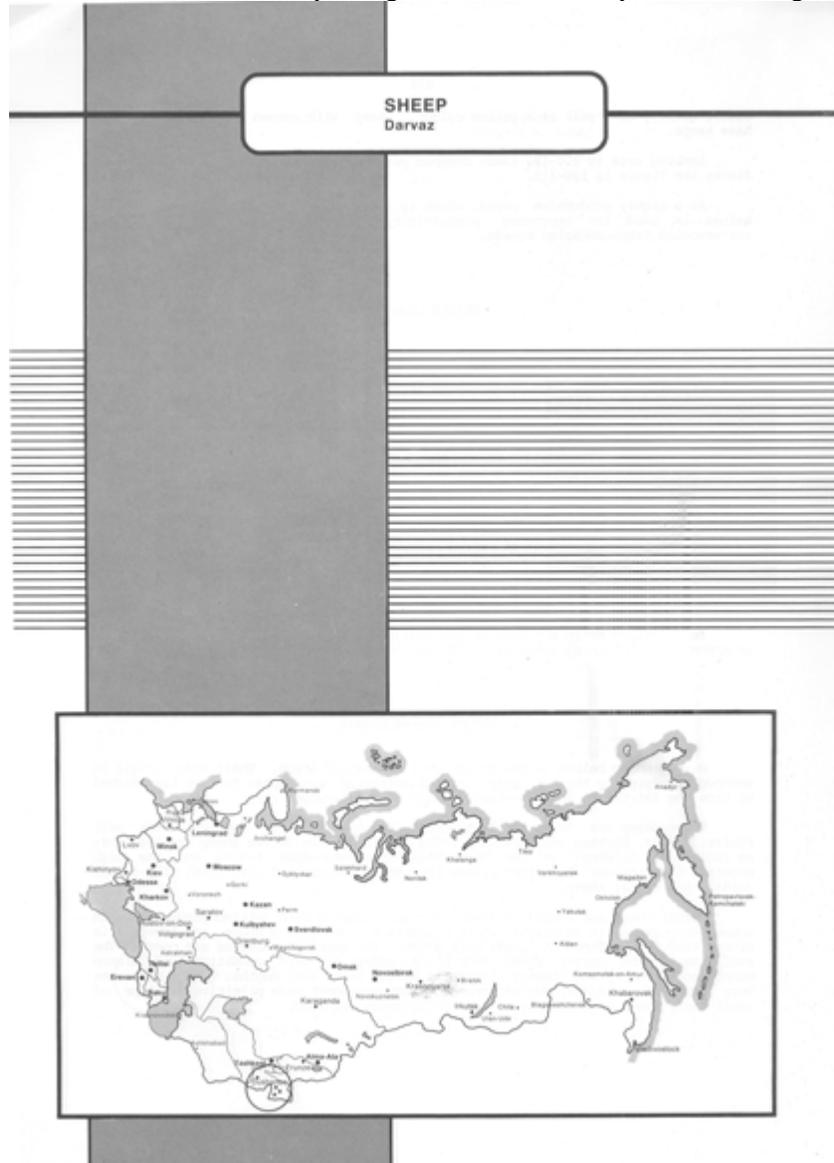
BOZAKH (Bozakh)

The breed was developed in the mountain regions of Armenia and Azerbaijan. Animals have a broad tail, consisting of two half-open lobes and a little appendage. They are fairly large: ewes weight 45-55 kg, rams about 65 kg. Lambs at birth weigh 3.3-3.5 kg and at weaning 20-22 kg. According to M.F. Ivanov, Bozakh sheep have the following measurements: height at withers 61.7 cm (range 53-71 cm), chest girth 86.6 cm (range 73-102 cm), chest depth 28.5 cm (range 24-33 cm). Rams and ewes are mainly polled. The facial profile is straight; the head is covered with short wool. Belly covering is good. Wool colour is chiefly dirty white or yellow-white; sheep with brown, light tan, grey or black colour are occasionally seen. In most cases head and legs are some shade of brown; occasionally they are grey or another colour.

The wool production in two shearings per year is 1.8-2.2 kg with a clean wool yield of 75-80%. The wool is lustrous. It contains 32.4% of true wool, 17.8% of intermediate fibres and 49.8% of guard hair. The average fibre length on the sides is as follows: true wool 8 cm, intermediate hair 10 cm,

guard hair 12 cm, and short guard hair 5 cm; fibre diameter is 29.9μ 38.7μ 61.2μ and 84.7μ respectively.

Milk production is satisfactory: 36-38 kg of marketable milk annually. Today Bozakh sheep are bred on the individual holdings of the local population in Armenia and adjoining areas of Azerbaijan and Georgia.



DARVAZ (Darvazskaya)

Darvaz sheep belong to the mutton-wool fat-tailed group. Their exact origin is unknown. Judging by the tail shape and its variation they appear to have been formed by crossing fat-tailed and thin-tailed sheep with fat-rumped ones.

These sheep are found in the mountain and high mountain regions of the west Pamirs, Darvaz, Karateg and Zaravshan in Tajikistan. Pure Darvaz sheep are left only on individual holdings in the Gorno-Badakhshan

Autonomous Region and the high mountain Garm region. In other places they have been crossed with local fat-rumped Jaidara and Hissar sheep. Darvaz sheep are raised in areas of arable farming with settled population. In summer they graze in mountains where pastures are at 3500 m above sea level; in winter they are confined in sheds with yards. In general, pastures are poor. The evolution of the Darvaz sheep took place under the hard conditions of broken mountainous country and severe climate. Winter lasts 4-6 months. Food resources were insufficient and methods of breeding and management were primitive. A type of small hardy sheep with low mutton-wool performance resulted.

Darvaz sheep have fine but strong bone. The head of most sheep is light with a Roman nose; the forehead is straight and narrow. The ears are of medium size, thin. Ewes are chiefly polled or with scurs; rams are horned. The neck is rather long, narrow, and straight. Withers are prominent and narrow. The back is straight and rather narrow; the rump is short, sloping and weakly developed. The sheep are mainly low-set, elongated and have deep chest and pendulous belly. Such shortcomings as narrowness behind the shoulders, sway back, sloping rump, sickle hocks and cow hocks are present. The tail varies in shape and size from short and fat or nearly thin, to long straight or bent with a fat deposit at the base.

Table 4.6 shows the measurements of Darvaz sheep.

Table 4.6 BODY MEASUREMENTS OF DARVAZ SHEEP

Measurement	Ewes		Rams	
	Average	Range	Average	Range
Height at withers	55.1	46-67	58.1	48-70
Height at rump	56.8	48-69	59.0	50-72
Body length	60.8	48-70	61.0	49-72
Chest girth	78.0	68-89	79.7	68-89
Chest depth	29.2	23-32	29.4	24-32
Chest width	16.5	13-23	17.0	13-25
Width at hips	15.6	12-22	16.0	12-23
Cannon bone girth	7.7	5.5-9.5	8.2	6-10

Darvaz sheep are small and late maturing; they reach maturity at the age of three years. The average live weight of mature ewes is 31 kg (range 18-43 kg); that of rams is 33 kg (range 20-49 kg). Lambs are small at birth, but strong. Ewe lambs average 2.4 kg (range 1.4-3.2 kg), ram lambs 2.8 kg (range 1.5-3.8 kg).

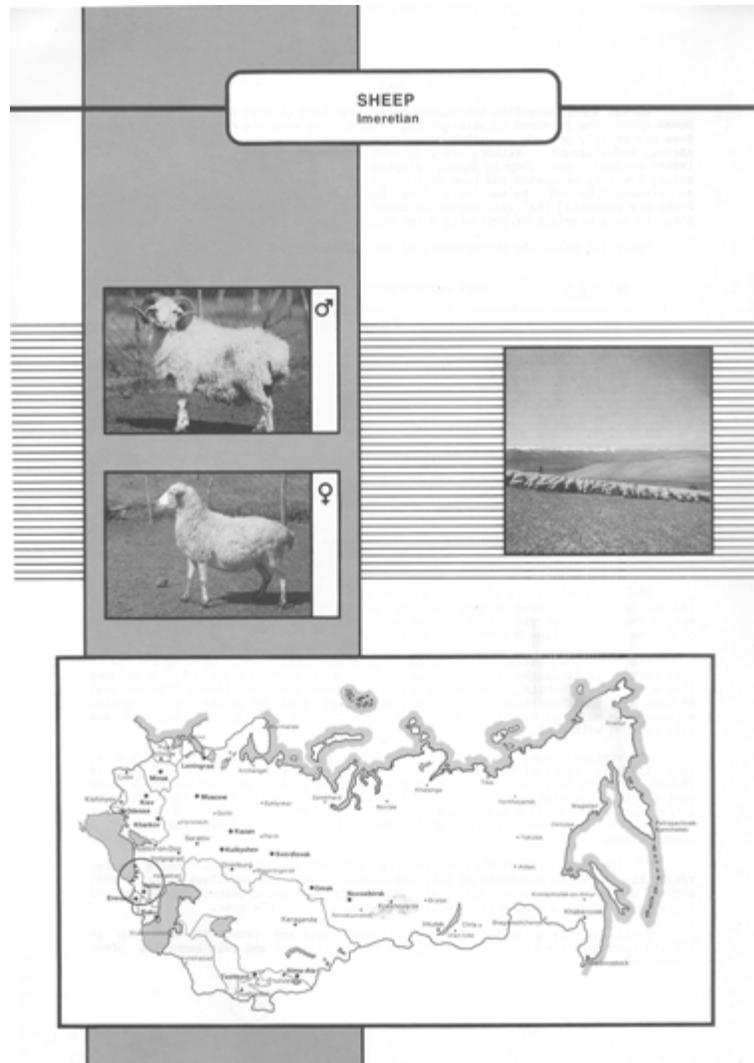
The slaughter yield of meat and fat is 41.3% on average; the best yield (43.3%) is obtained from wethers over two years old and the poorest (39.8%) from mature ewes. The fat yield from the fat tail ranges from 0.2 kg to 1.3 kg. The meat of Darvaz sheep is fine grained, but tough and lean. Fleece of the Darvaz sheep hangs in pointed locks. Wool is long and lacks uniformity; it is rather soft and not dense. Most animals are black; sometimes they are black-and-white, brown or white; white sheep are rare (about 10%) and most of them have black markings on the head, around the eyes and on the legs. Spotted animals with markings over the whole body are also seen. Head, belly and legs are well covered with wool.

The average annual fleece weight in shearings is: ewes 0.85 kg, rams 0.9 kg (max. 1.6 kg); lambs at the age of 4-5 months shear 0.3-0.4 kg. Clean wool yield is 75-78%. Wool is 15-17 cm long; it is silky with wavy crimp and contains much true wool and thin, elastic guard hair. The diameter of guard hair in ewes is 51-71 μ , of intermediate hair 33-47 μ and of true wool 27-31 μ . The amount of guard hair varies from 10.7 to 20.3% and of true wool from 72.3 to 77.6%. Guard hair is often unmedullated.

Considerable seasonal changes in skin and wool are observed. During winter total skin thickness decreases by 28%, the dermis by 30%, the papillary layer by 24%, and the depth of sweat glands by 26.5%. Under the year-round pasture management the increase of length and density of wool is irregular during the year.

Prolificacy is quite satisfactory although twins are rare. The lamb crop is 108-110 lambs per ewe lambing. Milk yield is insufficient and twin lambs are often underdeveloped.

While being small in size and having a low productivity, Darvaz sheep are distinguished by their good adaptation to the mountains. They are good walkers over the steep mountain slopes, with ravines and boulders; they withstand sharp changes of air temperature and atmospheric pressure; they are hardy while moving and endure cold winds and mountain snow storms. Sheep successfully compete with the local goats in utilizing the mountain farming area.



IMERETIAN (Imeretinskie ovtsi)

These sheep, of the mutton-wool-milk type are bred in the Ajar and Abkhazian ASSRs in western Georgia. They are considered to be the smallest among all the Caucasian mountain breeds.

According to the breed census on 1 January 1980 there were 834 head of Imeretian sheep, including 42 breeding rams and 625 ewes and yearlings. In 1964, 1970 and 1974 these sheep were not listed.

Imeretian sheep are small in size, their withers height is 48-55 cm. The head is small, with straight profile in ewes and slightly Roman-nosed in rams. The ears are small. Rams have well-developed horns; ewes are also horned. The forehead is covered with curly wool down to the nose. The neck is short; the body is small, on high strong legs; the rump is somewhat sloping. Fleece cover is satisfactory. The tail and the body are covered by the same wool. The tail reaches the hocks; it is straight, broad in the upper part and narrower in the lower section, gradually forming a thin tip.

The live weight of rams is 22-35 kg and that of ewes is 20-28 kg. The carcass weight is 14-20 and 10-16 kg respectively. The meat is tasty.

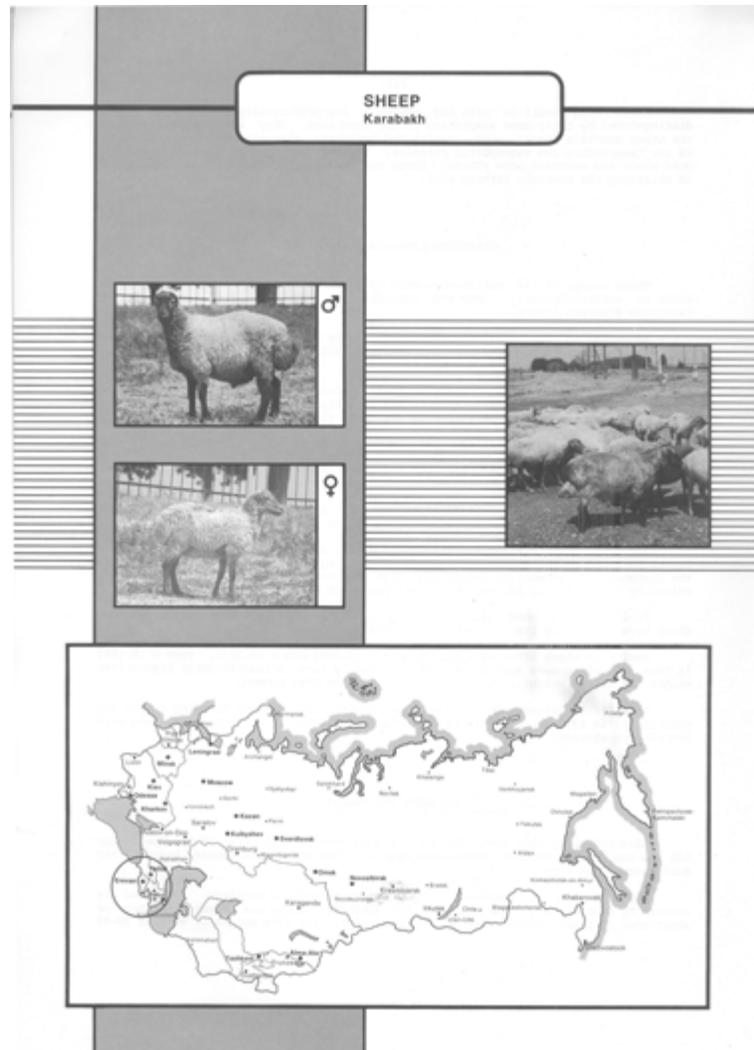
The wool is white, soft, sufficiently dense, and with a silky lustre. Staple length is 12-15 cm. The true wool and guard hair content each range from 42 to 58%. The diameter of true wool is 17-26 μ m and that of guard hair is 55-65 μ m. The wool is valued by the local population and is used for cloth and other artisan items.

Prolificacy is good (140-160 lambs per ewe lambing) but milk yield is low.

Sheep have a valuable trait: they come in heat throughout the year.

Imeretian sheep often have transferrin C (0.298) and A (0.213). Type E (0.118) is rare. Yearling ewes with Transferrin AC usually have a significantly higher live weight and fleece weight. Type B haemoglobin is the most common.

In order to preserve this valuable genetic resource a state breeding centre was established in 1977 in the Terzhol district. Here semen is collected for long-term deep-frozen storage.



KARABAKH (Karabakh)

Karabakh sheep have been raised for a long time in most parts of the Azerbaijan SSR and the Nagorny Karabakh Autonomous Region. They are a coarsewooled breed of the mutton-wool-milk type.

Karabakh ewes are hornless; rams can be horned or hornless. The head is covered by short wool. Ear length varies greatly; there are sheep with long or short ears or none. These sheep are small in size; the live weight of ewes is 39-43 kg and that of rams is 50-58 kg. Average withers height is 64.6 cm (range 53-74 cm), chest girth 63.1 cm (range 55-70 cm), chest depth 29 cm (range 18-34 cm).

The colour is usually dirty white or light brown, occasionally black or white. The tail is S-shaped; fat is deposited along its length except for the last two sections.

Ewes are shorn twice a year, giving a total of 1.5-2.0 kg of wool. Rams are shorn once and produce up to 2.5 kg per head, with clean wool yield of 75-76%. Lustre is poor. The wool contains 50.8% of true wool, 10.1% of intermediate fibres, 23.7% of guard hair, and 15.4% of short guard hair. The

length of wool fibres is 7 cm, of intermediate fibres 8 cm, of guard hair 8 cm, and of short guard hair 3 cm. Fibre diameter is 33.8, 47.1, 66.6 and 156 μ respectively.

Milk yield is satisfactory; ewes produce 35-40 kg of marketable milk. Milk is used for the production of butter and fresh cheese called pendir.

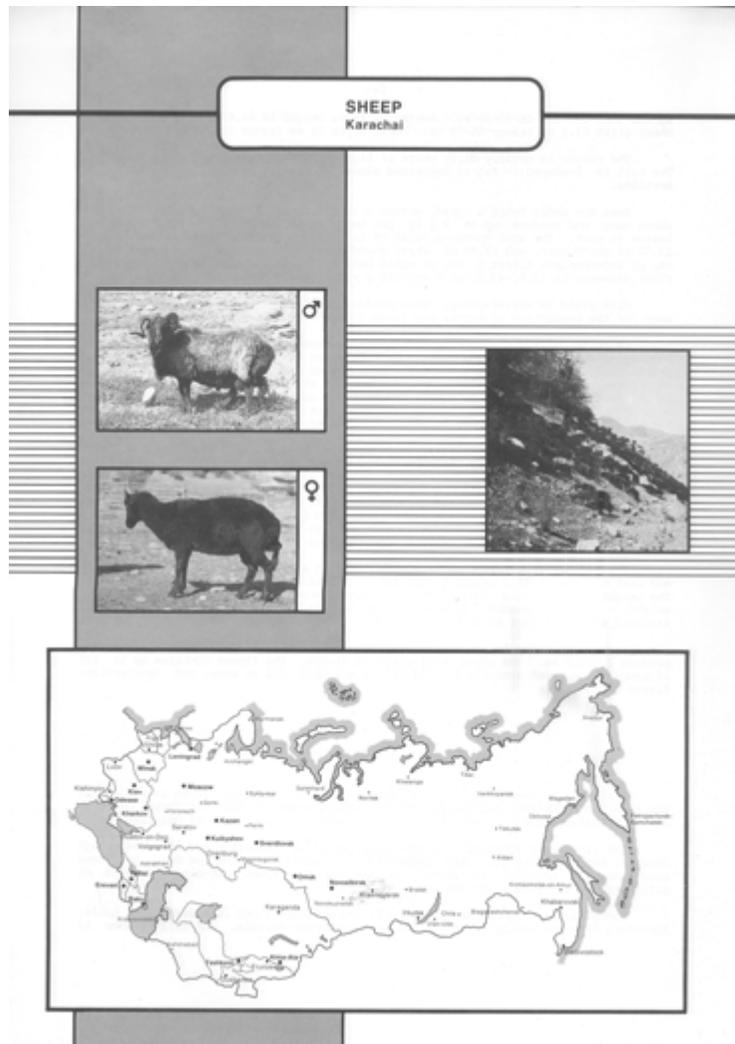
In spite of their low clip of rather coarse wool, Karabakh sheep are kept because of their hardiness and ability to subsist on rough forage, to gain weight on grazing and to traverse long distances. They are on pasture throughout the year. In summer they graze in the lowlands and in winter in the highlands, on alpine pastures. To get from winter quarters to summer ranges sheep cover 200-250 km and in some cases even up to 300 km. Sheep of the Karabakh breed are raised only on private plots in Azerbaijan and in small numbers in adjacent areas of Armenia.

The best variety of the Karabakh is the Karadolakh which is raised on a large scale on collective farms in Agzhabedinski, Agdam, Imishli and other districts of Azerbaijan. Karadolakh sheep differ from the rest of the population by a relatively larger size, better conformation and more fat in the tail. The Azerbaijan Livestock Institute has begun work to revive this variety.

At present the experimental farm of the Institute has 400 head of Karadolakh sheep with a live weight of 55-60 kg. They produce 115-120 lambs per hundred ewes and give 45-50 kg of marketable milk. The milk contains 7-8% of fat. Increase of the stock up to 5000 head is planned.

The average live weight of Karadolakh ewes in autumn is 66 kg (range 49-89 kg) and that of rams is 81.8 (range 63-101 kg). Yearling ewes in spring weigh 40-42 kg. The weight gain in ewes during the four summer months is 20% of the spring live weight. The corresponding figure in rams is 15%. Fat deposits in the tail of fattened wethers amount to 12 kg.

Karadolakh sheep have a somewhat higher fleece weight. Ewes shorn twice a year produce 2.5-2.9 kg. The clean wool yield is 71-76%. The fleece contains up to 12% of kemp. True wool accounts for 54-56%, guard hair 27% or more, and intermediate fibres 5-6%.



KARACHAI (Karachaevskaya)

According to the breed regionalization plan, the Karachai breed is raised in the Karachaevo-Cherkess Autonomous Region, Kabardino-Balkar ASSR and North Ossetian ASSR. Therefore, sheep of this breed are sometimes called Kabarda or Ossetian.

The area where sheep of this breed are raised is characterized by a very rough terrain, high humidity and sharp temperature fluctuations during the day. In these conditions the Karachai effectively subsist on alpine and sub-alpine ranges at altitudes up to 3500 m above sea level.

Sheep have a sound frame, deep chest, and well-developed legs with tough hoofs; therefore they can easily traverse the rough mountain terrain. The tail is some 44 cm long in rams and some 40 cm in ewes; it is broad, rounded or V-shaped at the root and S-shaped at the tip. When grazing, sheep carry 4-5 kg of fat in the tail. The head is small, narrow and Roman-nosed. Both rams and ewes are horned.

Sheep are predominantly black (up to 80%); grey, red and white are also seen. Most black sheep have a white spot on the poll and a white tail tip.

The wool is coarse and hangs in pointed locks. According to Mukhin (1965), the wool contains 66.6% of true wool fibres, 11.9% of intermediate fibres and 21.5% of guard hair. It is of better quality than the wool of other coarsewooled Caucasian breeds. Ivanov wrote in this respect: "Although the wool of Karachai sheep is not fine, it does not contain the very coarse hairs which are often present in the fleece of other Caucasian breeds. The ability to form thick felt makes the wool of Karachai sheep suitable for making such items as felt boots and its clear black colour in young sheep renders the items made from it very beautiful in appearance." Karachai sheep produce light and durable sheepskins with thick skin.

There are three types of Karachai sheep: a triple-purpose type producing mutton, wool and milk, and types tending either toward wool or towards mutton production. The average annual fleece weight is 1.6-3.1 kg in rams and 0.8-2.6 kg in ewes.

Karachai sheep are small in size. The average live weight of rams is 60 kg (max. 90 kg) and that of ewes is 45 kg (max. 70 kg). Sheep mature sufficiently early; by the age of three months lambs reach 38-40% of the live weight of adults (Table 4.7). When fed and managed properly, the 6-month-old rams weigh more than 50 kg. The carcass yield after grazing is 47-56%. Most fat is deposited on the loin and rump. The mutton and fat of Karachai sheep are very palatable.

Table 4.7 WEIGHT FOR AGE OF KARACHAI SHEEP

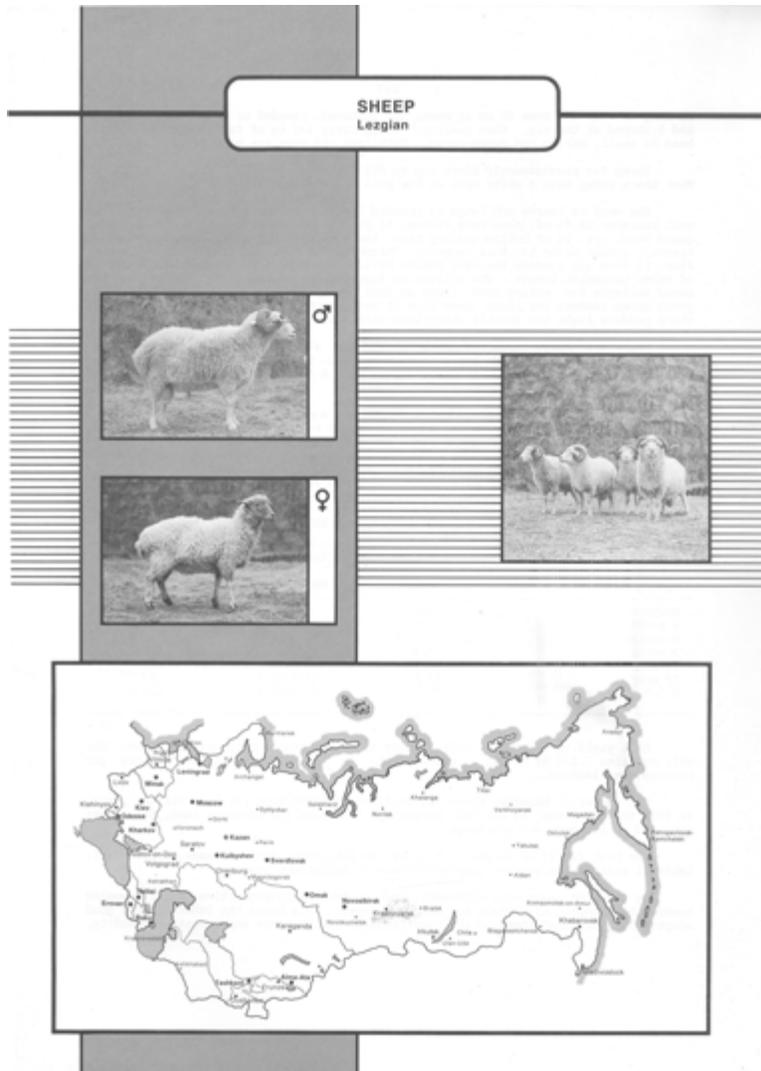
Age	Live weight (kg)		Percentage of live weight of adult
	Average	Range	
Newborn	3.6	2.9- 4.5	7.9
3 months	18.9	13.5-22.0	41.5
6 months	27.5	21.0-32.0	60.4
9 months	31.4	24.0-35.0	69.0
12 months	30.8	23.0-36.0	67.7
18 months	39.8	34.0-43.5	87.5
4.5-5.5 years	45.0	36.0-55.0	100.0

Milk yield is relatively high - 56-85 kg of marketable milk per lactation. The milk contains 7.2-9.6% of fat. Lambing rate is low - 105-110 lambs dropped per hundred ewes lambing.

The number of Karachai sheep has declined somewhat over the last fifteen years. In 1980 the total was 55 028 (94% purebreds) including 943 breeding rams, 646 other rams and 42 198 ewes and yearlings.

The best flocks of Karachai sheep are on Eltarkach, Osman Kasaev, Teberdinski, Labinski state farms in the Karachaevo-Cherkess Autonomous Region.

By crossing ewes with finewool rams a new highly-productive semifinewooled breed, the Mountain Corriedale has been developed. This breed has inherited the good adaptability of local sheep to the conditions of transhumance and excessive humidity.



LEZGIAN (Lezginskaya)

Lezgian sheep belong to the group of Caucasian fat-tailed breeds. They originated in the Dagestan ASSR and were described for the first time in 1912 when they were exhibited at the All-Russia Sheepbreeding Exhibition. Lezgian sheep are also raised in some districts of Azerbaijan on the border with Dagestan. This area is characterized by a mountainous relief and a great variety of climatic, soil and feeding conditions. Sheep are usually kept on a transhumance system in order to utilize the grasslands of both mountain and plains.

The number of sheep of this breed has increased over 20 times since 1964. The total in 1980 was 237 774 (32% purebreds) including 5344 breeding rams, 14 501 other rams and 134 809 ewes and yearlings.

Lezgian sheep have a strong constitution and are good walkers. Their conformation is typical of mountain sheep. They have an ample and fine bone, a somewhat elongated body on relatively short legs with tough hoofs.

The tail is fat, of medium size, S-shaped. The tip of the tail is lean, free of fat deposits and hanging down. Animals are usually horned.

In general, Lezgian sheep are small in size. The average withers height of ewes is 57.9 cm, rump height 59.1 cm, oblique body length 58.8 cm and chest girth 71.9 cm. Live weight is 25-55 kg in ewes and 35-65 in rams.

Some 75% of Lezgian sheep are white, often with coloured spots on the head, neck, and feet. Some 16% are black or black-brown and the rest (8-10%) are tan of various shades, grey or pied. The fleece cover is satisfactory and only 10-12% of sheep are poorly covered. The forelegs are usually covered with wool down to the knees and the hindlegs down to the hocks.

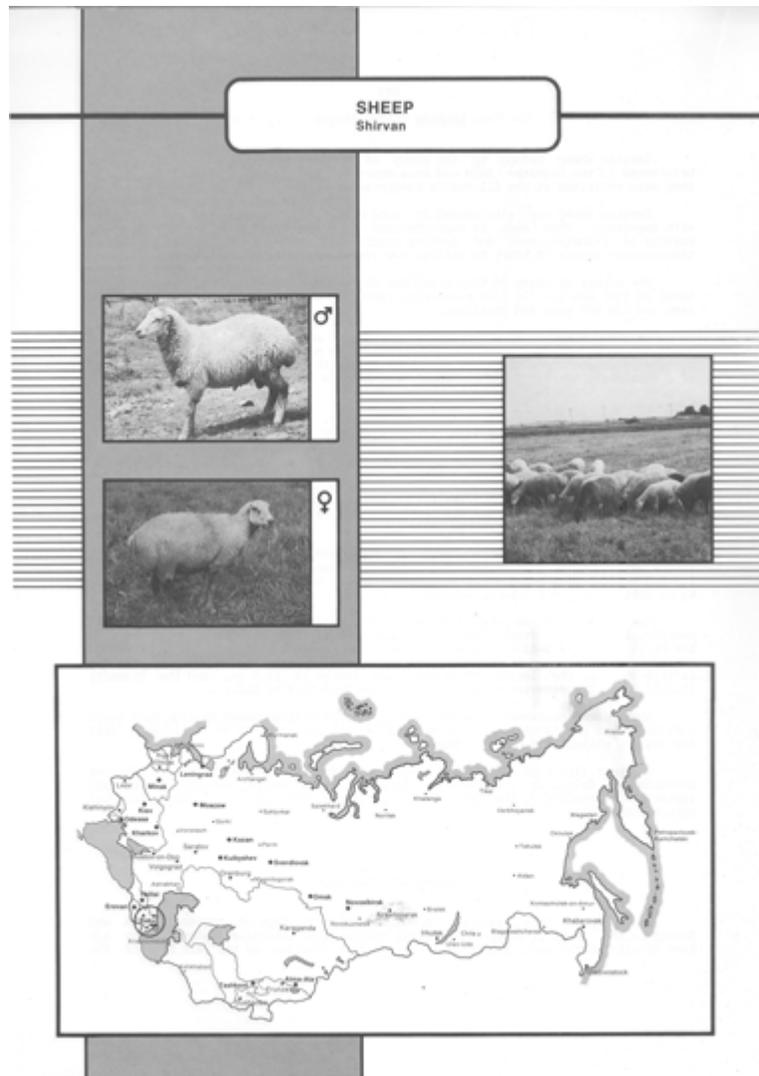
Sheep are shorn twice a year - in April and August-September. The spring fleece weight in ewes is 1.0-1.6 kg and the autumn one 0.4-0.8 kg. Rams produce 1.4-2.2 kg in spring and 0.6-1.0 in autumn. Lambs over one year of age clip 0.8-1.0 kg in spring and 0.4-0.9 kg in autumn.

The wool hangs in pointed locks; its quality is one of the best among coarsewooled breeds. Staple length is 14 cm (range 7-17.5 cm). True wool accounts for 60.5% (range 14.3-82.6%), guard hair for 1.7% (range 0.6-12.2%), and intermediate fibres for 37.8% (range 15.7-67.7%). The true wool length is 4 cm and the diameter is 16.0-29.5 μ , the length of intermediate fibres is 14.9 cm, and the diameter 30.0-57.8 μ . The diameter of guard hair ranges from 65.4 to 103.6 μ .

Among local coarsewooled breeds the Lezgian is distinguished by high milk yield - 65-80 litres per lactation, with marketable milk amounting to 35-40 litres. Ewes are usually milked from April to September.

The best flocks of the Lezgian breed are raised in southern Dagestan.

Further breeding and selection are aimed at increasing live weight and wool clip, and improving the quality of the carpet wool without any reduction in adaptation to local natural conditions.



SHIRVAN (Shirvanskaya)

The sheep of this breed are a mutton-wool-milk type of ancient origin and belong to the group of local (Caucasian) coarsewooled fat-tailed sheep. They are bred chiefly in the east and central regions of Azerbaijan on the left bank of the river Kura mainly in the Mugan, Salyany and Shirvan steppes and on the Apsheron peninsula.

Shirvan sheep are very similar to the Karabakh in conformation. As shown by their measurements (see Table 4.8) and live weight they are a large breed.

Table 4.8 BODY MEASUREMENTS OF SHIRVAN SHEEP (CM)

Measurement	Ewes		Rams	
	Average	Range	Average	Range
Height at withers	64.4	52-75	69.8	59-79
Chest depth	29.4	24-36	31.7	27-39
Body length	62.9	51-74	65.9	53-75
Chest girth	83.6	70-110	88.8	77-110
Cannon bone girth	7.7	6-10	8.2	7-11
Head length	19.3	16-26	21.4	18-29
Tail girth	57.2	30-91	70.3	50-95

Shirvan sheep are smaller than the Karabakh and they have a somewhat flatter and shorter body. The average live weight of ewes is 43 kg (range 33-59 kg) and of rams 50.7 kg (range 46-55 kg). On grazing, animals make high live-weight gains. The slaughter yield is 47%.

Fleece of Shirvans hangs in pointed locks and has a lot of brittle hair (kemp). The fleece weight (in 2 shearings) of ewes is 1.4-1.7 kg and that of rams 1.9-2.45 kg. Yearling sheep give 1.1-1.5 kg of wool, and lambs 0.3-0.4 kg.

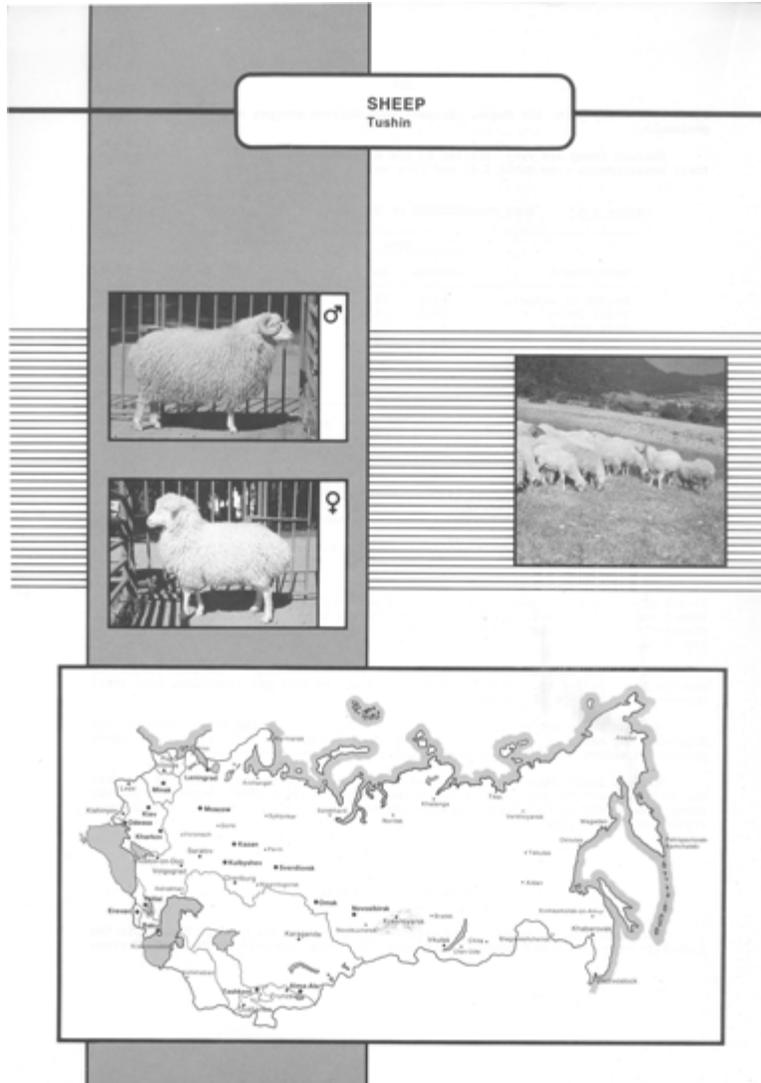
Most sheep (73%) are white with a red or greyish shade; the rest are black, black-brown, or light brown.

Shirvan wool is coarse and lacks uniformity. It contains 38% of true wool, 18-20% of intermediate hair, 20-22% of guard hair and not less than 20% of dead hair (kemp) and sometimes 30%. The staple length varies from 7.2 to 12.3 cm. The average diameter of true wool is 25.6 μ , of intermediate hair 38.5-46.8 μ and of guard hair 118-132 μ .

The lambing rate is 105-110 lambs per 100 ewes lambing. The live weight of newborn lambs is 2-4 kg. Ewes yield 40-60 litres of milk per lactation, the yield depending on the type of the sheep.

Shirvan sheep are valued for their good adaptation to the hot climate of the Mugan-Salyany areas of Azerbaijan. During long droughts as well as in cold snowy periods in winter sheep get supplementary hay and concentrate feeding.

Most of these sheep (up to 80%) are being crossed with the Azerbaijan Mountain Merino to improve mutton, wool and milk performance. As a result purebred Shirvan sheep remain only on individual holdings in Apsheron, Lenkoran, Masalli and Sumgait regions of Azerbaijan.



TUSHIN (Tushinskaya)

This coarsewooled breed of the mutton-wool-milk type was bred in Georgia in the 13th-14th centuries under conditions of year-long range husbandry. The breed derives its name from the Tushins, the people of Tushetia, the mountain district where they were developed. According to the breed regionalization plan, the Tushin breed is raised mainly in the Georgian SSR and partly in the Armenian SSR and in some districts of North Caucasus.

The Tushin sheep exhibit sturdiness and good adaptation to transhumance husbandry. When moving from winter quarters to summer ranges they can easily cover more than 500 km.

Tushin sheep have a strong constitution, a harmonious and compact conformation, ample bone, and tough hoofs. The brisket is full and round and the ribs are well sprung. The head has a straight profile. Rams have horns and ewes have rudimentary horns. The animals are relatively small in size. Withers height is 58-60 cm, chest girth 83-85 cm, and depth of chest

29-30 cm. The average live weight of rams is 58-60 kg and that of ewes is 40-42 kg. Table 4.9 shows the live weight at different ages under transhumance conditions.

Table 4.9 LIVE WEIGHT OF TUSHIN SHEEP AND LAMBS ON FARMS IN GEORGIA (KG)

Age	Ewes	Rams
Newborn	2.0- 3.6	2.2- 3.8
Weaners	17.8-21.8	18.8-22.3
6 months	21.2-26.4	21.2-29.1
18 months	32.9-45.7	40.4-52.8
30 months and over	34.6-47.7	45.6-63.2

Tushin sheep are fat-tailed (according to Bogolyubski they belong to the semi-fat-rumped breeds). Fat is deposited on the rump, in the thighs, and in the tail in the form of a fatty pad which is internally divided into two by a groove. The tail is of medium size or short; its tip is thin and free of fat. According to the shape and size of fat deposits, two types of sheep are distinguished: dumeuli and kentuli. The former have larger and somewhat pendent tails, which sometimes reach the hocks; the latter have raised tails at the height of the rump.

The meat of Tushin sheep is known for its palatability and a nice aroma free of the specific acrid smell of mutton. The carcass yield of meat and fat is 42.7-47.7% in wethers and 42.6-44.4% in ewes. With good feeding the carcass yield of fat rams at the age of 9-12 or 18 months is 50-56% of the live weight; the carcass weight ranges from 19 to 23 kg. In ewes the corresponding figures are 50-57% and 20.2-28.7 kg.

Tushin sheep produce coarse wool of better quality than nearly all other coarsewooled mountain breeds. The wool is white and lustrous. The first-grade wool contains 74% of true wool and intermediate fibres and 26% of guard hair. The diameter of true wool is 56 μ . The second and third-grade wool contains less true wool (35-44% respectively), and more guard hair (55-65% respectively). The diameter of true wool fibres is 26 and 27 μ respectively and that of guard hair is up to 70 μ . The locks are very wavy, 12-16 cm long. The wool of Tushin sheep is particularly valued in carpet making; it is also used for the production of worsted and cloth fabrics, and felt. The annual fleece weight for rams is 3.1-3.8 kg and that for ewes is 2.4-3.0 kg.

Milk yield is not high, 65-70 kg per lactation, of which marketable milk constitutes 10-15 kg. Lambing rate is rather low - 105-115 lambs dropped per hundred ewes lambing.

The number of Tushin sheep has increased three and half times over the last fifteen years. In 1980 the total was 928 136 (76% purebred) including 37 433 breeding rams, 19 109 other rams and 561 578 ewes and yearlings. For improvement in breeding flocks purebreeding is used. Thus preservation of the breeding type is ensured and hereditary stability of typical traits is increased. In all districts designated for raising of Tushin sheep grading up is widely used, which contributes to further growth of the Tushin population.

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5. HORSES

A.N. Kosharov, E.M. Pern and G.A. Rozhdestvenskaya

A great number of horse breeds have been developed in the vast territory and differing climatic zones of the USSR as a result of deliberate breeding or by unconscious selection under the influence of varied natural, social and economic conditions.

Table 5.1 HORSE NUMBERS IN THE USSR ON 1 JANUARY 1980
(Data of CSU - Central Board of Statistics)

Breed	Total	Purebred
Kazakh	312 447	63 329
Russian Trotter	287 267	26 803
Orlov Trotter	252 112	18 514
Yakut	134 014	133 431
Don	127 684	18 120
Byelorussian Harness	93 040	27 560
New Kirgiz	56 650	10 713
Russian Heavy Draught	48 490	4 314
Bashkir	45 717	15 368
Kustanai	41 772	2 922
Kushum	38 901	4 829
Soviet Heavy Draught	35 039	3 375
Kabarda	28 543	8 549
Karabair	28 223	25 499
Budyonny	22 293	5 668
Vladimir Heavy Draught	16 962	1 255
Tori	15 643	3 349
Latvian	13 939	1 200
Altai	10 011	3 500
Lithuanian Heavy Draught	9 000	5 122
Lokai	8 900	7 344
Ukrainian Saddle	7 458	923
Thoroughbred	6 990	6 990
Zhmudka	3 782	2 392
Akhal-Teke	3 579	1 168
Trakehner	2 839	1 765
Vyatka	1 840	11
Tersk	1 198	518
Iomud	964	616
Arab	784	484
Estonian Native	182	152
Deliboz	94	94

Some breeds were widespread and used in crossbreeding with the less productive ones. Others were kept pure but the area of their breeding is restricted. The breeding of some breeds has declined and they are now on the verge of extinction, for instance the Mingrelian, Mezen, Pechora and Tushin.

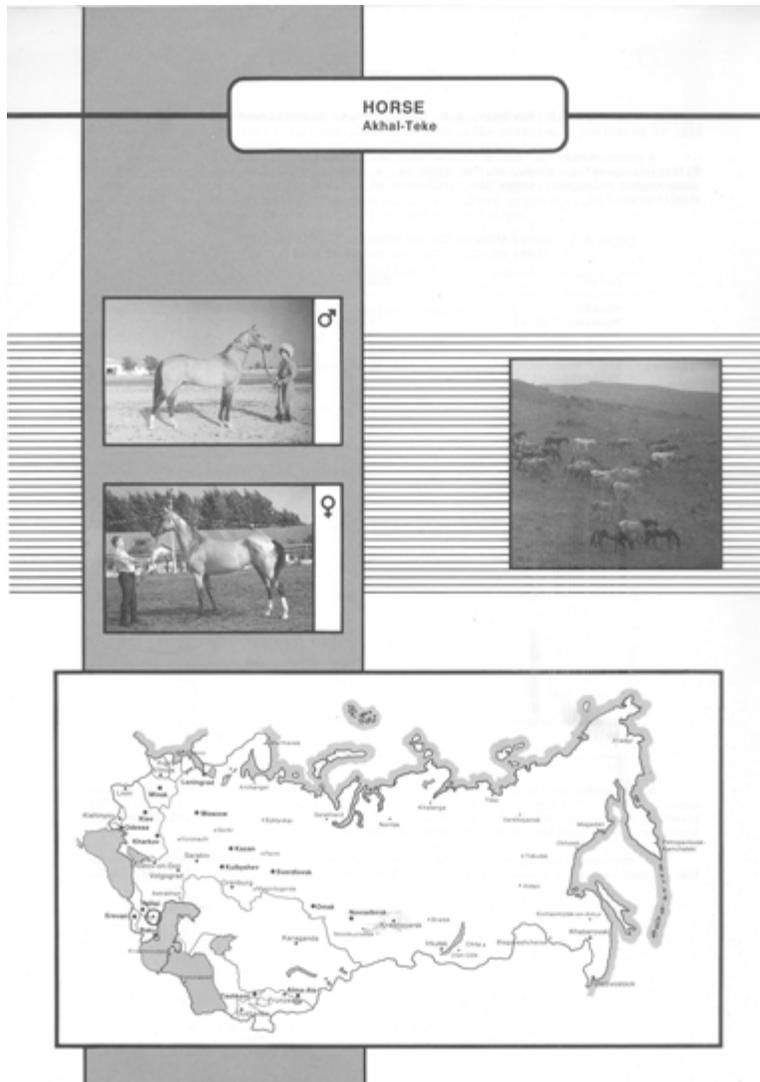
At the same time new breeds have been developed. For instance, during 1945-85 the following breeds received official recognition; Budyonny, Tersk, Vladimir, Tori, New Kirgiz, Kustanai, Latvian and Kushum. The breeding work for developing the Ukrainian Saddle and Byelorussian Harness breeds is nearing completion.

On 1 January, 1980, state farms had 3 053 100 breed horses including 550 400 purebreds. The monograph describes 33 breeds totalling 2 936 900 including 18% of purebreds. The monograph does not cover 11 breeds and breed groups present in small numbers and totalling 116 200 head. They include Voronezh Coach, Hutsul, Kuznetsk, Chumysh and others.

The Breed Regionalization Plan envisages an increase in the number of purebreds. When systematic grading up with stud sires is employed, crosses of the second and third generations are regarded as belonging to the breed while crosses of the fourth and later generations are accepted as purebreds.

The State Studbooks register pedigree sires and dams of elite or 1st class which are used for breeding at stud farms and stables. Registered horses are the best animals and make up the nucleus of the breed. About 60% of Thoroughbreds are registered, 33% of Budyonny and Don, 28-35% of Russian and Orlov Trotters, 28% of Russian and Soviet Draught and over 80% of Arabian, Akhal-Teke and Trakehner.

The elite nucleus of major breeds of horses is concentrated in 104 horse breeding centres where intensive breeding activities are undertaken. The horse genetic resources of the USSR are widely used throughout the world, horses being exported to over 20 countries.



SADDLE HORSES AKHAL-TEKE (Akhaltenskaya)

The breed is a direct descendant of ancient riding horses. It had emerged by the turn of the 8th century at the time when Turkmenian horses were regarded as the best in Central Asia. It was developed in the oases in the southeast of the Kara-Kum desert and the foothills of the Kopet-Dag. The Akhal-Teke was bred on the basis of a particular rearing system involving horse raising on a man-grown fodder consisting of limited but highly nutritive feed such as corn, alfalfa, bread and animal protein where available. This is typical only of the desert and semi-desert, as horse keeping on the steppes involves feeding substantial amounts of grass and hay.

From the Akhal and the Tejen oases in Turkmenia the breed was introduced into many other places. During the 8-10th centuries the guards of the khalif of Baghdad consisted of Turkmen horsemen mounted on Turkmenian horses. Persian, Bukhara and Turkmenian stallions were extensively

employed in the stables of Russian tsars in the 14-17th centuries. In the 15-19th centuries the Turkmenian penetrated to western Europe. In the USSR the Akhal-Teke is now found in Turkmenia, southern Kazakhstan and in North Caucasus.

Its conformation is as follows: head - light and clean-cut, straight and long in the muzzle; neck - long, thin, muscular, sometimes with a protruding throat-latch; long and high withers; long and often slightly dipped back; long loin; straight croup. The Akhal-Teke has a typical linear exterior. The chest is narrow and not very deep. Sloping shoulders, clean long legs, hard but moderately developed joints, long and often steeply sloping pasterns. Large and hard low-heeled hoofs. Tight thin skin; thin hair coat, mane and tail. Delicate but hardy build.

The average measurements (in cm) of stallions at studs are as follows: height at withers 158.3, oblique body length 159.8, chest girth 176.3, cannon bone girth 19.1, mares: 157.1, 158.9, 176.0 and 18.8 respectively. Live weight of stallions is 430-500 kg.

Age at maturity is 5-6 years, which is relatively late. Akhal-Teke horses show excellent speed, although they lack range and strength. Their action is distinguished by a strength, smoothness and elegant carriage which are well appreciated in modern classic events and particularly in the dressage. The jump is very soft and elastic. However, insufficient height and strength prevent it from fully matching the requirements of modern competitions. Nevertheless, Absent, Muar and Penteli of the Akhal-Teke breed are well-known names in world equestrian sports as winners in international competitions and the Olympic Games. The unique sporting assets of the breed are employed in crossbreeding the Akhal-Teke with the Trakehnen, Hanover and the Latvian riding breeds.

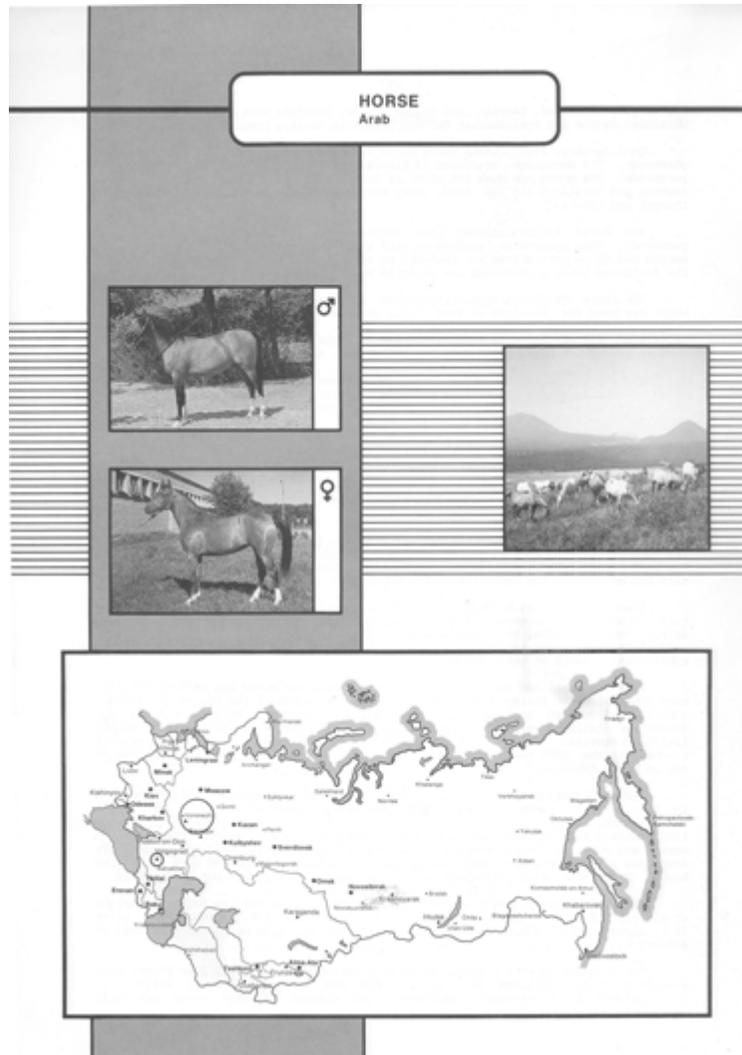
The Akhal-Teke combines average fertility with extended longevity. It is not uncommon that stallions are widely employed after the age of 20. The record longevity of 30 years was attained by the mare Elan which produced 17 foals. At the same time the breed is not easily acclimatized in other regions of the country.

Intensive agriculture and poor competitiveness have resulted in a sharp decline in the purebred population. Volumes III-V (1941-75) of the Studbook recorded 849 stallions and 1406 mares. However, volume VI of 1981 had only 87 stallions and 300 mares. This suggests that the breed's gene pool is strictly limited. The majority of the modern Akhal-Teke are direct male-line descendants of the sire Boinou (1885).

The Akhal-Teke has a low frequency of transferrin types. In 732 specimens the frequencies of different alleles were as follows: D 0.17; F 0.52; H 0.08; O 0.09; R 0.17. Transferrin M is absent; H and O are rare.

The breed consists of 7 sire lines and 5 mare families; two new lines are being formed.

It is planned to raise the breeding nucleus up to 700 mares. The breed has been spreading internationally. The United States and the Federal Republic of Germany plan to form Akhal-Teke breed societies.



ARAB (Chistokrovnaya arabskaya)

Like the Thoroughbred the pure Arabian breed is employed to improve the type and action of other breeds. Many investigators believe it to be the most ancient pure breed. Others think it developed as a result of crossing between ancient breeds of Africa, Central Asia and Asia Minor. The Arabian is believed to have originated during the 4-8th centuries in the hot dry climate of the steppes, deserts and oases in the Arabian peninsula. The first Arabian horses were imported into Russia during the rule of Ivan the Terrible. The first use of Arab stallions in England is recorded a little later. Extensive import of the Arab into Russia began in the mid-18th century i.e. in the era of the Turkish wars. A.G. Orlov imported 30 stallions and 12 of them were used at his stud. Smetanka proved to be the best and his descendants became the progenitors of the Orlov Trotter and Orlov Riding horse. Orlov was the first Russian to export Arab horses. From his stud he sold the stallions Alibei and Orlov Arabian to Britain. Prior to the 1917 Revolution the Arab was raised at private studs: Sangushko, Brabitsky, Pototsky, Sherbatova and Stroganov. After the Revolution the

Soviet Government took steps to revive horse breeding and instituted the Tersk stud on the basis of the former Stroganov and Sultan Ghirey farms. Breeding of Arabian horses with a selection programme started in 1925. The Tersk stud imported several stallions from Hungary and France in 1930, from Britain in 1936, and from Poland in 1939. As a result of continuous breeding a distinctive group of Arab horses was produced perfectly adapted to conditions in the USSR. The Arab is currently concentrated at five studs and two horse breeding farms. The mare population stands at 250.

Separation into intra-breed types is a specific feature of modern Arab horses. The Siglavi type has pronounced Oriental features, proportional build, fine-boned and robust constitution, low stature and adequate body size. The Koheilan type is distinguished by prominent body mass, large height, solid build and the ability to thrive irrespective of management conditions. The Koheilans show good action and satisfactory endurance. The Hadban type has less pronounced Oriental lineage, greater height, excellent limbs constitution, well-developed musculature; it shows high action and better endurance. The Koheilan-Siglavi type has been bred at the Tersk stud as a very promising one which successfully combines many assets of its progenitors. Outside the USSR it is named the "Tersk" type. The Arabian stallion measurements (in cm) are as follows: height at withers 154, oblique body length 152, chest girth 178, cannon bone girth 19.3; mares: 151, 151, 178 and 18.7 respectively.

Arabian horses bred in the USSR are larger and have a better conformation than those in many other countries. They have light, straight or dished heads with wide jaws, broad forehead, large eyes and short muzzle. A long high-set neck is arched to the poll. Long, well-muscled withers. Sloping shoulders prevail in the Hadban and the Koheilan-Siglavi types. Medium-long straight back, medium-long and flat loin; long, correctly-sloping wide croup, the sacrum often short; wide and deep chest. All types have well-developed costal cartilage. Correctly-set forelegs; well-developed forearms, knee-joints and cannons, medium-long and properly sloping pasterns. Correctly-set hindlegs, well-developed hock-joints, cannons and fetlock-joints. Sometimes there is a tendency to sickle-hocked hindlegs and formation of oxostoses. Solid tendons and ligaments, exceptionally hard hoofs. Predominant colour is chestnut; bay and grey are rare. There are no other colours in the breed.

The Arabian is an energetic, active and well-disposed horse.

Arab horses raised in the USSR show remarkable endurance. Their speed records in the Soviet Union exceed those in other countries by 3 sec. The USSR record for 2000 m is 2 min 14 sec, Polish 2 min 22 sec, Egyptian 2 min 18.4 sec, the United States 2 min 17.1 sec. The Arabian has also shown excellent endurance in long-distance races: 5 hr 6 min for 100 km under a 80 kg rider; 1 hr 38 min 8 sec for 50 km. An admirable example of their hardiness was the 1941 ride of the Tersk stud trainees from Lvov to Mineralnye Vody during the war. All Arabian horses, the two-year-olds included, successfully reached their destination. They work quite well in harness and may be used for different jobs.

Arabian horses bred in the USSR have remarkable fertility and longevity. The average foaling rate is 86 births per 100 mares; gestation period is 340 days. The outstanding mares Gazella and Tarashcha (dam and daughter)

produced 22 foals each. The stallion Nasim lived to the age of 31 years. There have been no recorded cases of melanosarcoma in the breed.

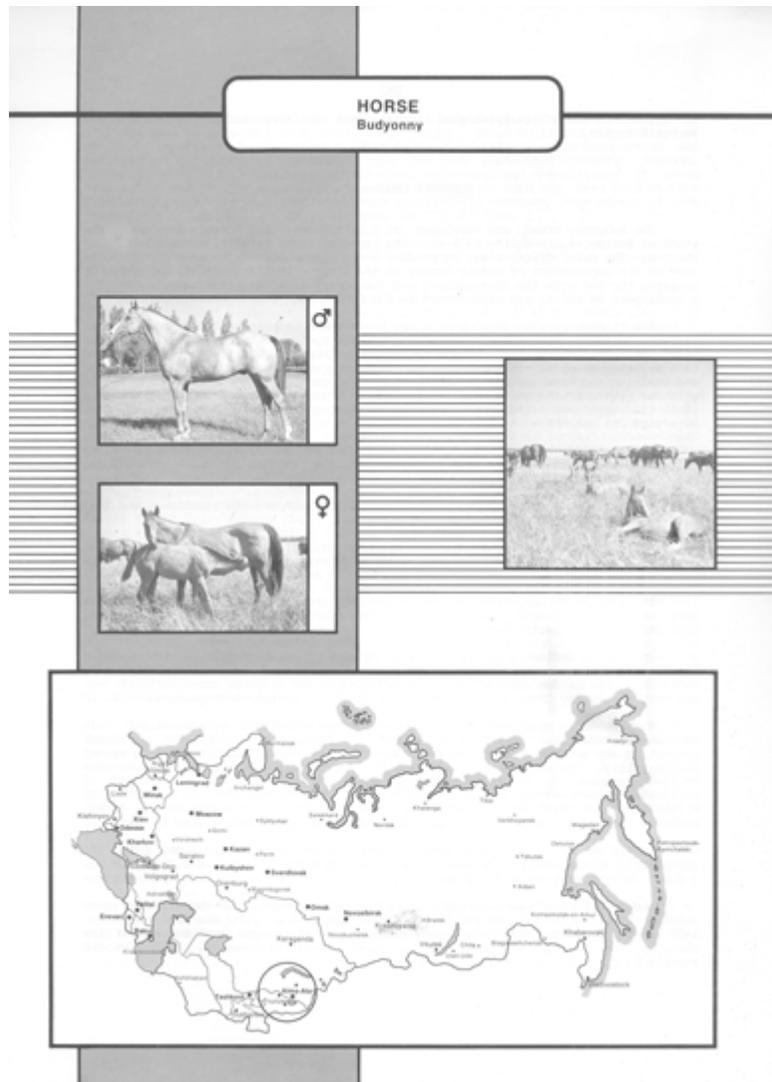
The breed's structure consists of intra-breed types, sire lines and mare families. The Nasim, Korei and Koheilan lines are the best represented. In the course of the breed's improvement in the USSR 5 mare families were formed.

The breed has the following blood group antigen frequencies: Aa 0.98; Ac 0.14; Ca 0.99; Da 0.00; Db 0.31; Dd 0.90; De 0.56; Dh absent; Pa 0.51; Qa 0.40. The polymorphism of the serum protein system is represented by 5 transferrin alleles, 2 albumin and 5 esterase and cocarboxylase alleles.

The Arabian is a most useful breed for improving small and light horses like the Karabakh, Deliboz, Iomud, Lokai and Tersk. It offers a rich source of genes for commercial production of various competition horses by crossbreeding.

The Arabian is an effective export item. Koheilan-Siglavi animals raised at Tersk stud and sold for export have repeatedly won prizes at national competitions, stallion exhibitions and races in the Netherlands, the FRG, France and the United States.

The best studs are Tersk stud in Stavropol territory and Khrenovski stud in Voronezh region.



BUDYONNY (Budennovskaya)

The Budyonny breed was developed at S.M. Budennyi and Pervaya Konnaya Armia studs of Rostov region during 1921-49. Its breeding went parallel to restoration of the Don. The main objective was to produce a high-grade cavalry horse which could be used in the improvement of saddle horses in the steppe regions. It was developed by crossing the Don with the Thoroughbred and subsequent inter se breeding of F_1 and F_2 . A small part of the F_3 was backcrossed to the Don and the Thoroughbred. Simultaneously with developing a new breed there was elaborated a novel method of improved taboo management. According to this system high-grade stock were kept under unfavourable conditions in special barns. Complete diet feeding was provided to a selected group of the best horses. The young stock received adequate exercise and training and were regularly tested at the hippodrome. The taboos were formed with due regard to the uniformity in type and to mass selection standards. Within a

short time type was fixed in the crossbreds forming the breeding nucleus and they were used for crossbreeding the local horses.

Although 100 Thoroughbred stallions were used in the formation of the new breed only the descendants of four were admitted into the breeding nucleus - Sympatiaga, Svetets, Inferno and Kokas.

Volumes I-V of the Budyonny studbook (1951-79) recorded 724 stallions and 4643 mares.

The modern Budyonny is a horse of ample height, solid clean build, with regular exterior and heavily-muscled body. It is easy tempered and energetic. The Budyonny is an easily broken and reasonably fast jumper. It is one of the best racehorses.

The average measurements (in cm) of Budyonny stallions are: height at withers 165; oblique body length 165; chest girth 190; cannon bone girth 22; mares: 161, 162, 188 and 20 respectively.

The strong influence of the Don breed resulted in preservation of corresponding intra-breed types in the Budyonny - eastern, heavy and basic. The Don also contributed the golden chestnut colour prevailing in the Budyonny breed although bay, and very rarely bay brown or black, may be seen at the Pervaya Konnaya Armia stud.

The breed's performance is improved by corrective crossbreeding with Thoroughbred stallions up to a level of 5/8 Thoroughbred blood but a higher proportion may lead to certain weaknesses such as poor bones, decline in body weight and fertility. The percentage of live births from the mares of the above inheritance is 67-70 compared to the breed's average of 78-80.

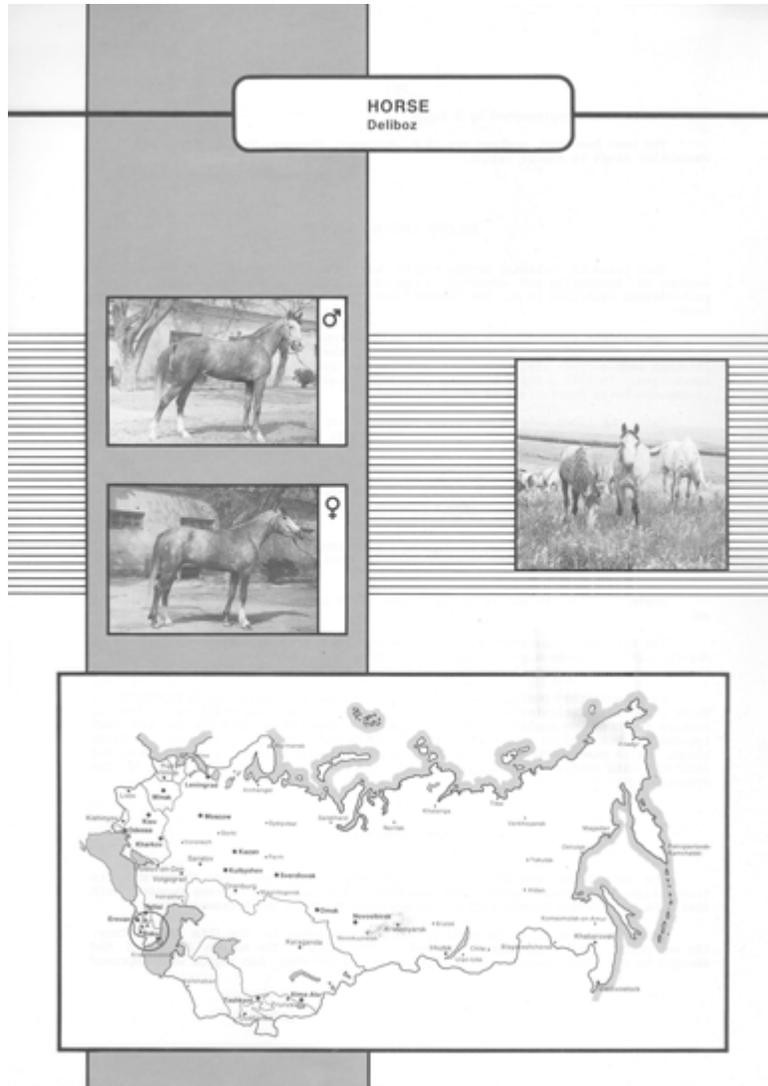
However, on a background of corrective crossbreeding, inbreeding with a high coefficient (6-12.5% according to Wright) does not cause any depression in the main economic characters of the breed. Budyonny horses have a long life span. The average economic life may be 15 years.

In 400 horses at the S.M. Budennyi and the Pervaya Konnaya Armai studs the transferrin allele frequencies were as follows: D 0.18; F 0.51; H 0.05; O 0.22; R 0.04; H is absent and H and R are rare.

Budyonny horses show remarkable endurance both in racing and the classic sport events. The breed's records are 1 min 43 sec for 1600 m and 2 min 35.9 sec for 2400 m. The stallion Reis held a USSR record and had international success in the obstacle race, Pintset in the three-day event, Gasan in dressage, Priboi in the steeplechase.

The breed is represented by 6 lines.

The best breeding centres are S.M. Budennyi, Pervaya Konnaya Armia and K.E. Voroshilov studs in Rostov region.



DELIBOZ (Delibozskaya)

This breed of oriental saddle horses was formed in Kazakh, Akstafa and Tazuz regions of Azerbaijan and adjacent areas of Georgia and Armenia. Some earlier publications described it as the "Kazakh" horse of Azerbaijan or as the Azerbaijan horse.

Specialists singled out a specific Deliboz type among large horse populations studied in the 1930s and late 1940s. Those horses were improved by Arabian and Karabakh saddle-type stallions. Deliboz horses spread widely throughout western Azerbaijan. In 1943 a State Breeding Cooperative (gosplemrassadnik) was established to improve horse populations of the Republic.

Since the 1950s Azerbaijan horses have been improved by Arabian and Tersk sires while Karabakh was bred separately. Crossbreeding involved horses of the Deliboz type.

Deliboz horses differ from others by a clean, short head with a broad forehead and narrow nose, a compact heavy neck, a ribbed massive body

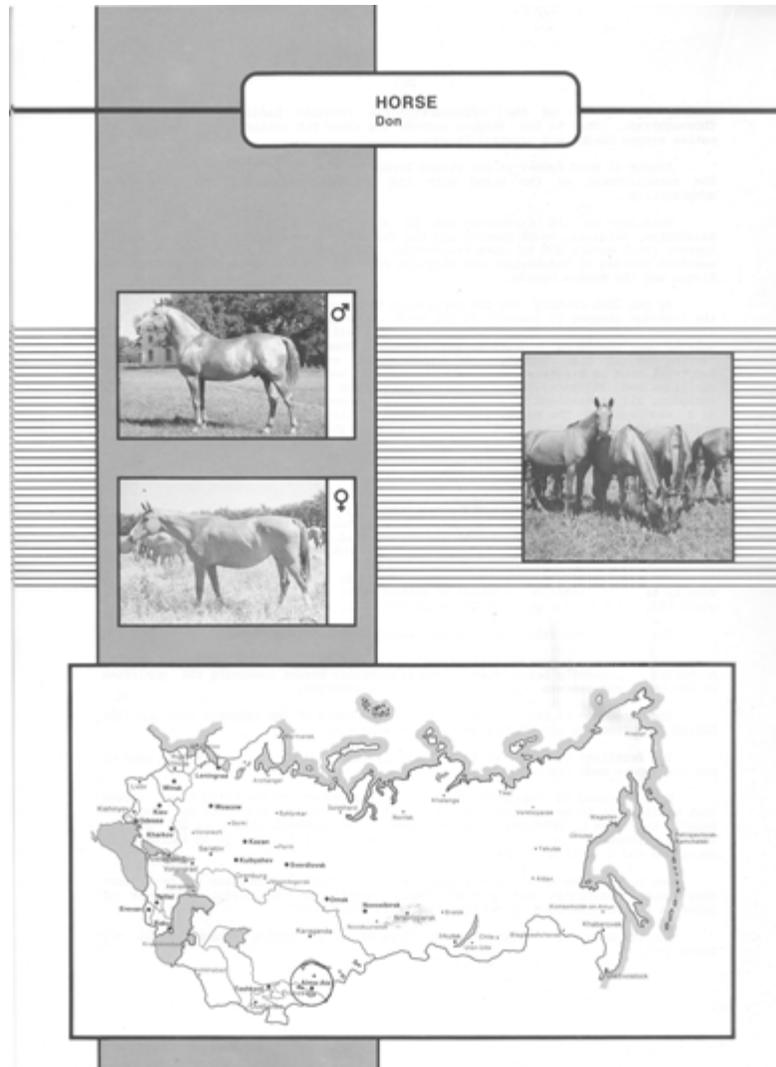
with a good top line and an even, long back and loin. Legs are clean and well proportioned and the cannon bone girth is larger than that of other horses.

Deliboz is characterized by unstable temperament and predominantly rack (or pace) gait. A typical feature is a peculiar lengthwise fold on the tongue giving the impression of a forked tongue.

Average withers height is 152 cm, chest girth 172 cm and cannon bone girth 19.4 cm.

The Deliboz horses show good working capacity. They easily cover 45-55 km a day in highlands under a pack weighing 115-130 kg, and 70 km under a rider. The best racing results are 1 min 56 sec for 1600 m and 2 min 55 sec for 2400 m.

At present the pedigree nucleus of Deliboz is represented by descendants of Tersk stallions Tselostat and Pygmalion; therefore the problem arises of how to restore the breeding nucleus of local horses. Dashyuz stud farm has the 140 most typical Deliboz horses including breeding mares with a high proportion of Tersk blood. It is planned to breed them pure but with single back crossing to one or two stallions with little Tersk blood in order to preserve the valuable traits of the crosses.



DON (Donskaya)

The Don breed was developed on the steppes of the Don river and its tributaries. It arose mainly from the south Russian steppe horses crossed with stallions of oriental breeds such as the Persian, Karabakh and Turkmenian.

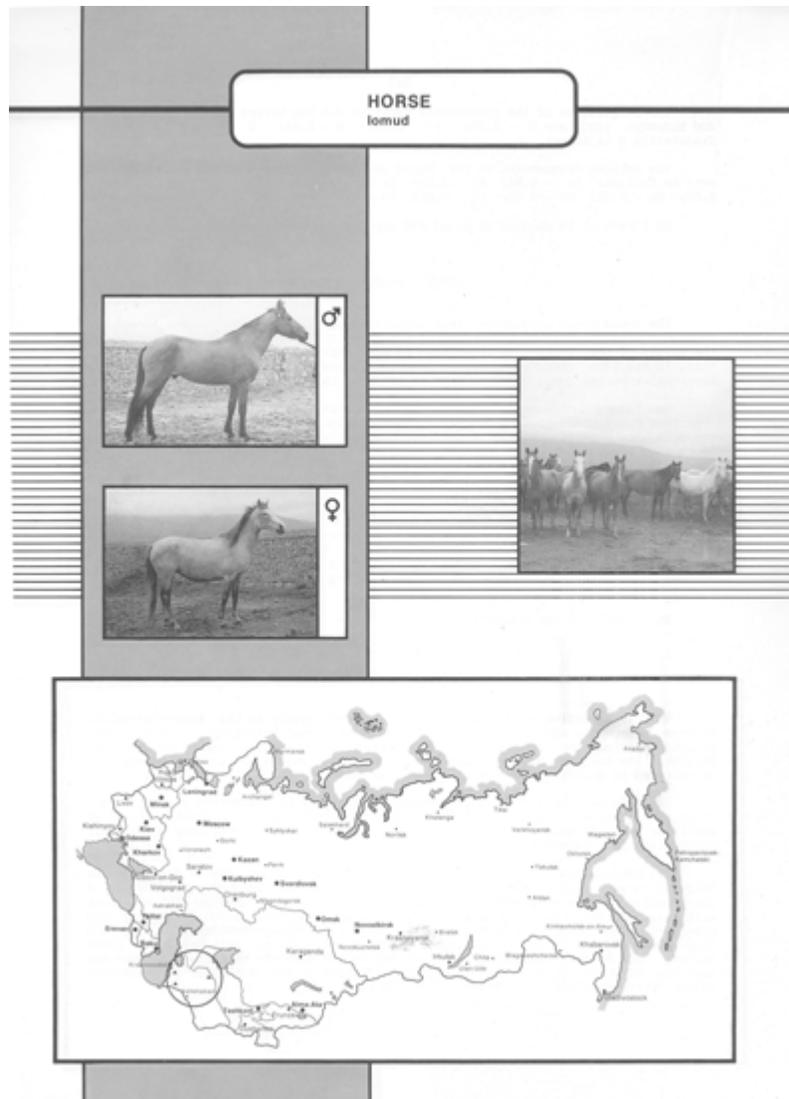
While intensive horse breeding in the Don area began in the late 18th century, the selection of the Don breed started in the 1830s. The modern Don breed had emerged by the 20th century. The population in the west Don region was improved chiefly by horses of the Orlov-Rostopchin (Russian Saddle horse) and by Thoroughbreds. That in the steppes east of the river Don retained many features of native steppe horses and oriental breeds.

Plenty of good fodder in the virgin lands and keeping in taboos contributed to the establishment of the breed with its strong constitution and remarkable adaptability.

This led to its extensive use in all steppe regions - west and south Kazakhstan, Kirgizia, south Siberia and the Transbaikal area - both as a purebred to improve local horses and to form new breeds. The Don was admirably adapted to the mountain regions of Kazakhstan and Kirgizia and used in the development of the New Kirgiz and the Kushum breeds. By the 20th century the Don population had become the largest in Russia. In the Transdon steppes it reached 70 000 head. However, during World War One and the Civil War it practically disappeared. Volume I (1949) of the Don studbook recorded only 89 pure stallions and 466 mares. Reestablishment of the breeding nucleus was carried out at S.M. Budennyi and Zimovnikovski studs in Rostov region and at Issyk-Kul stud in Kirgizia. Numbers rose and fell and in 1980 Volume VI recorded 126 stallions and 392 mares and the total population of purebreds numbered 17 000. Including all generations of crossbreds the Don breed numbered 128 000. Classified as a saddle breed the modern Don has a distinctive exterior. Its features are: medium-sized or sometimes light head with a straight or slightly dished face, wide forehead, fleshy jaw, medium-length neck low- or high-set, prominent crest and insignificant throat latch, medium withers, straight, flat and wide back, wide and flat loin, correctly sloping or sometimes straight croup, well-developed chest and wide trunk. The modern Don has considerably improved forelegs. While in 1950-60 underdeveloped knee-joint and knees which were too far back occurred in 20% of purebreds, the defect is now practically eradicated. The shoulder and the pasterns also showed much improvement. The number of sickle-hocked horses has decreased. The measurement of breeding animals at studs in 1984 produced the following results (in cm): stallions - height at withers 166; oblique body length 164; chest girth 194; cannon bone girth 21.0; mares 164, 165, 195 and 20.5 respectively. The predominant colour is chestnut, often with a golden sheen. The breed now consists of three intra-breed types - eastern, heavy and saddle. An effort is presently being made to use extensively horses combining the qualities of the heavy and eastern types with improved conformation. The formation of the new Zaboï line on the basis of the Zabavnik line and the Gulsyn line from the old Cheln line is almost complete. The fertility is high - up to 87% live births with 85% survival to one year of age even under moderate management conditions. Pure breeding in improved taboos and infusion of Thoroughbred blood showed that while an increase in Wright's inbreeding coefficient to 8-10% did not decrease height, body size or performance an increase of Thoroughbred blood over 25% sharply reduced fitness for the taboo conditions and eventually resulted in an increase in abortions and a decline of body size. Don horses have versatile working qualities. Although they are not very fast they possess remarkable endurance and rather high jumping abilities. They are of interest for mounted tourism and have high food efficiency. The breed record in flat races is 2 min 43 sec for 2400 m distance set by Mig (born 1971).

The frequencies of the transferrin types in 341 Don horses at the Zimovnikovski and Budennyi studs are D - 0.16; F - 0.49; H - 0.44; O - 0.21; R - 0.08. Transferrin M is absent.

The antigen frequencies in the blood groups of 200 mares at the Budennyi stud were as follows: Aa - 0.84; Ac - 0.36; Ca - 0.78; Da - 0.07; Db - 0.34; Dd - 0.69; De - 0.41; Dh - 0.05; R₃ - 0.86; Ka - 0.10; Pa - 0.03; Qa - 0.22. In future it is planned to breed and improve the Don by pure breeding.

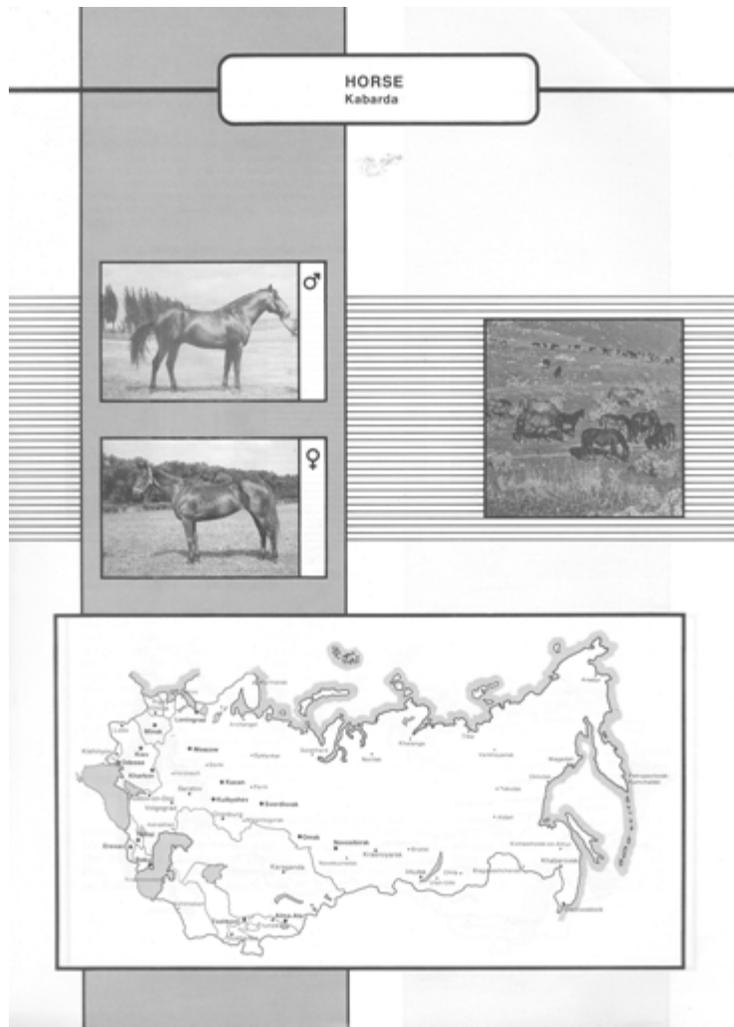


IOMUD (Iomudskaya)

The Iomud breed originates from ancient Turkmenian horses. It was formed by the Iomud tribe in the Tashauz oasis in southern Turkmenia. As the breed occupied the margin of the Turkmenian breed area it was influenced by steppe breeds. After that, in the 14th century, it was influenced by Arabian stallions. In contrast to the Akhal-Teke the Iomud breed is kept in herds in the desert and semi-desert.

The Iomud conformation has the following features: large clean-cut head, sometimes Roman-nosed, medium-long neck; medium-high withers, solid back with small curve to the withers, nicely turned and regularly sloping croup, shallow chest; clean fine legs, often bowed; sparse mane and tail; delicate skin. Colour is grey or chestnut, rarely golden chestnut or black. The measurements (in cm) of stallions are: height at withers 152, oblique body length 151, chest girth 168, cannon bone girth 19; mares: 149, 150, 167 and 18.3 respectively.

The lomud is a long-lived healthy horse. It shows soft "floating" action. The purebred population has declined substantially. Therefore stud farms to preserve the lomud genotype were set up in Turkmenia in 1983. They are charged with protecting the breed and restoring the breeding nucleus to a size of 240-250 mares from the present 140 mares. A conservation farm is being established in the Kyzyl-Atrek district. The breed requires protection.



KABARDA (Kabardinskaya)

This is a native North Caucasian breed found mainly in the Kabardino-Balkar Autonomous Republic and in the foothills area of Stavropol territory. In the process of its formation the Kabarda was influenced by many breeds - steppe horses, the Karabakh, the Persian and the Turkmenian. Kabarda horses are kept in taboos and transferred to mountain pastures in summer and to the foothill area in winter.

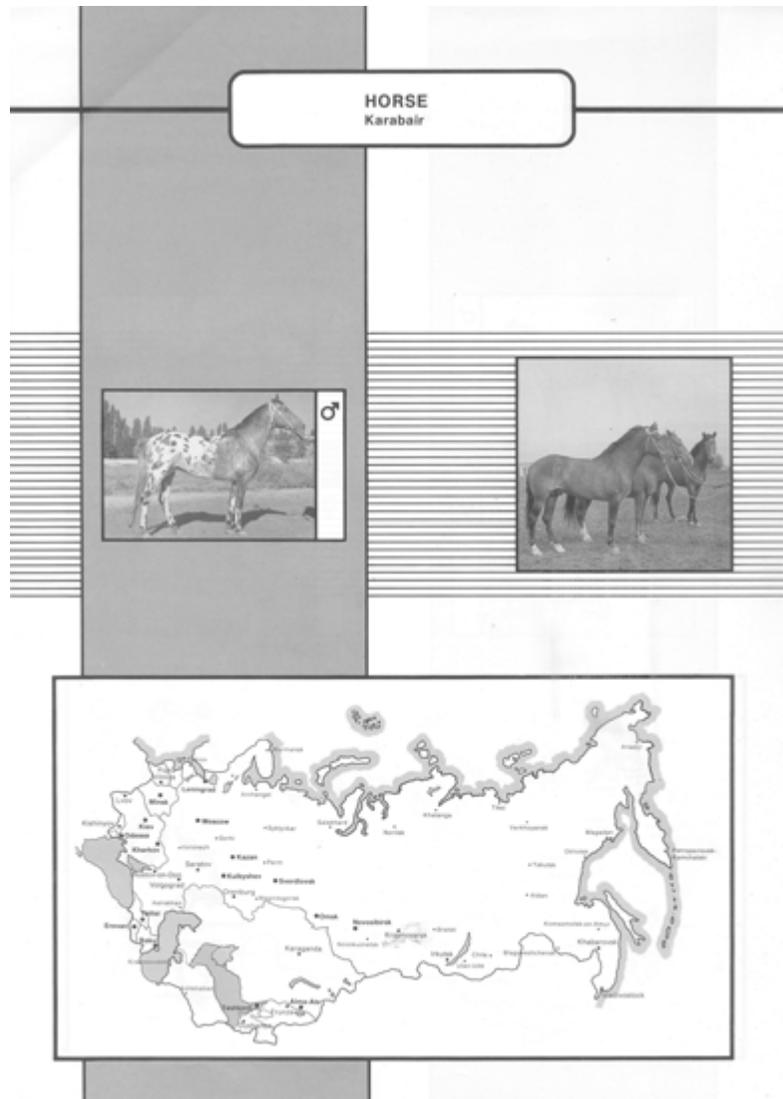
The Kabarda is primarily a saddle horse. The bulk of the horses are not large. Their average height ranges from 145 to 152 cm. However, the measurements (in cm) of stallions at studs were as follows: height at withers 155, oblique body length 153, chest girth 180, cannon bone girth 20. The Kabarda has a solid clean build. Its conformation may be described as follows: head - clean, sometimes coarse, ram profile, with long ears and usually a short poll; neck - medium-long, straight and well muscled; medium-high and long withers; straight, short and solid back; well-muscled loin; slightly sloping and heavily-muscled croup; medium-long and correctly-sloping shoulders; deep and long-ribbed chest; correctly-set legs, hindlegs often bowed; well-developed clean joints; hard hoofs. Although the Kabarda

has only a moderate hair coat its mane and tail may be quite thick and legs may have feather on the fetlocks. Predominant colour cherry bay, often bay brown; black is rare.

The Kabarda horse is well fitted for mountainous and stony terrain. It is considered to be the best mountain horse. It can show a fair speed and remarkable endurance. The breed's speed record is 1 min 54 sec for 1600 m and 2 min 44.2 sec for 2400 m. The record for the 50 km long distance is 1 hour 41 min 25 sec.

The purebred population recorded in volumes I-III (1935-53) of the studbook was 446 stallions and 3272 mares. The breed's breeding nucleus has dropped to 400-450 mares concentrated at Malokarachaevski and Malkinski studs and at the horse breeding farms of the Karachaevo-Cherkess Autonomous Region. The sharp decline of the pedigree nucleus stock is explained by the insufficient speed of Kabarda horses in hippodrome tests. The main breeding centres are Malkinski stud in the Kabardino-Balkar Autonomous Republic, and Malokarachaevski stud and the breeding farm of Krasny Partizan collective farm in Stavropol territory.

There are 4 blood lines in the breed. A new breed group has been formed by crossing the Kabarda with the Thoroughbred, the blood of the latter being from 5/8 to 3/4. Anglo-Kabarda horses are noted for their strong constitution, high speed and vigour. They combine perfectly the advantages of the foundation breeds and are of a very special type. In 1966 this breed group was recognized. The breeding farms of Kabardino-Balkar and Stavropol regions breed both purebred Kabarda and Anglo-Kabarda horses. The breed needs protection.



KARABAIR (Karabairskaya)

The Karabair is one of the most ancient breeds of Central Asia. Developed in Uzbekistan and northern Tajikistan the breed was established under the influence of southern and steppe breeds. It is well adapted to use under saddle and in harness (arba cart). It has the typical build of a saddle and harness horse.

The Karabair purebred population recorded in volumes I-IV of the studbook was 1537 stallions and 3871 mares. The Karabair breed is zoned for breeding in all regions of the Uzbek Republic.

In appearance the Karabair resembles the Arabian, Persian, and Turkmenian as well as the steppe breeds. It has a medium-sized clean-cut head with a straight or ram profile, wide jaw, medium-long poll and high set medium-long neck. Some Karabairs may have a shorter heavily muscled neck. It has medium-high and medium-long withers; wide and short, sometimes soft, back; medium-long, wide and well-muscled loin; regularly sloping and sometimes dropping croup; medium-long shoulders

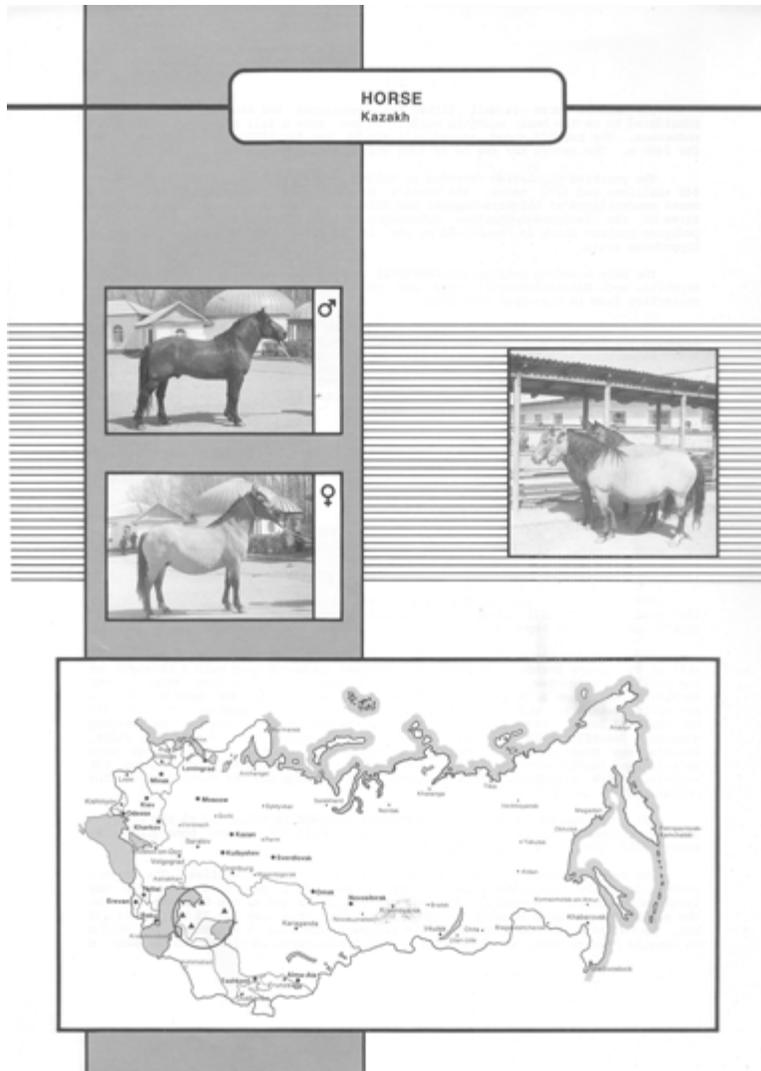
insufficiently sloping; chest well developed in length and width, forequarters more developed than the hindquarters; clean, strong legs with well-defined tendons; correctly-set legs. As a result of insufficient feeding the knee-joints are occasionally underdeveloped and hindlegs may be cow-hocked. The colour is bay, chestnut, grey or black.

The measurements (in cm) of the purebreds recorded in volume IV of the studbook are: stallions: height at withers 156, chest girth 175, cannon bone girth 20; mares: 151, 178, and 19 respectively.

The Karabair shows good endurance and versatile working qualities. The breed's records for 1600 and 2400 m are 1 min 54 sec and 2 min 51.4 sec. In the long-distance race it scored 22 min 34.6 sec for 14 km and 42 min 6 sec for 25 km. The Karabair gives good results in long rides. The best time for 75 km is 3 hr 32 min. Speed tests in harness produced the following results: 5 min 51 sec for 1600 m in Russian harness with a 600 kg load; 1600 m were paced in 14 min 45 sec with a 2000 kg load. The Karabair performs very well in national types of equestrian sports, mainly in kok-par. The Karabair is distinguished by sound health, average longevity and normal fertility, i.e. 75 to 85 foals per 100 mares.

The breed consists of three intra-breed types, basic, heavy and saddle, as well as 8 sire lines and 5 mare families.

The main studs are Jizak stud, the horse breeding farm of Gallyaaraal state farm and Navoi stud in Jizak region. The breed is improved through pure breeding.



KAZAKH (Kazakhskaya)

This group of steppe horses was numerous as early as the 5th century B.C. Since then Kazakh horses were influenced by many breeds - Mongolian, Karabair, Arabian and Akhal-Teke. In the late 20th century Kazakh horses have been improved by the Thoroughbred, Orlov Trotter and Don. Kazakh horses are kept on pastures the year round. They are concentrated in western Kazakhstan. In this vast territory they have become differentiated into various ecological types and varieties. The most widespread are: the Jabe and the Adaev.

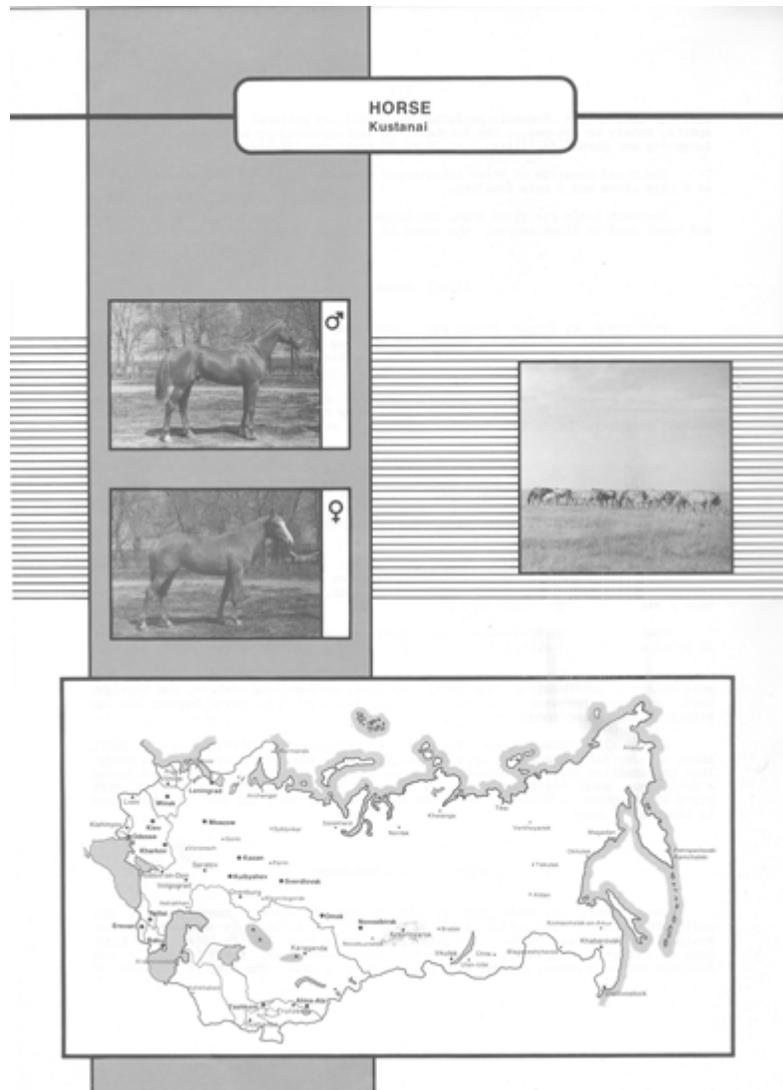
Jabe horses were formed in southern districts of Aktubinsk regions and then spread all over Kazakhstan. Their most important characteristics are: rugged head, thick neck, wide body and deep chest. The back is straight and the croup well muscled. Legs are set correctly and are sufficiently strong. The skin is thick and dense; hair covering is rather good. Colour is bay, dark bay or red, occasionally greyish or grey.

The measurements of stallions (in cm) are: height at withers 144, chest girth 180, cannon bone girth 19; those of mares are lower 142, 178, and 18.8 respectively. Considering their small measurements, Kazakh horses of the Jabe type have a high live weight - 400-500 kg.

Meat and milk performance of Jabe horses are very high - some mares yield up to 20 kg of milk at hand-milking and they fatten quickly.

Horses of the Adaev type have a more pronounced saddle character; they have a more clean-cut conformation, light head, long neck, well-defined withers, and straight back. However, horses with narrow chest and too light bone occur because of the primitive management conditions.

All in all, Kazakh horses fall short in performance. Their gaits are poor: short stride, jolting and not strong trot. At the same time they are very hardy. Thus the stallion Zolotnik covered 264 km per day and Adaev horses did 297 km during a daily run. Jabe horses are noted for their good meat characteristics - the meat yield at slaughter is 57-60%. The Kazakh breed numbers over 300 000. The best farm is the Mugojar stud.



KUSTANAI (Kustanaiskaya)

The Kustanai was developed in the steppes of western Kazakhstan at the collective-farm and state-farm studs. The breeding nucleus is concentrated at Kustanai and Maikulski studs. Its development dates from 1887 to 1951. The first date is the year of establishment of the state-owned stud, the Turgai; it was followed by the Kustanai in 1888 and the Orenburg in 1890. The last is the date of official recognition of the Kustanai breed. The new breed was developed by crossing native Kazakh steppe horses with Don, Strelets, Astrakhan (improved Kalmyk) and halfbred Thoroughbred stallions. Nevertheless, at the onset the crossbreeding was unsuccessful. Only after the nucleus of local brood mares, improved by pure breeding and regular creep-feeding, was formed at Kustanai stud did crossbreeding with Thoroughbreds yield a positive result. In the 1920s they began to develop a new breed at Kustanai stud. The work was continued in the 1930s with two systems of management. The first involved keeping in stables and on pastures, winter grazing in good weather, abundant hay and concentrate

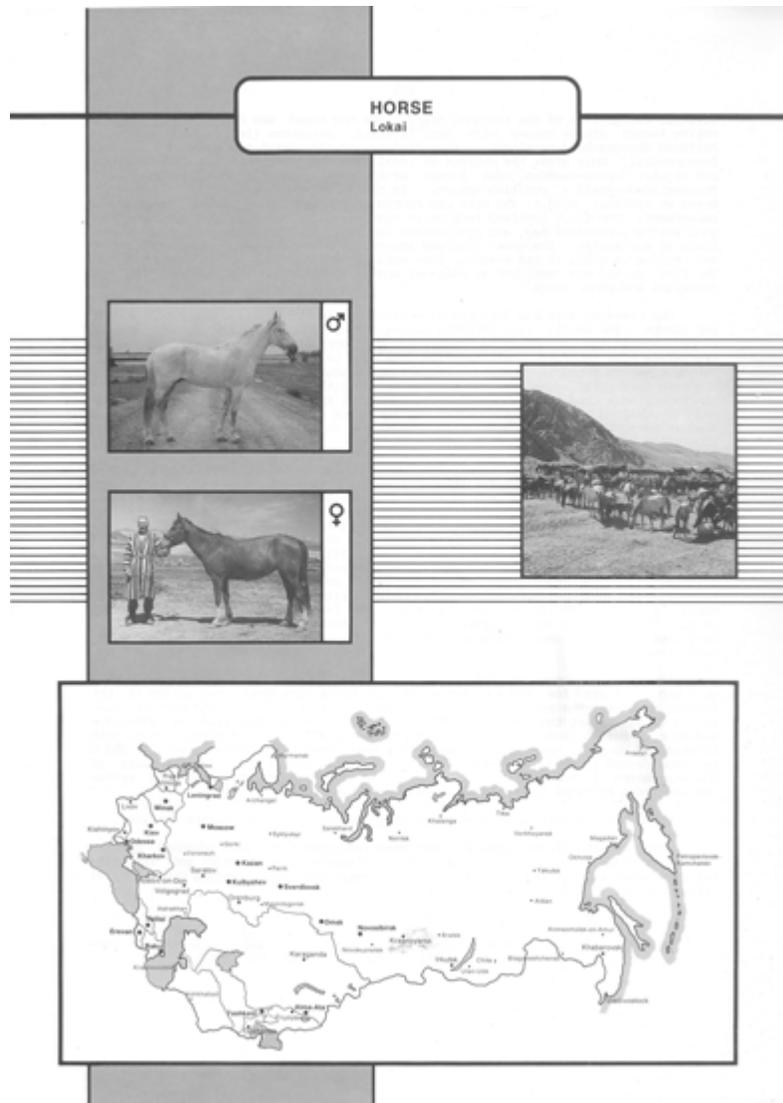
feeding, hand mating and weaning of the foals at 6-8 months. The other involved improved taboo keeping, year-round grazing and keeping in sheds in bad weather, free mating, hay and concentrate creep-feeding. The first method was employed at Kustanai and Troitski studs and the second at the Maikulski and other studs.

The breeding work was directed at developing simultaneously two types - saddle and steppe. The saddle type included horses with a high proportion of Thoroughbred blood, while the steppe type consisted of Thoroughbred-Don-Kazakh and other crossbreds bred inter se. All saddlers were put to speed tests at the hippodrome. The Kustanai is found in Kustanai region, in the south of Chelyabinsk region and in southern Kazakhstan. The breeding nucleus varied little. In 1930 the breeding herd at the Kustanai stud numbered 1000 mares. In 1981 the Kustanai and Krasnodon studs had 726 purebred mares. Seven-hundred and forty-six Kustanai pedigree stallions were used in pure breeding and general improvement. In 1980 the total Kustanai horse population numbered 40 200.

The modern Kustanai is a massive horse combining the best characters of a saddler and the pronounced basic steppe lineage. Its features include a straight medium-sized head, wide jaws, medium-long and occasionally short poll; medium-long, straight and low-set neck; wide and well-muscled medium-high withers; straight, wide and short back; flat, solid and well-muscled loin; medium-long, occasionally short, nicely-rounded croup; long and high-set shoulders; wide and deep chest; correctly-set legs, well-developed joints, hard hoofs; strong tendons and ligaments; clean and hardy build. The Kustanai shows remarkable fitness in a continental climate. The measurements (in cm) of stallions at studs in 1980 were: height at withers 163, oblique body length 161, chest girth 188, cannon bone girth 20.3; mares: 160, 159, 189 and 19.9 respectively. The largest horses are at the Kustanai stud. The measurements of animals kept in taboos were much lower. At the Saryturgai stud the mares measured 152, 156, 185, 19.2. Colour: bay, chestnut, reddish-grey, brown.

The Kustanai shows remarkable speed. Its records are 1 min 40.7 sec for 1600 m, 2 min 34.7 sec for 2400 m. Horses of the basic type show good action in the Russian harness. The record of maximum draught power is 456 kg; the average time with a 22-kg load at the trot for 2000 m is 6 min. The Kustanai also has admirable endurance. For instance, the stallion-Storm covered 178 km in 15 hours; Chervonets covered 100 km in 4 hours 1 min 5 sec. The best result of a 24-hour ride is 286.1 km. The record of a 6-day 420-km ride is 22 hours 32 min 31 sec. The fertility of Kustanai mares at some studs reaches 90%. Irrespective of the management system employed, the Kustanai longevity often exceeds 20 years.

The breed consists of 3 intra-breed types, 5 sire lines and 6 mare families. Three volumes of the studbook have been published. The main breeding centres are the Kustanai regional experiment station (formerly a horse stud) and Krasnodon and Saryturgai studs. The breed has good prospects for pure breeding with limited corrective crossbreeding by the Thoroughbred.



LOKAI (Lokaiskaya)

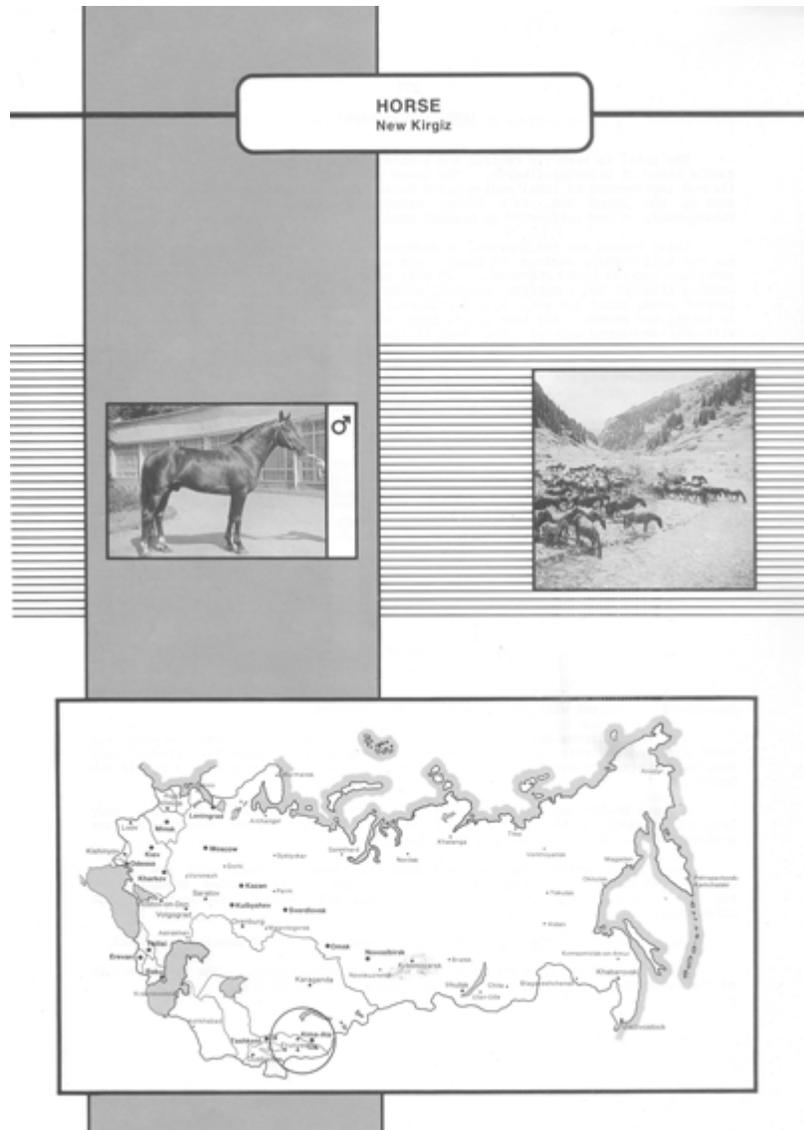
The Lokai is bred in central and southern Tajikistan; it is classified as a saddle breed of Oriental lineage. The breed was developed by the Uzbek Lokai tribe through improvement of local medium-sized horses using various Central Asian breeds, such as the lomud and, to a lesser extent, the Akhal-Teke and the Karabair. Subsequently it was influenced by Arabian stallions brought from Bukhara.

Lokai horses are the shortest in stature among the Central Asian breeds. They are not sufficiently uniform in type; the head is sometimes coarse and bulky and sometimes lacking breed character. In most cases the head is short, the profile is usually straight but sometimes slightly arched, the poll short, the neck medium in length, lean, often low set, with a prominent throat-latch. The withers are medium in height and broad; the back is straight, wide and short; the loin is prominent with well-developed muscles. The croup is long, often sloping and well muscled. The chest is deep and

broad, the ribs rounded, the groin short. The legs are solid with hard hoofs. The legs are not always properly set; the forelegs are often splayed and the hindlegs are often cow-hocked or bowed. Coarse joints and general flabbiness are found in horses of large size. Bay, grey and chestnut are the most widespread colours. The surface hairs are characteristically S-shaped. The average measurements (in cm) of Lokais are: stallions - height at withers 145, oblique body length 145, chest girth 162, cannon bone girth 19; mares: 142, 144, 162 and 18 respectively.

Lokai horses are characterized by good action and extreme hardiness. They have great endurance under saddle and pack and in national games, particularly in kok-par. They reach maturity late, but respond well to improved feeding and management. When purebred Lokais were reared in good stable conditions, by the age of 2 1/2 years they surpassed their contemporaries reared in taboos by 6 cm in height at withers.

A new breed of saddlers is now being bred in Tajikistan by mating Lokai mares to Arabian and Thoroughbred stallions.



NEW KIRGIZ (Novokirgizskaya)

This breed was developed in the state and collective farms of Kirgizia by crossing local horses with the Don and the Thoroughbred.

New Kirgiz horses are well adapted to highland conditions. They are used for stock work and for meat and milk production. They are short-legged and massive and they have a strong constitution. In type and conformation they closely resemble Don horses.

Average measurements of stallions (in cm) are: height at withers 156, body length 158, chest girth 188, the cannon bone girth 20.5. Mares' measurements are somewhat lower: 151, 155, 180 and 19 respectively.

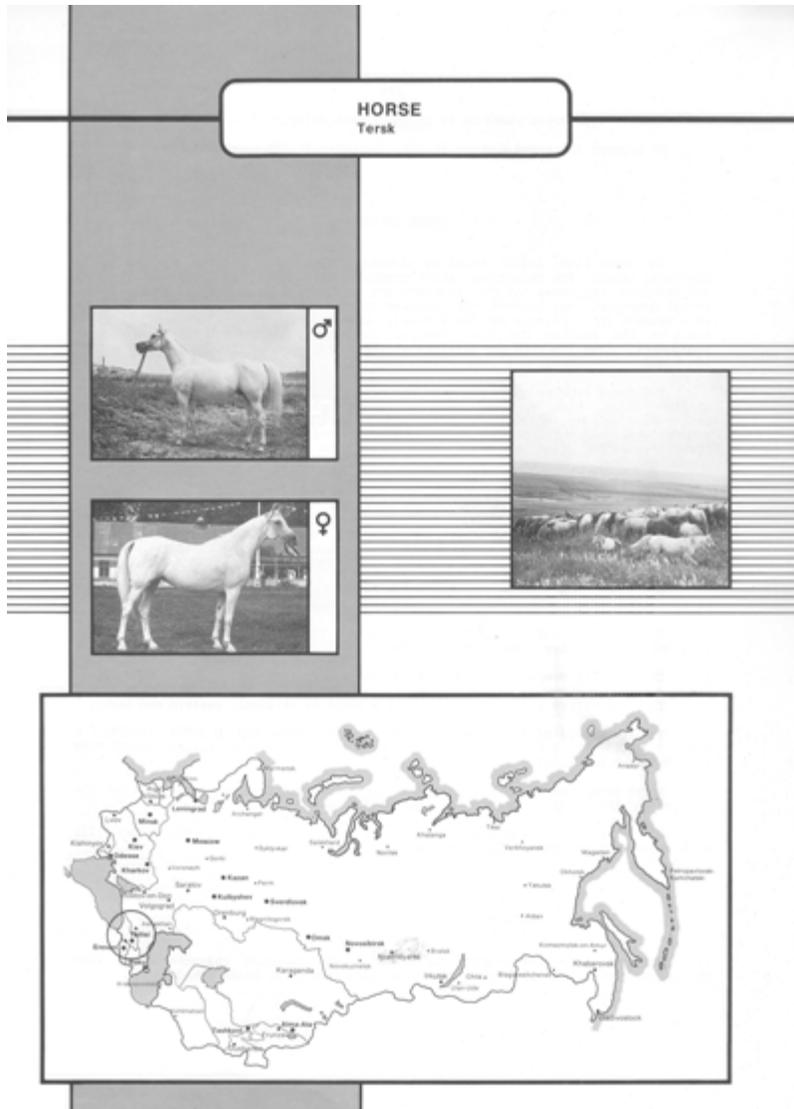
New Kirgiz horses have a medium-sized clean-cut head with low neck, well-defined withers, straight and level back and heavily muscled croup. The top-line is level. Legs are clean-cut with tendons well defined. Sickie-hocked legs often occur.

Three intra-breed types are recognized: saddle, thick and massive, standard.

New Kirgiz horses have performed well on hippodrome trials. The speed records of the breed are: 1600 m in 1 min 48 sec, 2400 m in 2 min 44.2 sec.

Massive type mares yield up to 20 kg of milk daily.

At present the breed numbers 56 650, including 10 700 purebreds.



TERSK (Terskaya)

The Tersk light saddle breed was developed during the 1920-40's at Tersk and Stavropol studs. The foundation stock consisted of the Strelets stallions Tsilindr and Tsenitel and mares of the Arab-Don and Strelets-Kabarda complex. Since the initial gene pool was limited, the Arabian stallions Koheilan IV, Marosh and Nasim were brought in to produce the Tersk breed. Selection was directed toward a breed as smart as the Arabian but more massive and better adapted to improved taboon management. Crossing with the Strelets stallions followed by inbreeding produced the new breed.

The Tersk type is quite close to the Arabian. Typical are the light head with straight face, wide forehead and jaw, long poll, medium-long high-set neck, medium-high withers, medium-long, flat and wide back, short and wide loin, nicely rounded and well-muscled croup, deep and wide chest, long and

sloping shoulders, correctly-stanced clean legs, thin hair cover, mane and tail. Colour: grey, bay, golden chestnut.

The measurements (in cm) of breeding animals at Stavropol stud are as follows: stallions - height at withers 160, chest girth 187, cannon bone girth 19.9; mares: 157, 182 and 19.3 respectively. Tersk horses perform well both in flat racing, classic events and, particularly, in the dressage. They are widely used in circuses. The breed has scored the following records for various standard distances 1600 m - 1 min 48 sec, 2400 m - 2 min 46 sec and 3200 m - 3 min 47 sec.

Tersk horses are known for their remarkable endurance. All the horses which participated in a 310-km distance race easily reached the finish. The Tersk has solid build and sound health. It is a long-lived horse. Average fertility: 70-75 live births per 100 mares.

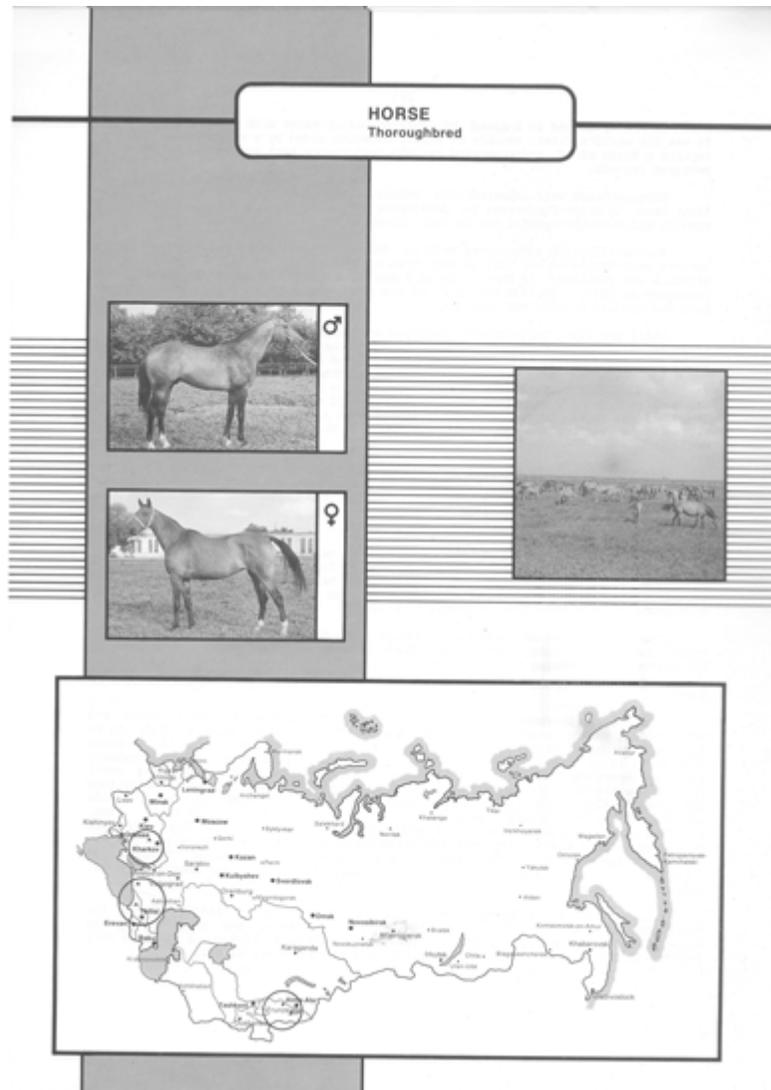
The breed is composed of 5 sire lines and 5 mare families.

There are three intra-breed types: the basic or original, eastern and heavy.

The frequencies of the transferrin types in the breed are D 0.52; F 0.24; H 0.67; O 0.15; R 0.01; M 0.03. Among the 13 saddle breeds raised in the USSR transferrin M occurs only in the Tersk breed.

Tersk stallions are widely used to improve native mountain breeds such as the Deliboz and the Lokai. The Tersk is also in demand for export.

Concentrated at one stud - Stavropol - the pedigree nucleus is very small (250 mares) and requires protective management.



THOROUGHBRED (Chistokrovnaya verkhovaya)

Owing to its outstanding performance and breeding characteristics the Thoroughbred occupies the leading position in international horse breeding. It was developed in England by crossing native mares with Oriental stallions. It was the world's first example of animal breeding aided by a government effort to improve a horse breed and supported by the performance test system and centralized pedigree records.

Thoroughbreds were imported into Russia in the late 18th century. They were first used by Orlov-Chesmenski in developing the Orlov Riding horse. After that Mosolov and Muraviev-Apostol set up their purebred Thoroughbred studs.

During 1772-1808 races were held in Moscow. The first Russian horse racing society was instituted in 1825 in the town of Lebedyan. Volume II of the English studbook was published in Russia in 1826 and the Moscow horse racing society was organized in 1834. In 1836 Volume I of the

studbook, which recorded Thoroughbreds born and used in Russia, was published.

Until the 1880s Thoroughbred breeding was quite limited; however it quickly began to develop following the introduction of the totalizator. The All-Russian Derby race for 2 versts 133 sazhen was established in Moscow in 1886; in 1900 the range was extended to 2 versts 144 sazhen. Other traditional races were also introduced. This resulted in an increase in the stock of breeding mares. The studbook recorded 432 mares in 1882; 1688 in 1900 and 2800 in 1914. Breeding of Thoroughbreds spread to remote parts of Russia such as Central Asia and the Far East. During World War One and the Civil War, Russian Thoroughbred breeding was almost destroyed.

Restoration of Thoroughbred populations began after the 1917 revolution. The state studs, including the Kuban-Chernomorski (later renamed "Voskhod"), were established in 1921. By 1925 the studs managed to gather 206 mares which were entered into the studbook in 1926. In 1940 the mare population at studs numbered 800.

In 1924 the races and competitions for the main traditional prizes including the M.I. Kalinin prize - the most prestigious prize for two-year-olds over a distance of 1600 m - were resumed. Competitions were also held for the All-Union Grand Prize for three-year-olds over 2400 m (equivalent to the English Derby) and for four-year-olds and older over a distance of 3200 m. The Thoroughbred was used in developing other breeds such as the Russian Saddle horse, Budyonny, Kustanai, New Kirgiz, Anglo-Kabarda and Ukrainian. It is used in corrective crossbreeding to improve the performance of various breeds. In the USSR there are 1400 mares and 110 stallions bred at 12 studs and at 10 horse breeding farms.

The modern Thoroughbred in the USSR is a proportionally built large and strong-boned riding horse. The average measurements (in cm) of mares at studs are as follows: height at withers 161; oblique body length 160; chest girth 185; cannon bone girth 19.5; stallions: 163, 163, 188 and 20.25 respectively. The Thoroughbred has a well-proportioned, clean-cut head, medium-long poll, wide jaw and long neck; prominent withers, short sloping shoulders, long forearm, short cannon; medium-long and normally sloping pasterns, hard, coloured hoofs; long thigh and cannon; wide and deep chest, well-sprung ribs; well-muscled, medium-long back and loin; long, wide and normally sloping croup. All joints are well developed. The Thoroughbred is generally a clean horse with well-defined musculature. However, there is a marked variation within the breed from the standard type both to the "noble" Thoroughbred type and to a simple horse. Common colours: bay, bay-brown, light chestnut, brown, black; grey is rare.

Thanks to its endurance which is the highest among saddle breeds the Thoroughbred scores speed records at various distances and wins top class competitions. Its absolute record for 1000 m is 58.9 sec; 1200 m - 1 min 10.8 sec; 1600 m - 1 min 36 sec; 2400 m - 2 min 27.2 sec; 3200 m 3 min 22 sec.

Genetic parameters of speed are: the average speed of two-year-olds was 12.75 sec for 200 m; standard deviation 0.4 sec; coefficient of variation 3%; heritability 0.25-0.35; age repeatability 0.65 for the two and three year olds, 0.50 for the two and four year olds, 0.7-0.8 for the three and four year olds; environmental repeatability coefficient - 0.7-0.9. The potential maximum

speed in the modern breeder population (calculated from the record speed corrected by the heritability and repeatability) is 56 sec for 1000 m. Although the Thoroughbred speed records made in the USSR are lower than the European records many USSR-born horses have won important international prizes. Since 1953 USSR Thoroughbreds have won the main prize of the International Congress of Socialist Countries 19 times, the European prize in the FRG 4 times and the great Pardubice steeplechase 8 times.

The Thoroughbred is particularly sensitive to proper management and breeding conditions. It can be kept only in stables and on improved pastures. Because of their extremely high growth rate Thoroughbreds suffer from insufficient feeding more than other breeds and may quickly develop irreversible retardation of growth and bone formation. Even minor faults in the management of mares may cause decline of fertility. It is considered by many that normally the Thoroughbred has low fertility. This may not be quite true because a number of studs manage to achieve 88-90% of live births. The high requirements of the Thoroughbred in management and feeding imply low disease resistance. It is susceptible to infectious rhinopneumonia which provokes abortions, to bronchial pneumonia in foals which may be fatal, to various stresses, and, particularly, to "transportation stress" which may cause colds during transport to a competition site.

Thoroughbreds are very sensitive to inbreeding. Even low inbreeding coefficients (3.12% or more) may result in a reduction in endurance and fertility.

At the same time Thoroughbreds are long lived. Up to 10% of mares at studs retain their reproductive capacities for 20 years or more. The stallion Budynok lived 34 years; the mare Sosna III lived 31 years and founded a most valuable family by producing 17 foals.

The Thoroughbred shows remarkable adaptability. It is bred in Lithuania, Ukraine, North Caucasus, Central Asia and Kazakhstan. It has acclimatized admirably in mid-mountain areas and spread to mountain ranges.

The physiological adaptability of Thoroughbreds is vividly demonstrated by high and versatile working qualities. The breed shows the highest gas-energy exchange ratio. The Thoroughbred has 20% more blood than the Don and its blood contains 25% more haemoglobin. As its blood flow rate and the heart's systolic volume are higher, the oxygen supply to the organism is double.

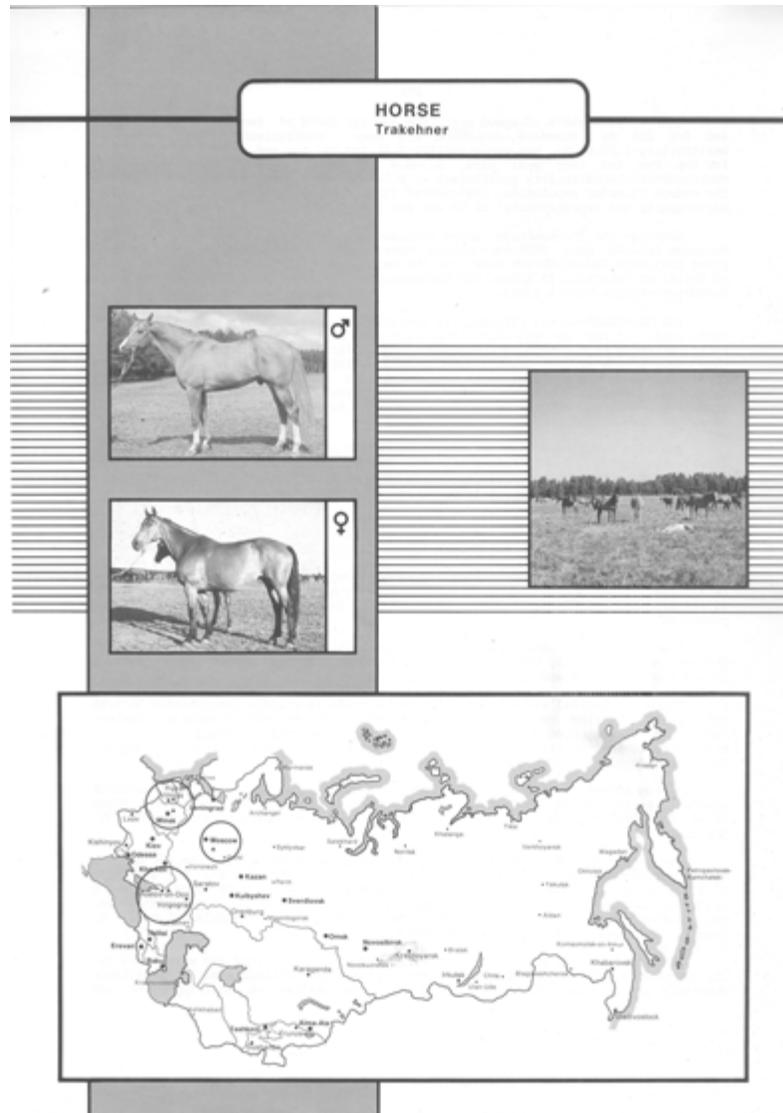
During intensive training and race testing Thoroughbreds display excellent adaptability to oxygen deficiency represented by a high rate of the venous blood oxidation - 86%, and an admirable ability to sustain the impact of low oxygen (5%) gas mixtures during artificial hypoxia.

The allele pool of blood groups by loci is as follows:-, A with the Aa antigen 0.91; A 0.Q8; C with the Ca antigen - 0.64; C 0.35; D- D^{r3-5} 0.29; D^{Br3-5} 0.21; D^e 0.07; D^d 0.06; D^{de} 0.11; D^{dr} 0.27; D^{dh} 0.01; K - K^a 0.05; K 0.94. In the D system the D^{ad} is absent. There is a high polymorphism in the serum protein system. The transferrin system has practically equal concentrations of alleles F, D and O. Transferrins H and P are rare and M is absent.

The breed is made up of home-bred lines, international lines and mare families. The home-bred Granit II, Duglas and Brimston lines are distinguished by remarkable endurance and high adaptability. Among the mare families the most important are three at Voskhod stud in Krasnodar

territory, one at Onufriev stud in Kirovograd region of the Ukraine and one at Kabardin stud in the Kabardino-Balkar Autonomous Republic. These are the three best studs.

The breeding system used combines line breeding with selection and pair matings. The international exchange of breeding material is used to increase heterozygosity. Breeding animals are continually being exported and imported.



TRAKEHNER (Trakenenskaya)

The Trakehner saddle breed was developed in East Prussia from 1786 to 1878. The first date refers to the transfer of Trakehnen stud to state ownership and to the appearance of Lindenau who set forth clear-cut breeding objectives and began practical work on the improvement of the local horse population. The second date refers to starting the Trakehner studbook.

At Trakehnen stud the aim was the development of a large cavalry horse to be used for the improvement of working and saddle characteristics in utility horses. After this the Trakehner became the improver of the East Prussian, Hanoverian and Mecklenburg breeds.

The basis for the Trakehner breed was the native Lithuanian horses which had been improved by stallions of various breeds, including the Thoroughbred, Mecklenburg, Danish and Turkish. The final stage of breed

formation was strongly influenced by a Turkmenian stallion and by three of his sons.

Later the emerging Trakehner was profoundly influenced by Thoroughbred stallions. By the late 19th century the Trakehner became one of the best high-grade saddle horses well adapted to keeping in stables or on pasture. It became a leading improver in the vast region of Lithuania, Brandenburg, Poznan and Pomerania. By the early 20th century the Trakehner's influence reached the north Baltic area but was cut short by World War One.

Breeding of the Trakehner was resumed in the USSR in 1945 at S.M. Kirov stud in Rostov region. The Trakehner admirably acclimatized to new climatic conditions and its improvement has progressed ever since.

At present the Trakehner is used in classic sports events and in initial crossbreeding with such breeds as the Ukrainian Saddle, Hanoverian and the riding type of Latvian. It is also employed in crossbreeding with other breeds to produce racehorses.

There are approximately 2000 Trakehner horses in the USSR as well as 700 mares which constitute the breeding nucleus at the studs in Rostov, Ryazan, Kaliningrad regions and in Byelorussia, Lithuania, Latvia and Estonia.

It is a large, heavily-muscled and boned horse of classic saddle build. The measurements (in cm) of stallions at stud were: height at withers 165; oblique body length 168; chest girth 196; cannon bone girth 21.7; mares: 162, 165, 193 and 20.7 respectively. It has a large clean-cut head, long or medium-long highly-set neck, high and long withers, back slightly dipped to withers, flat and wide loin, nicely rounded and heavily-muscled croup, sometimes sloping with short sacrum, correctly sloping long shoulders, legs properly set, dry, with well-defined tendons, short cannon with longer forearm, regularly sloping medium-sized pasterns, hard hoofs. The disposition is kind and energetic. Colour: chestnut, bay, black or dark bay; grey is rare.

The performance of the Trakehner is good. It combines speed, strength, endurance and elegance of action. In the USSR the Trakehner is tested in flat and obstacle races, steeplechase and classic events. In speed it is second to Thoroughbreds but may compete with the Budyonny. It has scored quite high records in various races: 1 min 42 sec for 1600 m, 2 min 11 sec for 2000 m 2 min 34 sec for 2400 m. The Trakehner stallion Kover is the holder of the absolute stadium jump record - 225 cm. Trakehner horses have repeatedly won the USSR national obstacle race, three-day events and the dressage. The Trakehner stallion Pepel was the winner of several USSR cups and at the Olympics.

The Trakehner is inferior to other saddle horses in adaptability. Although it requires excellent feeding and thorough management, its fertility is lower; the average foal crop is 70-72 foals per 100 mares. The Trakehner is less resistant to colds and infectious diseases but its physiological adaptability to heavy work is quite high.

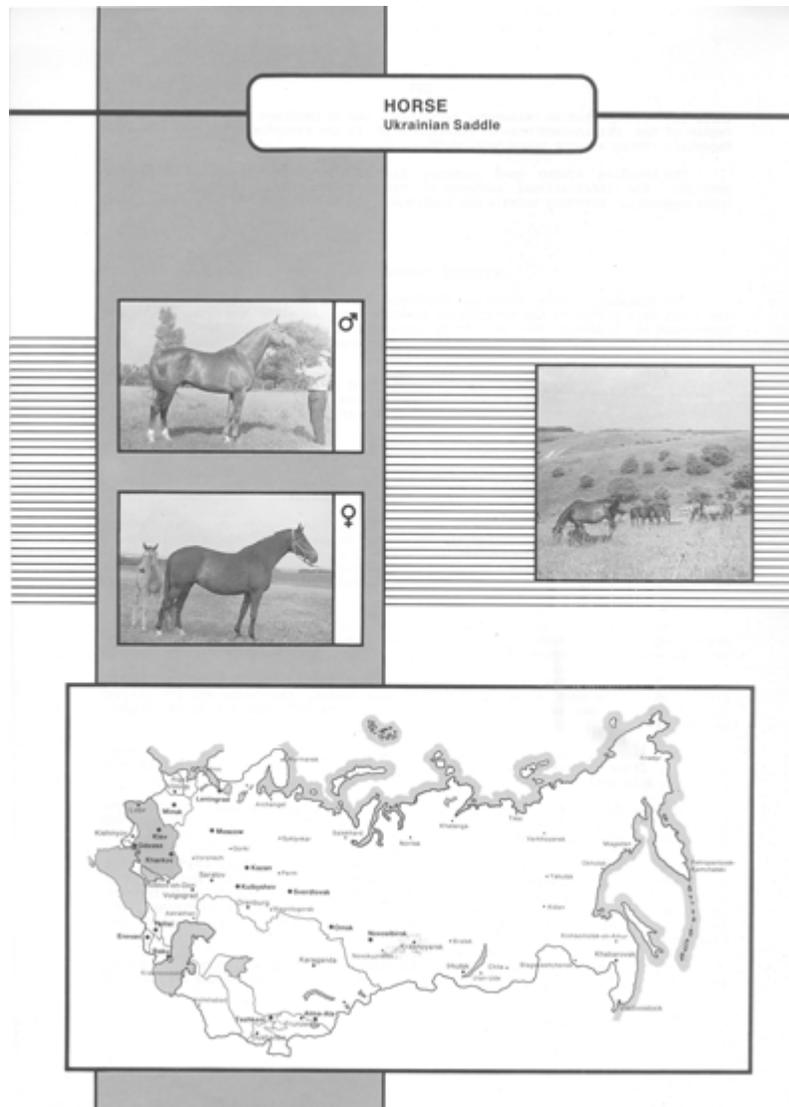
In haemodynamic characteristics the Trakehner is second only to the Thoroughbred. In the volume of blood per kg of live weight it is 11 ml inferior to Thoroughbreds (97 vs 108), in haemoglobin - 1.6 g (16.8 vs 18.4) but almost equal in the number of erythrocytes per kg of live weight. The heart's systolic volume is 1.25 litres.

In spite of the small numbers of the breed, owing to the combination of inbreeding with crossing with Thoroughbred and Arabian stallions no marked inbreeding depression has been observed.

Two intra-breed types have been segregated - typical and heavy. The most popular stallion lines are 6.

The International Congress of Socialist Countries on Horse Breeding has developed a uniform selection programme and exchange of breeding material between Poland, the GDR and the USSR. The Trakehner population has been steadily growing and the breed has good grounds for further increase.

The best breeding centres are S.M. Kirov stud in Rostov region and Nyamun stud in Lithuania.



UKRAINIAN SADDLE HORSE (Ukrainskaya verkhovaya porodnaya gruppa)

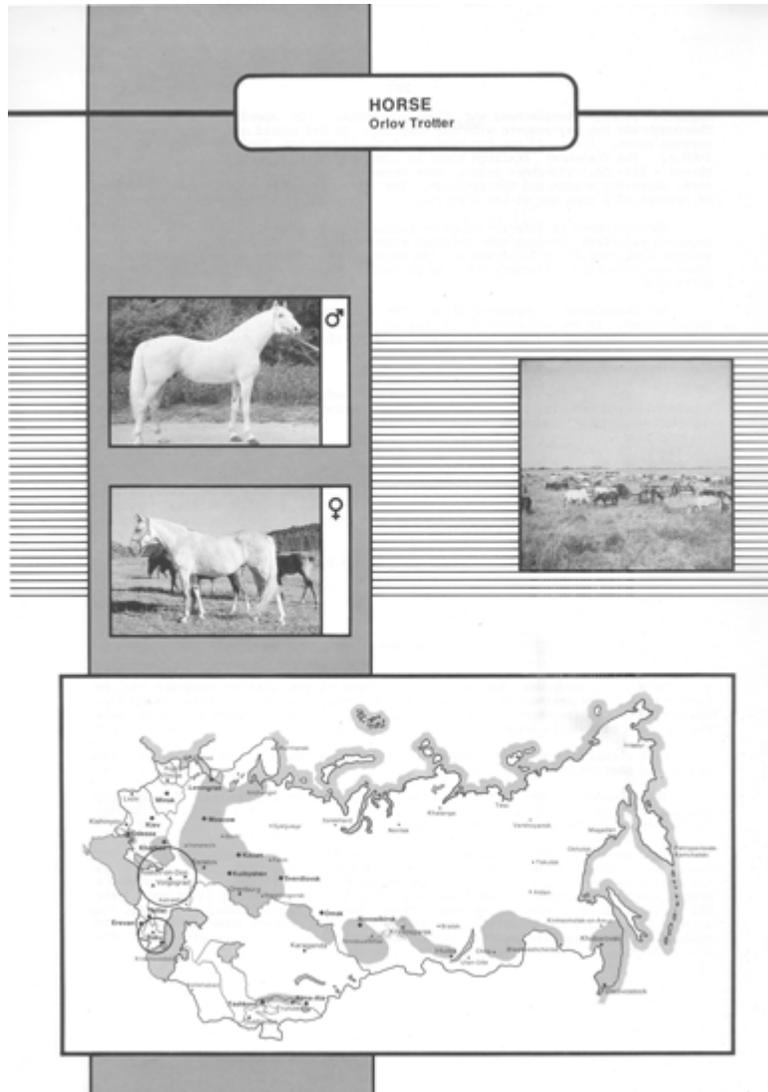
This breed group was developed in the studs of the Ukraine since the war by crossing Hungarian mares (Nonius, Furioso-Northstar and Gidran) with Trakehner, Hanoverian and Thoroughbred stallions. Particular value was attached to individuals with a trace of Russian Saddle horse blood. At the initial stages of breeding the improved taboo system was used. Now stable and pasture management are used. Their breeding began at Ukraine stud in Dnepropetrovsk region and subsequently continued mainly at Aleksandriisk, Derkul'sk, Dnepropetrovsk and Yagolnitsk studs. The Ukrainian saddlers are now bred mostly for sport. They are large heavy saddle horses. The head is well proportioned, the eyes expressive; the straight neck is long, as is the poll; the withers are prominent, the back long and flat, the loin broad and well muscled; the croup is long and has a normal slope; the chest is broad and deep, the body

heavy and the limbs well set. The build is solid. The average measurements (in cm) of stallions are: height at withers 165, oblique body length 166, chest girth 191, cannon bone girth 21; the measurements of mares are somewhat less: 160, 160, 188 and 19.8 respectively. The most widespread colours are bay, chestnut and brown.

Transferrin alleles have the following frequencies: D 0.30, F 0.43, H 0.02, O 0.11, R 0.12. Transferrin M is absent.

Ukrainian Saddle horses perform well in classic events, particularly in dressage. The Soviet equestrians riding them have repeatedly won or have been runners-up in the highest-ranking competitions, such as the Olympics and the World and European Championships.

In the long term, the main breeding method is that of pure breeding with corrective crossing with the Thoroughbreds. The Bespechny line of the Ukrainian breed consists of horses derived from the last of the Russian Saddle horse (Orlov-Rostopchin).



HARNESS BREEDS
ORLOV TROTTER (Orlovskaya rysistaya)

The Orlov Trotter was developed by A.G. Orlov at Khrenov stud beginning sometime between 1775 and 1784. The first date is that of the establishment of the Khrenov stud while the latter is that of the birth of Bars I, the progenitor of the modern pedigree Orlov. Arabian horses were crossed with the Dutch, Danish and Mecklenburg harness breeds. The Orlov evolved under the natural conditions of Voronezh region, characteristic of central Russia, and used natural pastures in the flood plain of the Bityug river. The combination of stable and pasture produced a breed with good action and adaptability to various management conditions. It thus became possible to spread the breed beyond the limits of Voronezh region to different climatic zones of the country, from Poltava to Perm regions, from Pskov to Kurgan regions and from Kirgizia to Altai territory. The Orlov is

also taken to the mountain regions east of Lake Baikal as the principal improver of the native breeds.

The Orlov is widely used as a draught horse, as a utility horse for light and medium-heavy agricultural jobs, as a pleasure and competition horse and as the principal improver of small native horses throughout the Soviet Union.

When the breed was being established and Bars I (a stallion of mixed Danish, Dutch and Arab origin) was in use at Khrenov stud, there were 77 mares of various origins there (including 10 Arabs, 2 Persians, 3 Caucasians, 1 Don, 32 English Thoroughbreds, 5 Mecklenburgs and 1 Spanish). Bars' granddaughters, however, played the decisive role in the establishment of the breed. The number of purebred Orlov Trotters changed depending on market conditions as well as social and economic factors. Significant damage to the breed was caused by uncontrolled crossing with the American Trotter during 1885-1913, as well as by the First World War and the Civil War, following which the breed had to be re-established. The first volume of the Orlov studbook in 1927 recorded 939 stallions and 1120 mares, while in 1954, Volume 8 listed 3228 purebred mares. Subsequently, however, the number of horses in the breeding nucleus began to decline. Volumes 19 and 20 recorded 432 stallions and 652 mares in 1982.

The modern Orlov Trotter is distinctive in its type and conformation. Its head is well proportioned and clean cut, poll long and jaws broad, neck long and muscular and often high-set, withers medium in height and length, back long and flat and sometimes slightly dipped, loin of medium length and flat, croup straight and nicely rounded, chest wide, medium-deep, ribs well sprung, legs properly set and the joints well developed, often somewhat coarse. The forearm, cannon and metatarsus are medium in size, the pasterns often short and straight. The limbs are sometimes hairy. The colours are grey, bay, black and chestnut.

The measurements of stallions (in cm) are withers height 162, oblique body length 164, chest girth 187, and cannon bone girth 20.5; mares: 160, 164, 186 and 20.2, respectively.

The adaptability of the Orlov Trotter to either stable or pasture management has contributed to its spread to various parts of the country as well as to the development of specific lines. For instance, Dubrovski, Khrenov, Novotomnikov and Perm stud types have been formed, with distinctive exterior features. The Khrenov is the most popular standard type of the Orlov described in all textbooks and guides. The Dubrovski type is distinguished by smaller size, somewhat more primitive build, fleshiness and solid build. The Novotomnikov is characterized by its clean build, prominent "Arabian and swan-like" breed features and more rapid maturity. The Perm type is the most fleshy and large type with a somewhat coarse build characteristic of carriage horses.

Serum proteins and blood type antigens have been studied at Khrenov, Novotomnikov and Perm studs. Five transferrin alleles have been found, as have two each of albumin and ceruloplasmin, four of esterase, and three carbonic-anhydrase alleles. The Orlov has a high concentration of H, R and F transferrin alleles. Six blood group systems have been found (A, C, D, K, P, Q); most rarely encountered are Dh (0.07) and Da (0.20); no Pb antigen has been found. The Dd (0.88) and Aa (0.81) antigens are the most widespread.

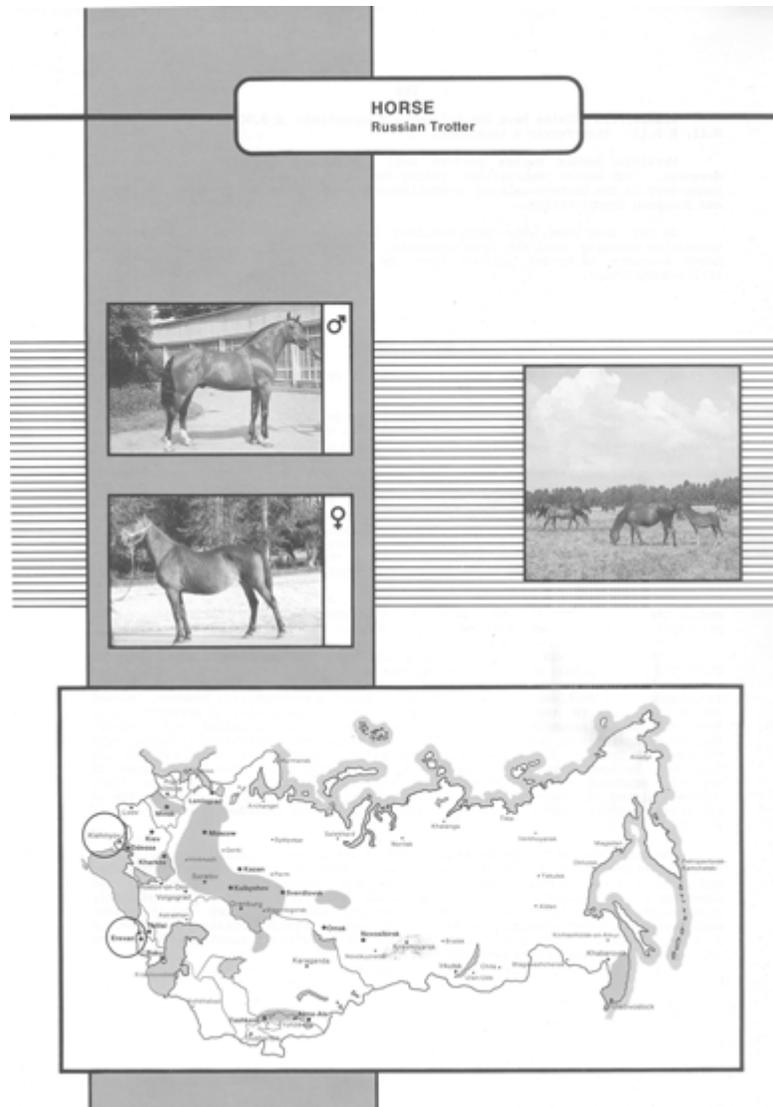
The average speed of adult trotters is currently 2 min 20 sec for 1600 m; the record is 2 min 1 sec.

The Orlov is very fertile. At the studs there are 80-85 live births per 100 mares and the survival rate to one year of age is 78-83%. Its robust constitution and high adaptability result in a long life span. The outstanding stallion Kvadrat was used as a sire up to the age of 32, while the mare Gondola (b. 1933), having won the most prestigious prize at the Bars hippodrome, equivalent to the Derby, lived to the age of 27 years and produced 17 foals.

Pure breeding is the main method of producing the Orlov Trotter. No depression of the main economic characters occurs with up to 5% of inbreeding.

The reduction of the breeding nucleus at studs is mainly attributable to the breed's lower speed potential.

The breed consists of 12 sire lines and 16 mare families. The best studs are Khrenov, Novotomnikov, Perm and Altai.



RUSSIAN TROTTER (Russkaya rysistaya)

The Russian Trotter was developed by crossing the Orlov Trotter with the American Standardbred (American Trotter) and subsequent breeding inter se.

The crossbreeding began in the 1890s. Prior to 1914, 156 stallions and 220 purebred mares were used. After World War One and the Civil War the importation of American Trotters stopped; systematic activity began so as to improve the speed, conformation and the measurements of the crossbreds. The goal was to find the best combination of these features. By 1950 the breed formation was completed. In 1960, in order to improve the breed's speed, a second crossing of Russian Trotters with American Standardbred stallions was made. The crossing still continues.

The modern Russian Trotter is a typical harness horse. Characteristically, it is generally clean and proportionately built and has well-developed muscles and tendons. The head is light, profile straight, neck long and straight,

withers medium in height, back and loin straight and well muscled, croup flat, long and broad. In appearance the Russian Trotter is, however, inferior to the Orlov; it more frequently possesses such defects as bowed legs or close hock-joints, drooping and short croup, exostoses and curb. The commonest colours are bay, black and chestnut; grey horses are less common. The average measurements (in cm) are: stallions -height at withers 161, oblique body length 163, chest girth 185, cannon bone girth 20.5; the mares' measurements are smaller: 159, 162, 184 and 19.8 respectively.

The speed of the Russian Trotter is quite high. The 1600 m trot record is 1 min 56.9 sec.

Twelve lines have been isolated in the breed.

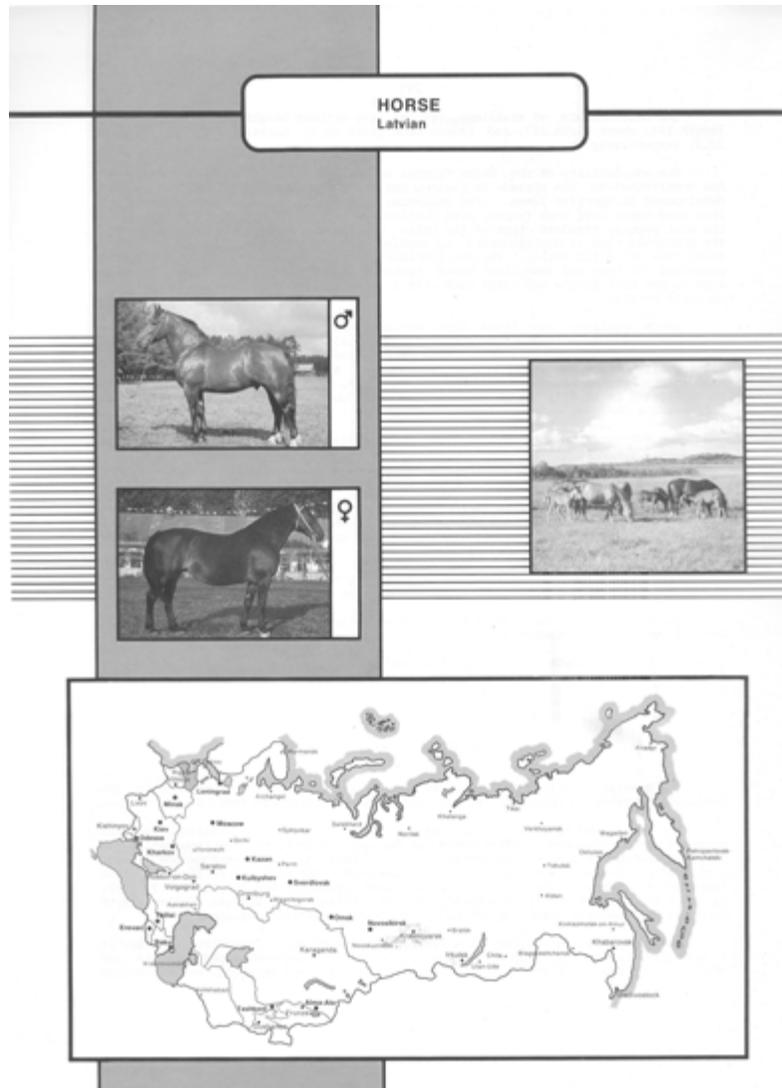
Blood group and transferrin alleles have the following frequencies: blood group antigens - Aa 0.83, Ac 0.03; Ca 0.89; Da 0.28, Db 0.21, Dd 0.77, Dc 0.28, Dh 0.19; Ka 0.19; Pa 0.76; Qa 0.12; transferrins - D 0.26; F 0.39; H 0.08; O 0.08; R 0.17. No M transferrin has been found.

Russian Trotters have adapted well to varied conditions. Their distribution is broad, extending from the Baltic republics to western Siberia.

The breed's fertility is up to 75 foals per 100 mares. The life span averages 15-17 years. The highest longevity was displayed by the stallion Podarok (b. 1935) who founded a line, lived to be 29 and was used in mating up to the age of 28; and the mare Mazurka (b. 1954) who lived until 1980 and produced 16 foals.

As the percentage of the American Standardbred blood increases, three out of every four crossbreds display marked growth retardation, deteriorating conformation and dramatically reduced fertility. At the same time, the use of inbreeding against the background of crossbreeding causes no inbreeding depression even if the inbreeding coefficient is as high as 12%.

There are 1600 stud mares in the pedigree nucleus of the Russian Trotter. The total number of purebreds is as high as 27 000; there are some 290 000 crossbreds of various generations. The breed is bred in 27 studs, the best of them being Elan, Smolensk, Zlynsk, Alexandrov, and Dubrovski. Studbooks are published regularly, with 23 volumes out so far. In the long term, pure breeding and corrective crossbreeding with the American Trotter are to be used.



LATVIAN (Latviiskaya)

The Latvian breed was developed in Latvia from the beginning of the 20th century up to 1952 by crossing the native horses with west European harness and harness-saddle breeds. Oldenburg, Hanoverian and to a less extent Holstein stallions had most influence. Between 1921 and 1940, 65 Oldenburg stallions and 42 Oldenburg mares were imported from the Netherlands and Germany; they became the core of the breed. Besides the purebred Oldenburgs, Oldenburg crosses and Hanoverian, Norfolk Roadster, Ardennes and East Friesians were widely used. A special role in breed formation was played by the Okte stud in the Talsa region. Two types, the harness horses and the equestrian sports horses, have been evolved. Prior to 1960, the harness type was emphasized. Subsequently, as mass scale equestrian sports developed in Latvia on a large scale, the number of horses of the sport type was increased through infusion of the Hanoverian and, to a less extent, Thoroughbred blood.

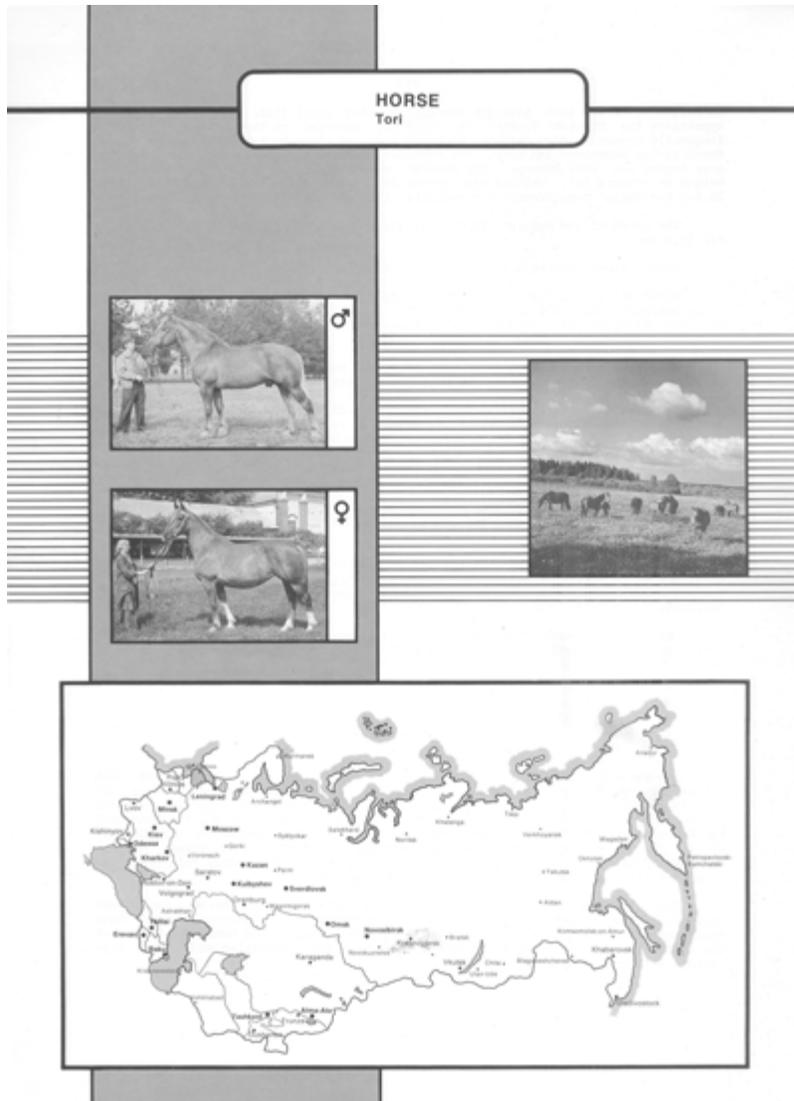
The modern Latvian is a successful combination of the features of the utility and saddle horses. Tall, heavy muscled and bony, in format they are intermediate between saddle and harness horses. Latvians have a well-proportioned and solid build; the joints are sometimes coarse. Muscles are well developed, bone structure solid, chest broad, withers moderately pronounced or high and long, shoulder long, back and loin flat, long and well muscled, croup long and with a normal slope, legs properly set and with well-developed knee-joints and hocks. Defects include short and ringboned pasterns and cow hocks. The commonest colours are bay, brown and black; chestnut is less frequent.

The average measurements (in cm) of stallions are: height at withers 164, oblique body length 166, chest girth 190, cannon bone girth 23. Taller stallions (168 to 170 cm) are now being used due to the popularity of the riding type. The average measurements (in cm) of the mares are 161, 167, 191 and 22 respectively.

Latvian horses have shown good results in performance tests both in harness and under saddle, particularly in competitions. The records are: 2000 m draught walk with a pull of 150 kg, 13 min 40.6 sec; 2000 draught trot with a pulling effort of 50 kg, 4 min 36.8 sec; draught endurance with a pull of 300 kg, 1537 m and the maximum pull 927 kg.

The breed consists of 2 intra-breed types, harness and sport horses, and of 4 major lines.

Pure breeding and limited crossing with Hanoverian and Oldenburg stallions are the main improvement methods. The best farms are Burnieke state farm, Uzvere and Tervete collective farms and the Sigulda experimental farm of the Institute of Animal Breeding.



TORI (Toriiskaya)

This is an all-purpose utility breed. It was developed in Estonia at Tori stud from 1890 to 1950, by crossing native Estonian mares with European halfbred stallions. The breed was founded by the stallion Hetman, the son of Stewart and an unknown hunter mare. Stewart was a crossbred of a Norfolk Trotter and an Anglo-Norman mare.

The formation of the breed involved extensive use of Hetman and his sons. As a result, a valuable breeding nucleus was rapidly formed. By the end of the 1930s, however, signs of inbreeding depression were found, which manifested themselves in a deterioration of performance and robustness. Crossing with Breton Post-horse stallions was used to eliminate the inbreeding depression. As a result, the massive type became widespread within the breed and the quality of the gaits began to decline.

A need also arose for a combination of utility and sporting qualities in the horses. To meet this need, a limited experimental new introductory crossing

between Tori horses and Hanoverian and Trakehnen stallions was undertaken.

The modern Tori is clearly a harness type and has a very clean and solid build. Its conformational features include a large or medium-sized head, clean-cut and sometimes with a shortened poll. The neck is medium in length and fleshy; withers are average in height, back long and flat, loin medium and broad, croup broad, long and well muscled. The chest is very broad and deep. The limbs are clean and properly set. The average measurements (in cm) of Tori stallions at the studs in 1982 were: height at withers 162, oblique body length 170, chest girth 200 and cannon bone girth 22.3. The colours are chestnut, bay and reddish-bay.

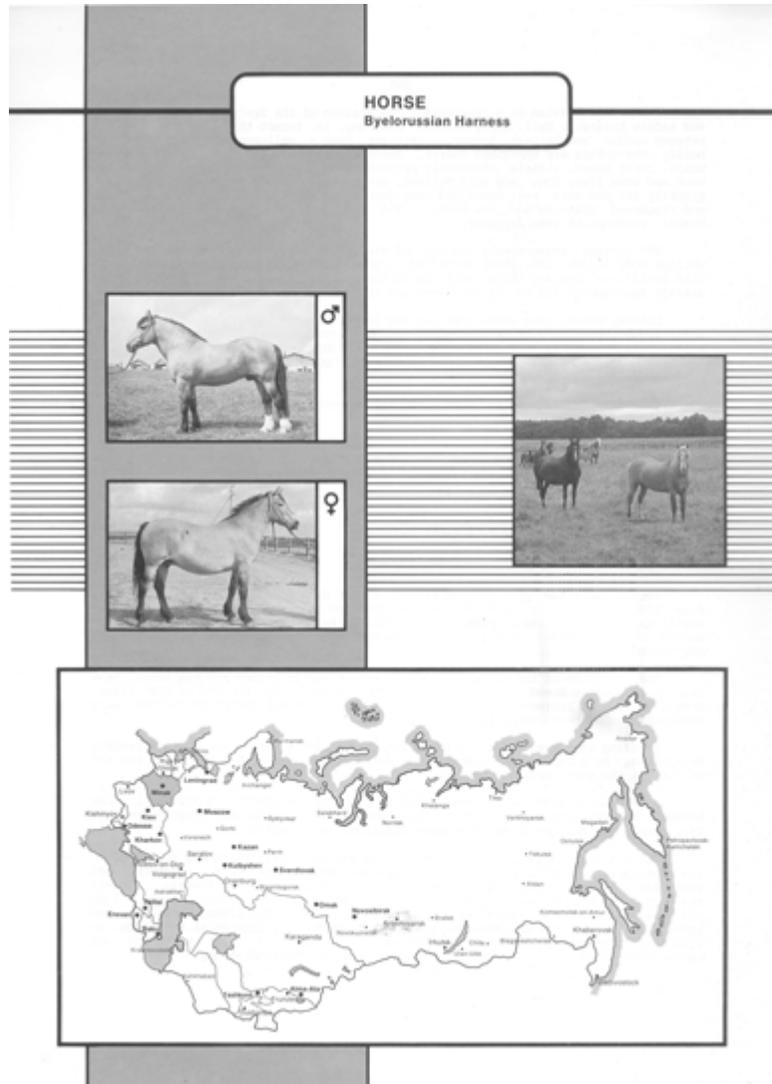
Tori horses have good performance. The breed records are 13 min 21.5 sec in 2000 m draught walk with a pull of 150 kg, 4 min 44.8 sec in 2000 m trot with a pull of 50 kg. The maximum draft endurance with a pull of 300 kg was 1238 m and the maximum pull 880 kg.

The breed consists of 10 lines.

The allele pool of biochemical polymorphism is four types of esterase, the absence of the H allele, six transferrin types and rare M and P alleles.

The breed's fertility is quite high, reaching 86 foals per 100 mares.

The breed has spread throughout Estonia. The main breeding centres are Tori stud and the breeding farms at Pyarivere and Aravete state and collective farms.



BYELORUSSIAN HARNESS (Belorusskaya uprazhnaya)

The Byelorussian Harness breed was formed on the basis of the native northern forest type of horses improved by the Døple (from Norway), Ardennes and Brabançon breeds. The Døple influence was the strongest. Long-term inter se breeding of various generations of crosses created a breed most suitable for the current requirements of Byelorussian agriculture. The horse has adapted well to work in wooded areas with swampy and sandy soils. It can also be used for milk and meat production.

It is a medium-sized horse with the characteristic conformation of a harness horse. The head is not large, the forehead wide, the neck well muscled and average in length, the withers average in height and length, the back long, flat and often slightly dipped, the loin flat and short, the croup wide, nicely rounded and well muscled with a normal slope, the chest wide and deep. The limbs are clean and solid. The mane and tail are thick but the fetlock tufts are small. The stallions' measurements (in cm) are: height at withers 153, oblique body length 163, chest girth 184, cannon bone girth 21.5. Live

weight is 540 kg. The mares measure 150, 161, 183 and 21 cm respectively. Their live weight is 490-500 kg. The colours are dun, bay, chestnut and light bay.

The top performance results are: the 2 km walking record with a pull of 150 kg is 14 min 41 sec; the 2 km trotting record with a pull of 50 kg is 5 min 01 sec. The best pulling endurance result with a pull of 300 kg was 388.8 m. The maximum load capacity has reached 660 kg.

The mares' average daily milk yield is 9 litres. At established koumiss farms the best mares produce 2560 litres of marketable milk in a 6-month lactation.

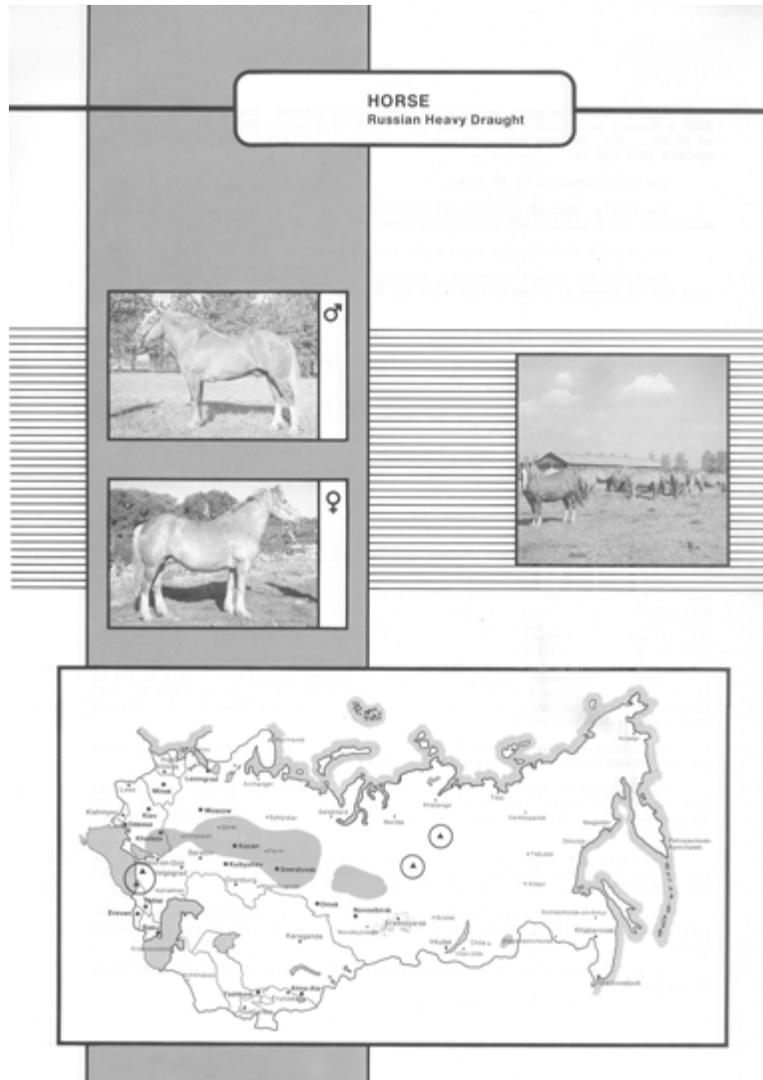
The dressing percentage is 51. Despite the fact that the Byelorussian matures late, by weaning at 6-7 months the foals reach a live weight of 170-190 kg. The Byelorussian has a high fertility and longevity. Mares have often remained fertile to the age of 26.

Two types, the large and the medium, are distinguished within the breed.

There are 6 lines and 4 mare families. The leading breeding centres are Zarechye stud and the stud on Pobeda state farm in Byelorussia.

Improvement is by pure breeding. Two volumes of the studbook have been published, listing 135 stallions and 616 brood mares. A new line is currently being tested.

As at 1 January 1980, the Byelorussian Harness breed numbered 93 040, including 27 560 purebreds.



RUSSIAN HEAVY DRAUGHT (Russkaya tyazhelovoznaya)

The breeding of a small draught horse which was strong, sufficiently fast, easy to keep and economical as regards management and feeding, went on in Russia concurrently with the breeding of a large heavy draught breed. The genetic material for the breed came from native Ukrainian breeds, the mountain Ardennes and, in part, from the Brabanmated with Brabançonson and the Orlov Totter.

Systematic breeding began in the 1860s. The main nucleus of the breed was formed at Peter's Academy (now the K. Timiryazev Moscow Agricultural Academy), Chesma stud in Voronezh region, at Kochubei and Chaplits studs in Poltava region and Derkulski stud in the Ukraine. Meanwhile, grading up of native horses with the Ardennes was taking place. In 1875 there were nine Ardennes stallions in Russia; the number rose to 597 by 1915. By the beginning of the 20th century the Ardennes type became the most popular in Russia. Even in regions where there was a demand for large heavy draughts and where high grade Ardennes were

mated with Brabançons, the crosses retained the old denomination of Ardennes. During the breed formation period, a role of particular importance was played by two breeding centres, the Chesma and the Dubrovsk, and subsequently by the Pershino and Khrenov studs. By the beginning of the 20th century, the world's zootechnical public was introduced to the Russian Heavy Draught at the 1900 Paris Exhibition. However, the First World War, followed by the Civil War, just about wiped the breed out. In 1924, only 92 Ardenne stallions were found. In 1923, breeding animals at Dubrovsk stud were moved to Novoalexandrov stud in Voroshilovgrad region, while the Khrenov stud stock was moved first to Pershino and subsequently to Uralsk and Kuedin studs. By the year 1937 the stock of purebreds was reconstituted and isolated as an independent breed.

Due to its high-profit feeding and high adaptability, the Russian heavy draught became quite widespread. It is now bred in the Ukraine and North Caucasus, in Udmurtia and Byelorussia, in Kirov, Sverdlovsk, Perm, Vologda and Archangel regions and in western Siberia.

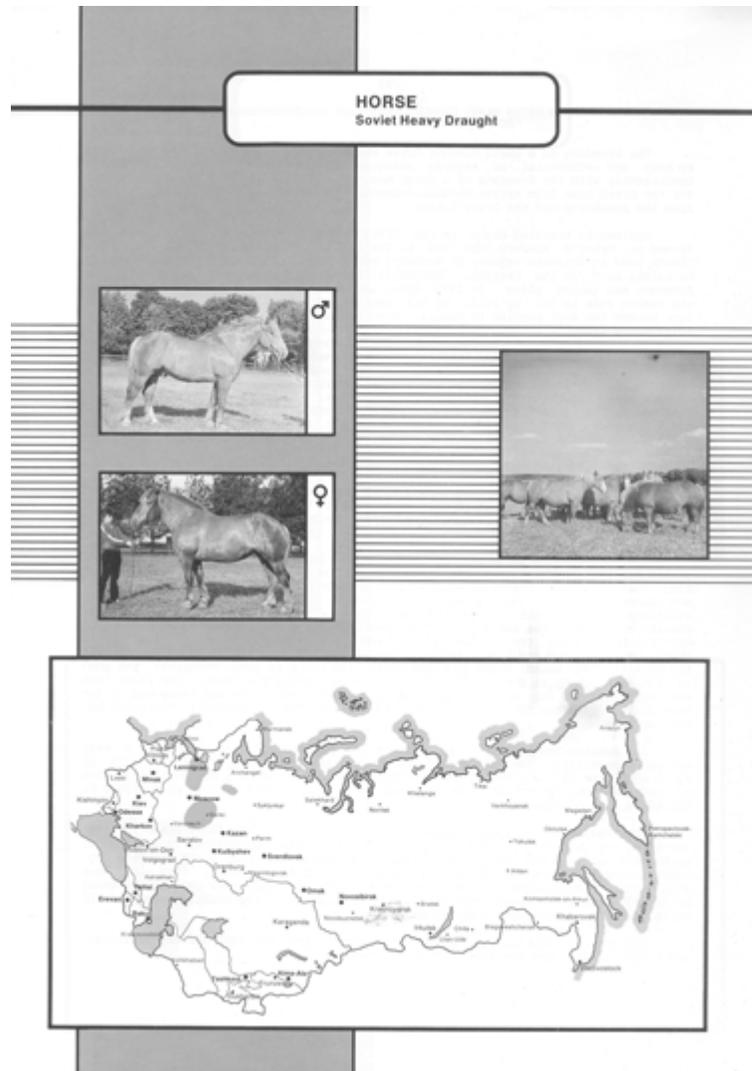
The horse is not large yet heavily muscled; its trunk is long and broad; the joints are well developed and the limbs solid. The average measurements (in cm) of stud stallions are: height at withers 152, oblique body length 161, chest girth 200 and cannon bone girth 22.5; mares: 149, 158, 192 and 21.2 respectively. The stallions' live weight is 600-700 kg; that of mares is 550-600 kg. The characteristic features are as follows: the head is average size, clean cut, with Oriental breediness; the forehead is wide and the profile is straight. The neck is short, broad, fleshy and high crested in stallions. The withers are low and broad; the back is long, broad, often somewhat soft; the croup is long, drooping; the loin is flat. The chest is deep and broad; the ribs are steeply sloping. The front legs are short, set too far apart; the pasterns are sometimes short and ringboned. The knee-joints are often too far back. The commonest colour is chestnut; brown and bay are rarer.

The Russian Heavy Draught horse is strong, shows a fair speed and has a very willing disposition. The 2000 m draught walking record with a pull of 150 kg is 15 min 5 sec; the 2000 m trotting record with a pull of 50 kg is 5 min 20.4 sec; the draught endurance record with a pull of 300 kg is 1091 m. The maximum pull record is 820 kg or 117% of live weight.

The Russian Heavy Draught matures early; by weaning, the foals reach 250 kg. The mares are good milk producers. At koumiss farms mares produce up to 2500 kg of marketable milk in 6-7 months of lactation. The record milk yield is 5540 kg. Russian Draught horses can be used for periods of up to 25 years. They also have good fertility and longevity. The stallion Kolodnik (b. 1952) was used for breeding up to 1978, while the mare Logika (b. 1962) in 18 years of reproduction produced 18 foals, remains in good health and is still fertile.

The breed's structure includes 2 intra-breed types, the Ural and the Ukrainian, and 6 male lines. One new line is being formed.

The transferrin polymorphism has been studied in 862 horses and the allele frequency is as follows: D 0.33, F 0.31, H 0.06, O 0.01, R 0.27.



SOVIET HEAVY DRAUGHT (Sovetskaya tyazhelovoznaya)

This breed was developed during the period from the '80s and the '90s of the last century up to 1952 when it was recognized as a new heavy draught breed. The breeding zone was quite extensive, including Yaroslavl, Vladimir, Gorki, Penza, Ryazan, Tula, Tambov, Voronezh and Orel regions and Mordovia. This was a zone with a developed industry and intensive agriculture, requiring strong and sufficiently fast horses of ample size. Success in the breeding of this type of horse was guaranteed by a stable supply of fodder.

Initially, native horses were improved by stallions of the Belgian Brabançon draught breed. In 1885, three Brabançon stallions were recorded in stud use in the above zone; in 1895 they numbered 58, in 1905 - 394 and in 1945 - 891. The breed nucleus was initially at Khrenov stud and subsequently at Pochinkovsk stud. Mares of multibreed origin (Percheron-Ardenne-Suffolk-Danish and different varieties of saddle horse) were mated with Brabançon stallions for three to four generations and the

progeny were bred inter se. At the same time grading up was taking place on a large scale and crossbred stallions were widely used.

In 1936, three state breeding centres, Pochinkovsk, Mordovian and Gavrilovo-Posad, were established. Alexandrov farm in Vladimir region and Yaroslavl farm branched off from the latter. Subsequently, the Pochinkovsk and the Mordovian facilities were transformed into studs.

As the intensification of agricultural production proceeded, demand for massive heavy draughts was growing. The influence of Brabançons began to spread. In the Baltic zone, new breeds, the Lithuanian and the Estonian Heavy Draught, began to be formed on a different local mare basis.

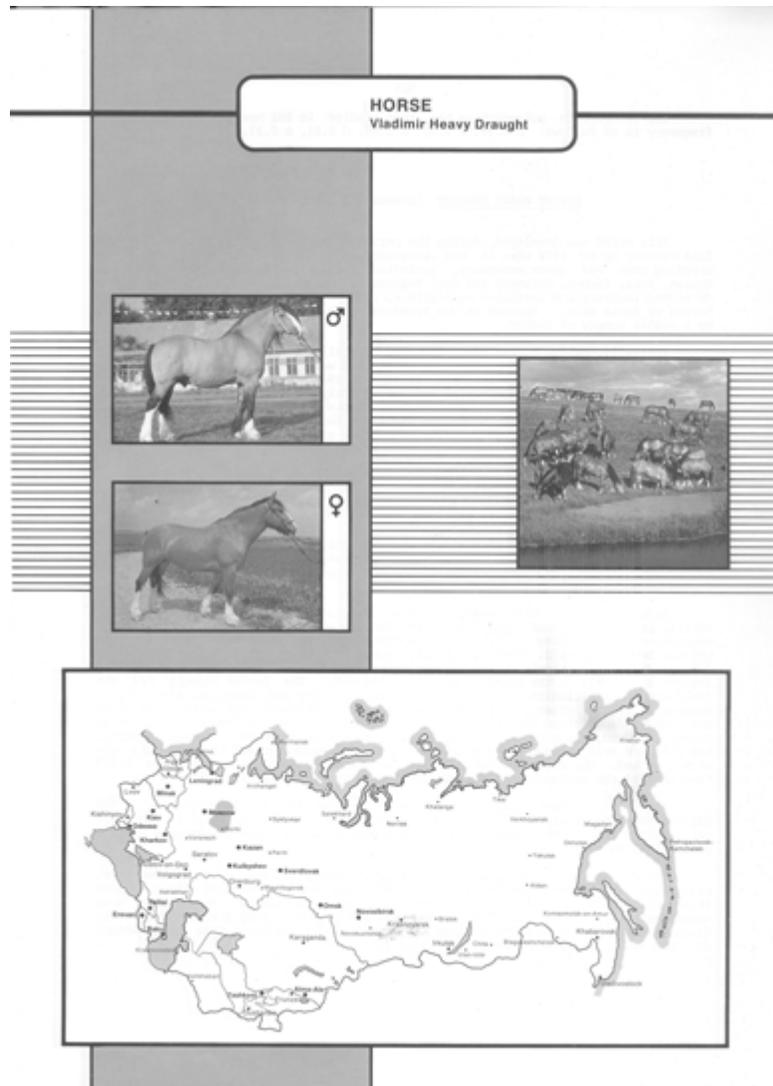
Modern purebred Soviet Heavy Draughts are distinguished by ample height and clearly expressed harness type. They are heavily muscled and boned. The average measurements of breeding stallions at the studs (in cm) are: height withers 163, oblique body length 172, chest girth 215, cannon bone girth 25; mares: 160, 168, 205 and 22.75 respectively. The live weight of stallions is 850 kg and sometimes reaches 1 000 kg; the mares' weight is 650-750. The Soviet Draught has the following characteristics: the head is average in size and clean-cut, the neck is average in length, often on the short side and well muscled; the withers are low; the back is long, often slightly dipped, the loin is average in length, the croup is broad, furrowed, drooping and heavily muscled, the chest is broad, average in depth, the ribs are well sprung. The forelegs are often pigeon-toed and the hind ones are sickle-hocked. The build is quite coarse, soft and yet much cleaner and more solid than that of the Brabançon. The predominant colours are chestnut, brown and bay.

The Soviet Heavy Draughts are good utility horses and breeders. The established records are: 2000 m draught walk with a pull of 150 kg in 11 min 51.8 sec; 2000 m trot with a pull of 50 kg in 4 min 50 sec; draught endurance with a pull of 300 kg - 1138 m; maximum pull, 851 kg.

The Soviet Heavy Draughts mature extremely early and are good milk and meat producers. With normal feeding and management the foals at weaning attain a live weight of 360-400 kg. The breed's record milk yield is 6320 kg. They have a good weight gain per fodder unit but demand good management. They are insufficiently disease resistant and adapt to extreme management conditions worse than other breeds do. The mares' fertility varies from 65 to 76%.

The breed comprises 2 lines and 3 mare families. A new line is now being developed.

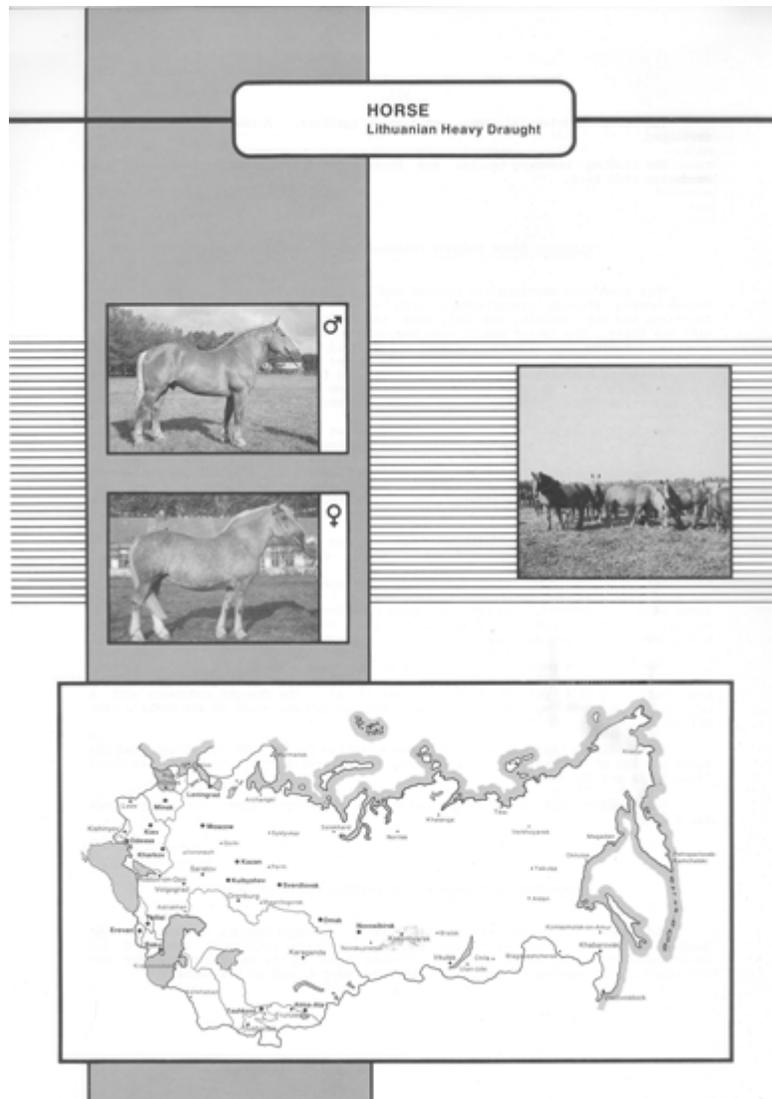
The leading breeding centres are Pochinkovsk stud in Gorki region and the Mordovian stud farm.



VLADIMIR HEAVY DRAUGHT (Vladimirskaya tyazhelovoznaya)

This breed was developed in Ivanovo and Vladimir regions on the basis of large native horses through crossbreeding with various draught breeds, such as the Percheron and the Suffolk, and later with the Clydesdale and, to a lesser extent, with the Shire. The latter was in wide use only from 1919 through 1929. The aim was a horse of medium draught power or less which would have rather high speed. In the formation of the breed, a particular role was played for more than a hundred years by Gavrillovo-Posad breeding station, previously a stud farm and a state breeding stable. Its experts invested no small effort in the creation of horses of uniform type in the region. In 1946 the new heavy draught breed was recognized. Vladimir Draughts combine ample size, stout build, speed and an energetic temperament. Compared to the Clydesdale, the Vladimir has a more developed chest and cleaner and more solid build. The average measurements (in cm) of the stallions are: height at withers 160, oblique

body length 165, chest girth 196, cannon bone girth 24. The stallions' live weight is 750-800 kg. The mares' measurements (in cm) are 157, 162, 188 and 23.0 respectively. The inadequate size of Vladimir Draughts is due to their being reared in simple management conditions at collective farm studs. The features of the conformation are: a long clean-cut head with the profile often arched; elongated and well-muscled neck; sufficiently pronounced and long withers; back somewhat long, a little dipped; short and broad loin; long, moderately sloping croup; long legs, clean and properly set. The chest is broad but not deep and the ribs are insufficiently sprung. The hair of the mane, tail and limbs is well developed. The Valdimir's have excellent gaits. The predominant colour is bay; brown and black are less frequent. There are characteristic markings on the head (a star or blaze) and legs. The Vladimir's performance test results are good. The 2000 m walking draught record with a pull of 150 kg is 12 min 34.2 sec; the trotting draught record for the same distance with a pull of 50 kg is 4 min 34 sec. The draught endurance with a pull of 300 kg is 987 m, while the maximum pull was 820 kg, 94.3% of the horse's live weight. The Valdimir's have a high growth rate, with the foals' live weight reaching 200 kg by the age of six months. The mares are quite fertile, the live birth rate being 75-80 foals per 100 mares. The breeding work is being carried out at the Yuryev-Polski stud. The breed has 4 lines.



LITHUANIAN HEAVY DRAUGHT (Litovskaya tyazhelovoznaya)

This breed was developed in Lithuania by crossing Zhmudka horses with the Swedish Ardennes. The third and fourth generation crossbreds (2nd and 3rd backcrosses) were bred inter se. The breeding began in the early 20th century and the breed was recognized in 1963. In 1964 there were 62 000 in Lithuania.

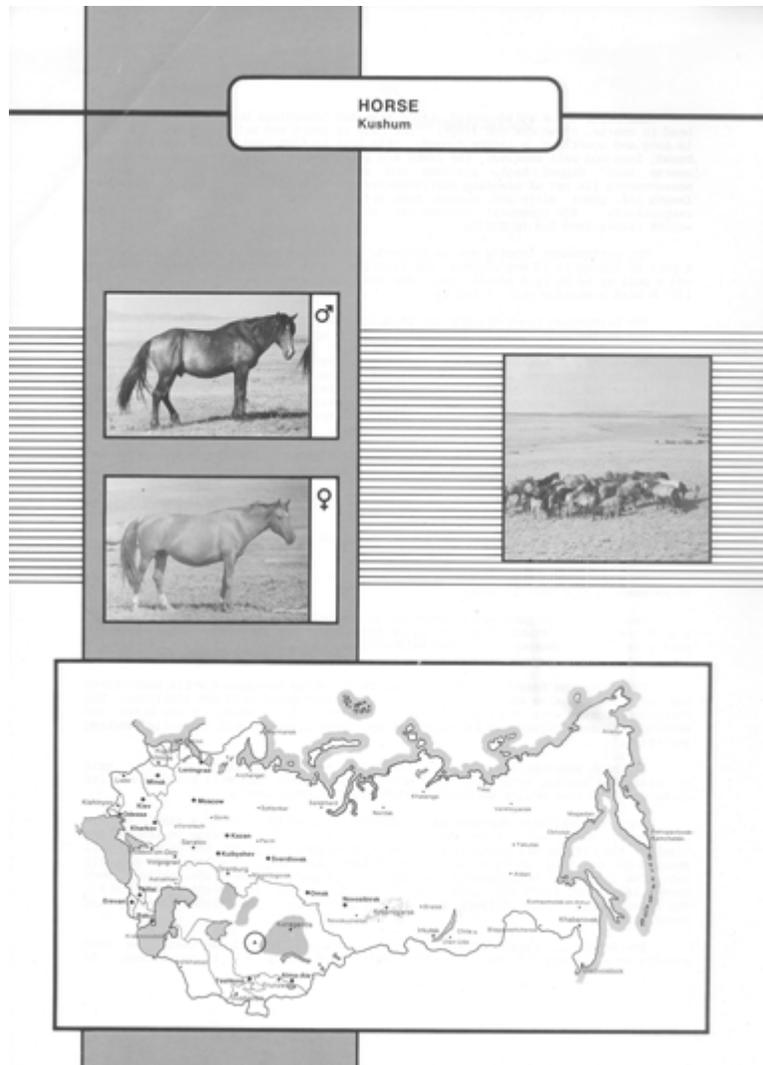
The breed has a solid build, large size and harmonious body proportions. The head is coarse, clean cut and large; the neck is short and well muscled; the back is long and sometimes a little dipped; the loin is flat and broad; the croup is broad, long and well muscled; the limbs are solid and properly set. Defects include coarse head, dipped back, pin-toes and sickle-hocked hindlegs. The average measurements (in cm) of breeding stallions are: height at withers 160, oblique body length 166, chest girth 205, cannon bone girth 24; mares: 157, 165, 200 and 23 respectively. The commonest

colours are chestnut and bay. The stallions' live weight varies from 850 to 920 kg.

The performance records are as follows. The 2000 m walking draught record with a pull of 150 kg is 13 min 20 sec; the trotting draught record for the same distance and a pull of 50 kg is 4 min 45 sec. The draught endurance with a pull of 300 kg is 1397 m with a maximum pull of 860 kg. The Lithuanian Heavy Draught has good longevity and fairly high fertility. The foal crop at the best studs is 80%; survival rate up to one year of age is 76-79%.

Their solid build enables Lithuanian Heavy Draughts to display good adaptability to extreme and harsh conditions. When used to improve meat and milk yield in native Altai horses, first crosses and backcrosses had better live weight indices and higher growth rate; they better withstood the conditions of year-round grazing. Crossbreeding of the native Altai and improved horses with the Lithuanian Heavy Draught is being used to develop a new breed.

The breed comprises 9 lines. It is bred at Nyamun, Sudav and Zhagar studs and at horse breeding units of collective and state farms.



KUSHUM (Kushumskaya)

The Kushum breed was developed at Pyatimarsk and Furman studs in Urals region of Kazakhstan from 1931 to 1976.

Originally, the goal was to develop, on the basis of the native Kazakh horses, a good army mount suitable for keeping in taboos all the year round. Kazakh mares were crossed with Thoroughbreds and halfbreds, as well as with trotters, to obtain larger size and to improve gaits.

To retain the Kazakhs' high adaptability to taboo management while maintaining and improving the size and action, the crossbreds were mated with Don stallions. The three-way crosses were subsequently bred inter se. As a result, a new breed was developed, characterized by high adaptability, large size and good versatile working qualities.

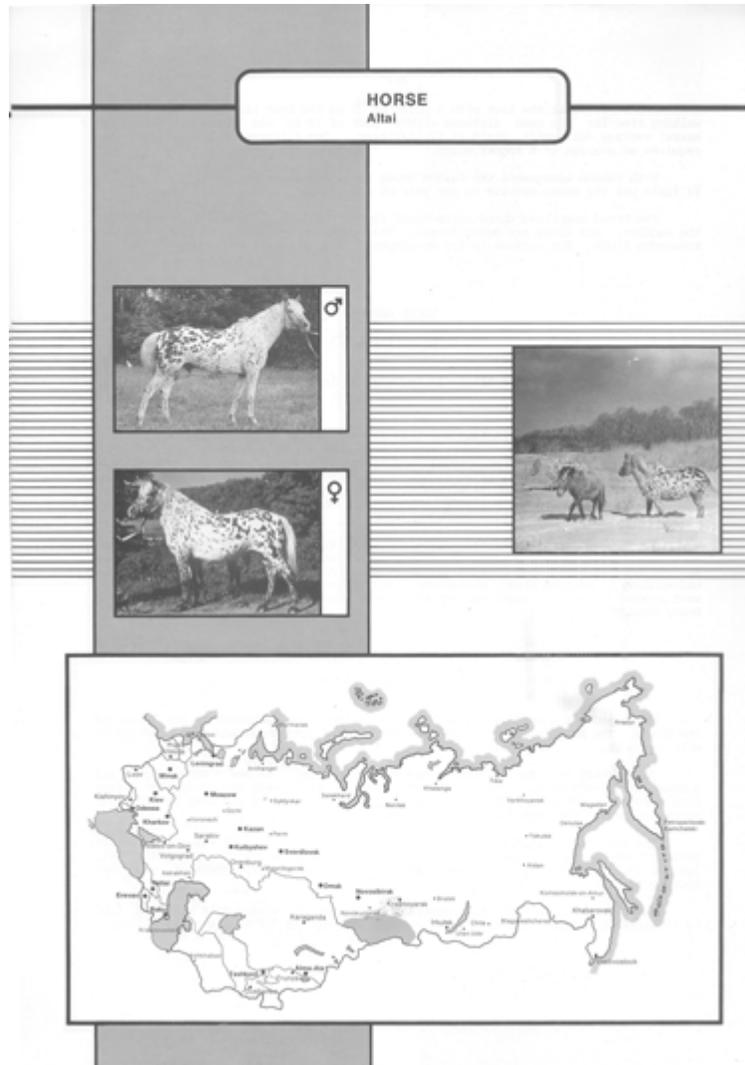
Its high adaptability to local conditions, reflected in increased weight gain in spring and autumn, renders the Kushum suitable for meat and milk production. Its large size and live weight guarantee a high yield of horse meat.

The characteristic features of the Kushum are a solid build of a saddle-harness horse type; the head is large but not coarse; the neck is average in length and fleshy; the withers are pronounced; the back is long and flat; the croup is well muscled but not long enough; the chest is broad and deep; the legs are properly set. The stallions' measurements (in cm) are: height at withers 159, oblique body length 161, chest girth 187, cannon bone girth 20.5. The live weight is 520-550 kg. The mares measure 154, 157, 182 and 19.2 respectively. The colours are bay and chestnut.

The Kushum is versatile and has high endurance. In all-day tests, the best results were 214 and 280 km. The record horse did 100 kg in 4 hr and 11 min. In 2-km harness tests at the trot with a pull of 28 kg the best time was 5 min 54 sec; walking time for the same distance with a pull of 70 kg was 16 min 44 sec. The mares' average daily milk yield is 13-14 litres. One kilogram of live weight gain requires an average of 8 fodder units.

With taboo management the Kushum shows fertility and sound health. Eighty to 84 foals per 100 mares survive to one year of age.

The breed comprises three intra-breed types, the basic, the heavily muscled and the saddler. Six lines are being formed. The breed is bred mainly at Pyatimarsk and Krasnodon studs. The outlook is for development through pure breeding.



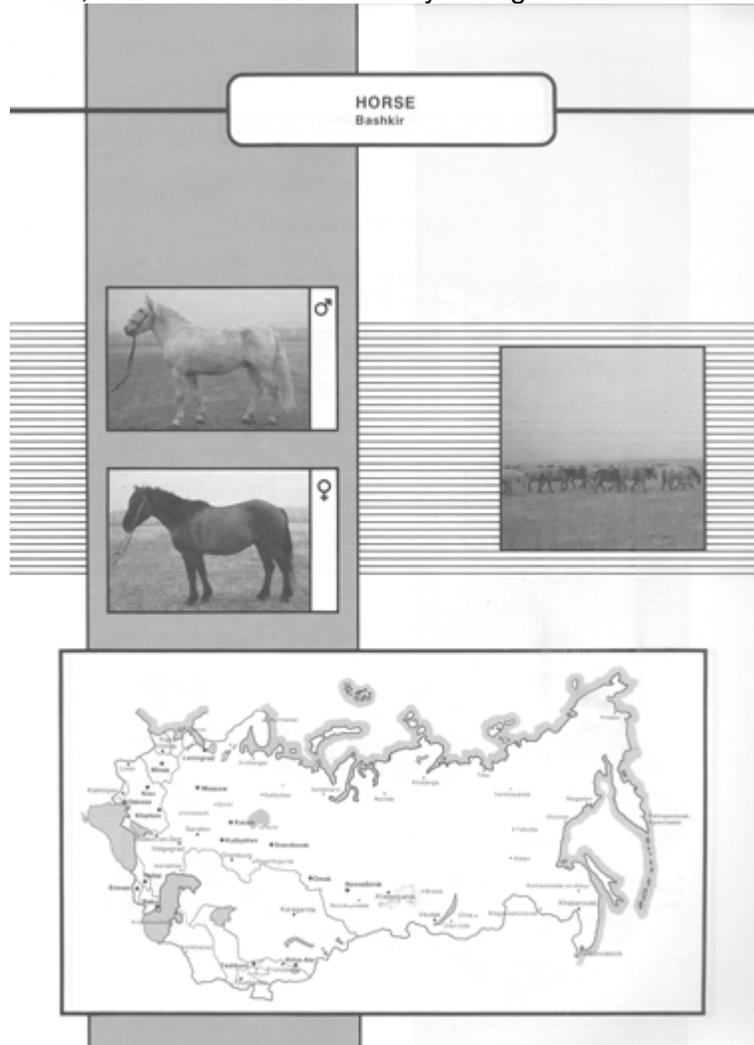
LOCAL BREEDS
ALTAI (Altaiskaya)

The formation of the Altai lasted for a long time and was significantly influenced by the harsh continental climate and the conditions specific to the mountain taiga.

In the typical native Altai the head is average in length, large and somewhat coarse; the neck is fleshy; the back is long and slightly dipped; the croup is well developed, the legs are short and properly set. Occasional defects in conformation include sloping pasterns and bowed hocks. The average measurements (in cm) are: stallions - height at withers 140, chest girth 170, cannon bone girth 19; mares: 137, 170 and 18 respectively. The colours are chestnut, bay, black and grey, sometimes chubary spotted.

The Altai displays extremely high adaptability to year-round pasture grazing. Altai crosses with pure breeds have a good performance. They are larger, more massive and stronger than the Altai while retaining their sound health and are undemanding as regards their management. Activities are

underway to develop a new meat-producing breed by crossing the Altai with the Lithuanian, Russian and Soviet Heavy Draught.



BASHKIR (Bashkirskaya)

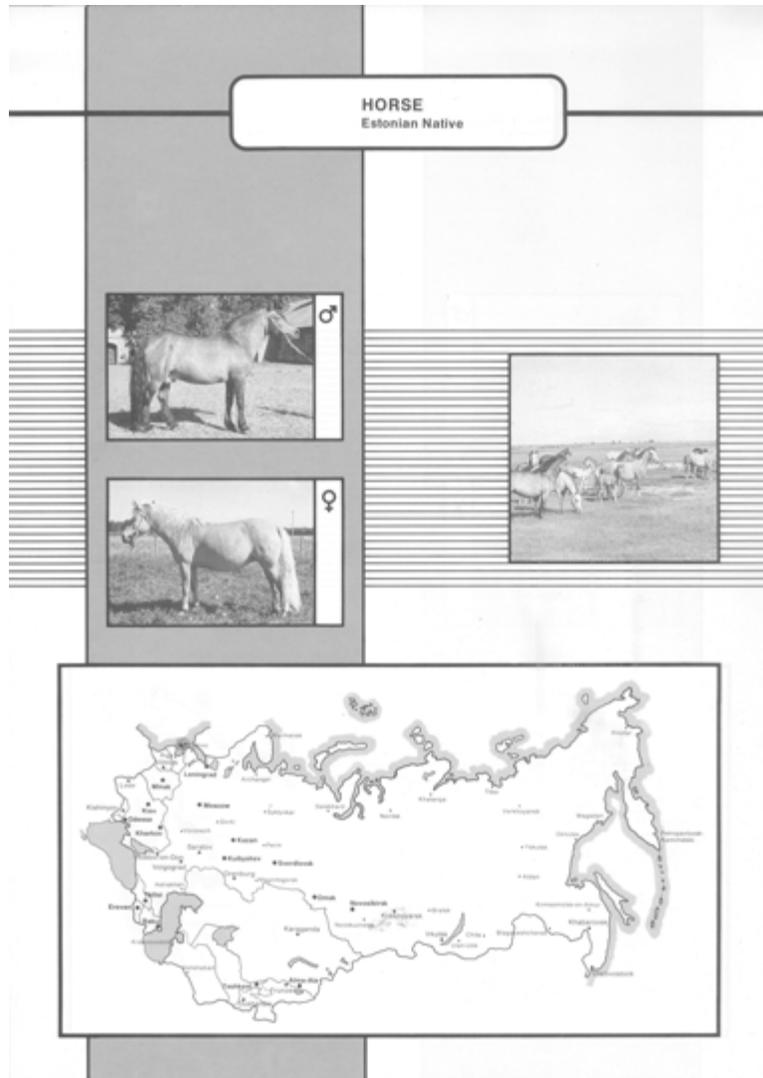
The breed was formed in the mountain and steppe zone adjacent to the Volga and the Urals. The Bashkir was used as a draught and utility horse and as a producer of milk and meat.

The Bashkir is small, wide-bodied and bony horse. It has a massive head and a short and fleshy neck. The withers are low, the back erect and board, the croup nicely rounded, the ribs long and well sprung, the chest broad and deep and the legs short and bony. The mane and tail are thick.

The average measurements (in cm) are: stallions – height at withers 143, oblique body length 144, chest girth 180, cannon bone girth 20; mares: 142, 145, 178 and 18.5 respectively. The most widespread colours are bay, chestnut, roan and mouse grey.

The Bashkir has a high work endurance. The mares' average milk yield is 1500 kg of marketable milk. The best mares produce 2700 kg in 7-8 months of lactation.

The Bashkir is being improved by pure breeding and by crossing with the Russian Heavy Draught. Experimentally, the Bashkir was crossed with Kazakh and Yakut horses. The Bashkir stock is mainly concentrated at Ufa stud, the leading centre for the breed.



ESTONIAN NATIVE (Mestnaya estonskaya)

The Estonian Native is one of the few breeds which have retained the characteristic features of the native northern horse and were not significantly influenced by crossing with other breeds. It played an important role in the formation of the Obva (now extinct) and Vyatka breeds. The Estonian first penetrated Russia via Novgorod as early as the 14th and 15th centuries due to its good working qualities and high adaptability. As agriculture developed and demand for working horses grew, simultaneously with pure breeding the native horses were crossed with larger breeds. Reliable information on the improvement stages of the Estonian dates back to the origins of the Tori stud in 1856. The stud was engaged in pure breeding of native horses and crossing them with light harness and saddle breeds. The best crossbred mares were subsequently used to develop the Tori. The first pure breeding stage yielded good results; the purebred stallion Vansikasa, distinguished by extraordinary strength and pulling endurance, was produced. He won many prizes in tests at Paris, Riga and

Moscow exhibitions in the native horses group. His daughters were foundation mares of the Tori.

Nonetheless, as agriculture became more intensive and the road network and transportation needs developed, the Estonian Native lost the competition to the new breed and is no longer used in mainland Estonia, surviving only on the islands of Saaremaa, Hiiumaa and Muhu. The total purebred herd is 1000 head.

The modern Estonian is not large in size; the head is well proportioned, has a wide forehead and is sometimes somewhat coarse; the neck is on the short side or medium in length and fleshy; the withers are low and wide; the loin is well muscled; the croup is average in length and has a normal slope. The chest is very wide and deep; the legs are short, properly set and distinguished by firmness and cleanness. The hoofs are extremely solid.

The animal is undemanding; it has extraordinary endurance and quite good action. The fodder utilization is good. It has a willing disposition.

The average measurements (in cm) are: stallions - height at withers 142, oblique body length 147, chest girth 178, cannon bone girth 19.5; mares: 141, 149, 182 and 19 respectively. The predominant colours are chestnut, bay, light bay, dun and grey.

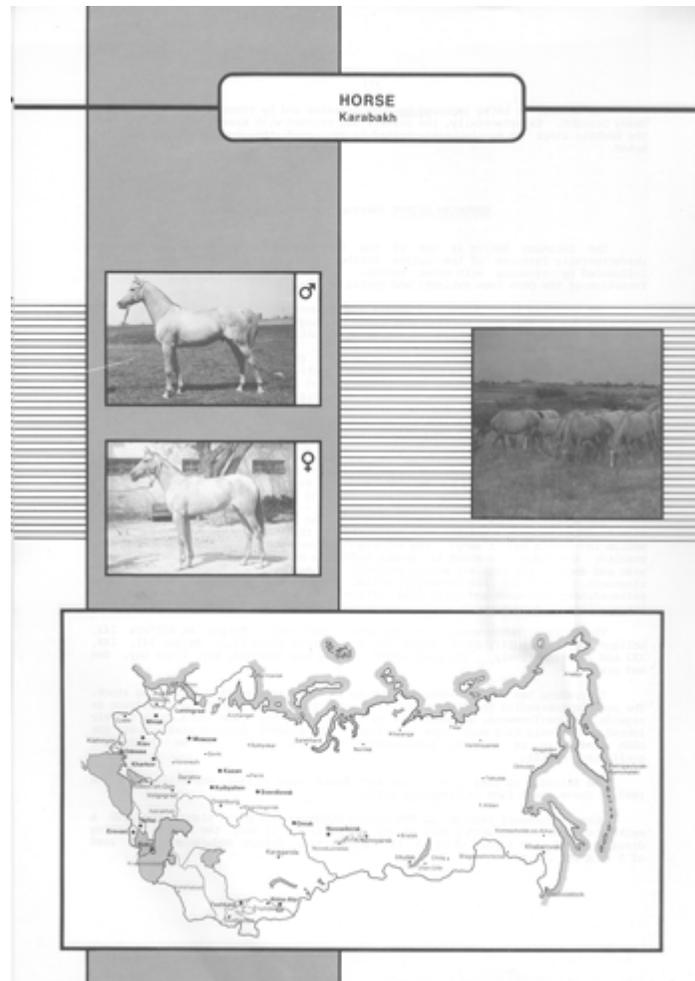
Inbreeding has become widespread due to the limited size of the breeding stock. The average inbreeding coefficient is 3.12%. Practically no inbreeding depression as regards work performance, measurements or conformation has been found, but closely inbred individuals take more time to mature. The breed's champion stallion at the USSR Exhibition of Economic Achievements in 1984, Askar, had an inbreeding coefficient of 18%.

The Estonian is long lived; the mare Tenki, born in 1946, was still alive in 1983 at Syrve state farm in Kingisepp region.

Work performance records of the Native Estonian are quite high. The 2000 m walking draught record with a pull of 150 kg is 17 min 26 sec; the 2000 m trotting draught record with a pull of 50 kg is 6 min 25 sec; draught endurance with a load of 9 tons was 208 m.

At present the local Estonian is used for light agricultural work, as a saddle horse for children and in tourism. It represents good breeding material for the production of ponies in various crosses. It is also being used to cross with disappearing Ob (Priobskaya) breed.

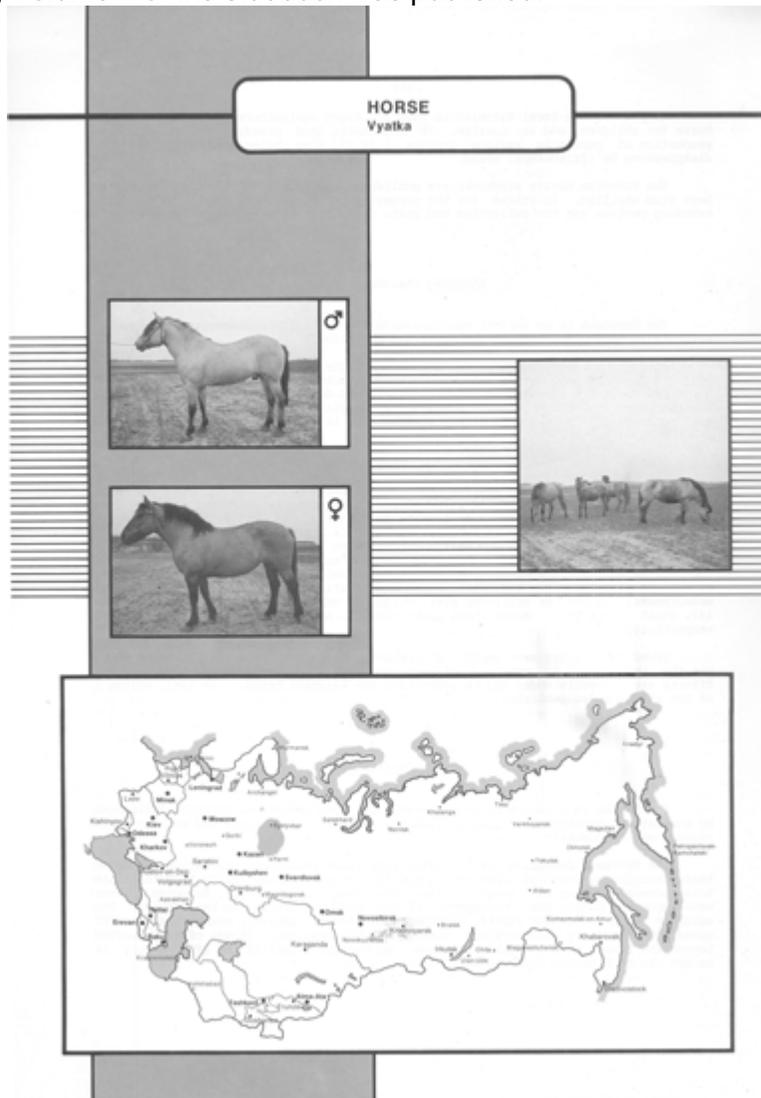
The Estonian Native studbooks are published regularly. The semen of Ampel, the best stud stallion, is stored for the preservation of the genotype. The leading breeding centres are the collective and state farms Kyarla, Kylyala and Oriesaare.



KARABAKH (Karabakhskaya)

The Karabakh is an ancient mountain saddle breed. It was developed in Nagorny Karabakh in Azerbaijan between the Araks and Kura rivers. Prior to the 19th century the Karabakh khanate was the breeding centre of the best horses in Transcaucasia; the Karabakh had a substantial influence in improving horse breeds in the neighbouring countries. It was developed by crossing the native Azerbaijan horses with Persians, Arabs and Turkmenians. The Arabian influence was most pronounced; there are important similarities in appearance between the Karabakh and the Arabian. Long-term breeding based on taboo management in the mountains has led to the evolution of specific features in the breed. The horse is not large; its build is clean and thick-set; the muscles are well developed and the tendons are well defined. The head is small and clean cut; the profile is straight and the eyes alert. The neck is set high and average in length; the withers are average in height; the back is average in length; the loin is flat, short and wide; the croup is average in length, wide and well muscled; the chest is deep. The limbs are properly set, sometimes bowed; the hoofs are not large yet solid. The skin is thin; the hair is soft and gleaming; the hair of the forelock, mane and tail is thin. The colour is chestnut, or bay with a

characteristic golden tint. The average measurements (in cm) of stallions are: height at withers 150, oblique body length 147, chest girth 169, cannon bone girth 18.6; mares: 146, 145, 164 and 18.5 respectively. Breed numbers are very small. At present, the Karabakh is bred at Agdam stud, yet the total herd is composed of Arab Karabakh crossbreds of various grades. Efforts are currently under way to regenerate the Karabakh breed. In 1981, Volume 1 of the studbook was published.



VYATKA (Vyatskaya)

The Vyatka is a native northern breed. Its development was strongly influenced by the natural conditions in the territories of what are now Kirov and western Perm regions and in Udmurtia.

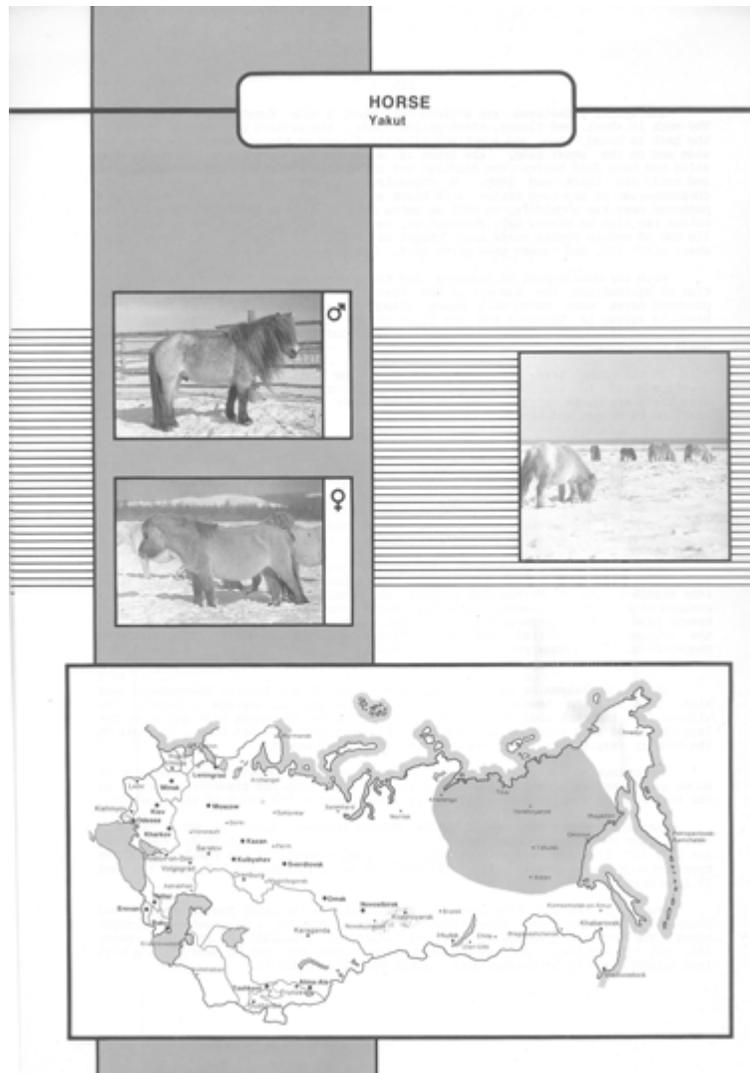
The Vyatka's formation was at different times influenced by native Estonian horses brought by Novgorod colonists in the 14th century and by edicts from the state horse breeders during the reign of Peter the Great.

Subsequently, Estonian horses were imported during the development of the mining industry in the Urals. The valuable features of the Vyatka

included good draught ability, such as sufficient speed, extraordinary endurance and good fodder utilization. It was often exported beyond the limits of the Vyatka province. By the first half of the 19th century it became the best troika horse in Russia.

The Vyatka's features are a clean-cut head, a wide forehead and broad jaws. The neck is short and fleshy, often well-arched; the withers are average in size; the back is broad, long and sometimes slightly dipped at the withers; the croup is wide and on the short side; the trunk is wide and deep; the legs are short and solid and have good hoofs; the hindlegs are often sickle-hocked. The forelock, mane and tail are thick and long. A characteristic feature of the breed is its chestnut-roan or bay-roan colour with black stripe along the spine and wing-shaped patterns over the shoulders, as well as zebra stripes on the forelegs. However, the colour can also be brown, bay, chestnut or, rarely, black. The average measurements (in cm) of modern Vyatka mares are: height at withers 140, oblique body length 150, chest girth 172, and cannon bone girth 18.9. The live weight is 400 kg.

With the development of industry and transportation and with the intensification of agriculture, the numbers of the Vyatka were sharply reduced; most of the purebred mares were mated with heavy draughters and trotters. The 1980 horse breeding survey in Udmurtia and the Kirov region showed that the total number of horses classified as Vyatka was about 2000. No stud breeds the Vyatka. The breed needs protection. In the long term, the breed could become quite competitive due to the development of tourism. As draught horses, the crosses of the Vyatka and heavy draughters are quite strong, have very good fodder utilization and practically no reaction to midges and blood-sucking insects.



YAKUT (Yakutskaya)

The Yakut was developed in Yakutia by unconscious and natural selection in the harsh conditions of northern and central Siberia. Compared to horses of similar type and Mongolian origin, the Yakut is larger and more massive. Three Yakut types have been formed: the Northern original Yakut (the Middle Kolyma or Verkhoyansk horse); the smaller southern type which was not crossed with improved breeds; and the larger southern type tending towards the breeds used for the improvement of the local Yakut. The last type is widespread in the regions of central Yakutia, including Yakutsk, Namtsi, Orjonikidze, Megino-Kanglass and Amga regions, where trotters and heavy draughters were used for improvement. The Middle Kolyma is the most valuable horse. It has greater homogeneity and size. Typically the head is coarse, the neck straight and average in length, the withers low, the back wide and long, the croup drooping, the chest wide and deep, the legs short and with solid hoofs. The mane and tail

are thick and long. The hair on the body is very thick; in winter it is up to 8 cm in length.

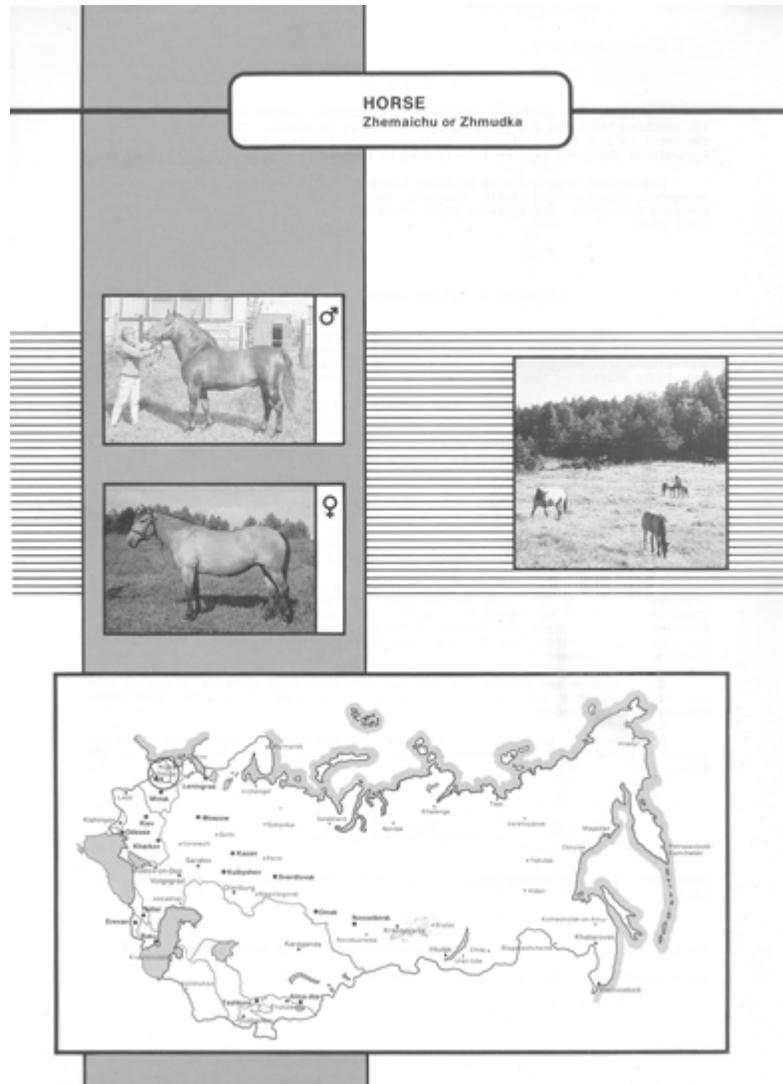
The colour of the Yakut is usually bay, grey-brown or grey; less often roan or mouse grey. Native horses have a dark stripe down the back and transverse stripes on the forelegs. A dark grid-like pattern is often found on the point of the shoulder.

The measurements (in cm) of Middle Kolyma stallions are: height at withers 139, oblique body length 148, chest girth 173, cannon bone girth 19.7; the mares are 137, 145, 171 and 18.1 respectively. The measurements of the smaller southern type are much less with 135, 141, 163 and 18.4 in stallions and 132, 138, 158 and 17.2 in mares.

The larger southern type includes descendants of the local Suntar, Megezh and Olekminsk varieties. They show traces of trotter and, to a less extent, draught blood. The body measurements are (in cm): stallions 141, 149, 182 and 18.4; mares 136, 150, 176 and 18.4. Considering these measurements the Yakuts have quite a high live weight - 450 kg on average with a range from 430 to 470 kg.

The Yakut is a good meat producer; the carcass weight of 6-month-olds is 105 kg, reaching 165 kg by 2.5 years of age and 228 kg in adults. The high milk yield of the Yakut is also worthy of note. At the experimental farm of the Yakut Institute of Agriculture the mares produce 1200-1700 kg of marketable milk in a 6-month lactation.

The outlook suggests pure breeding since with extensive husbandry and primitive management crossbreeding fails to yield the desired result. The leading Yakut breeding facilities are Leninski state farm and Karl Marx collective farm in the Yakut ASSR.



ZHEMAICHU or ZHMUDKA (Zhemaichu or Zhmudskaya)

This is a native Lithuanian breed of the forest type, known since the 16th Century. Despite repeated crossing with various breeds, it has retained its type and suitability for work on small farms. Undemanding as regards management conditions and highly adaptable, the Zhemaichu has long been exported to western Europe.

The old Zhemaichu type was small in size (up to 144 cm in height); it had a small straight or somewhat dished face head with a wide forehead. The neck was well muscled, the trunk undersized, the withers not too high, the back flat and solid, and the legs clean and firm. Their small height and consequently insufficient strength were the main deficiencies.

The modern Zhemaichu formed in the post-war years by pure breeding and the selection of large individuals with high work endurance, and through limited crossbreeding with North Swedish stallions, is taller (152-154 cm), has a somewhat extended trunk (157-160 cm) and a very massive body with a girth of 188-190 cm, as well as clean legs with a cannon bone girth of

10-20 cm. The new intra-breed type has retained the characteristic exterior features of the old zhmutka.

The Zhemaichu is a very good combination of utility and sporting horse features. It is quite strong and has good endurance and agility. The best time shown in 2 km trotting draught tests with a pull of 50 kg is 4 min 42.6 sec. The Zhemaichu has also shown good results in steeplechases of average difficulty. It is not accidental therefore that in their time Lithuanian horses were the foundation for breeding the Trakehnen.

Their massive and clean build combined with their high sporting potential make the breed valuable material for breeding medium-sized horses for large-scale equestrian sports and tourism.

Their massive and solid build and high adaptability also make Zhemaichu stallions suitable for use in the development of a new meat-producing breed in the Altai.

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6. GOATS

A.A. Orekhov

Goats are raised in practically all climatic zones of the USSR. They are easy to keep, well adapted to diverse environmental conditions and very prolific. Because of their pointed muzzle and thin and very mobile lips, they are able to pluck out sparse and short grass on hill slopes among stones, and to feed on aftermath. On poor pasture with thin grass stand, where cattle, horses and even sheep remain underfed, goats are able to find enough feed and maintain productivity. Due to their unique biological features, goats can be successfully raised in zones with poor grass vegetation such as highlands, mountains, deserts, semi-deserts and steppes.

The most famous product of goat husbandry is cashmere, whose lightness, softness, relative strength, low heat conductivity and uniformity make it one of the most valuable wool fibres. The cashmere, either pure or mixed with Merino wool, is used for production of high-quality light shawls, fine knitted goods and the best kinds of felt. Orenburg cashmere shawls, which together with Palekh boxes and Vologda lace are masterpieces of folk art, are well known far outside Russia. "Gossamer" cashmere shawls were shown, as unique works of art in Paris (1857), London (1862), Brussels (1958) and Montreal (1967) International Exhibitions, and each time were awarded top prizes.

During the Second World War the goat population decreased: it was only 11.4 million in 1946. After the war it began to increase rapidly and reached 17.1 million in 1952, of which 7.1 million were in state and collective farms. However, during 1952-66 the goat population on all kinds of farming enterprises went down from 17.1 to 5.5 million, i.e. by nearly three times. In collective and state farms their population decreased sharply - from 7.1 million to 891 000, i.e. more than 9-fold - especially in Kazakhstan, Turkmenia, Georgia, Armenia and Azerbaijan. Rise in prices for cashmere, goatskins and meat led to an increase in the goat population on collective and state farms from 891 000 in 1965 to 1 365 000 in 1983; and, including private plots, from 5 561 000 to 6 135 000.

There are four goat husbandry zones in the Soviet Union, distinguished by different products.

Zone 1 - cashmere production: southern part of the Urals, Volga area, Rostov and Voronezh regions, Gorno-Altai and Khakass Autonomous Regions. Here they raise Orenburg, Don and Altai Mountain wool goats. In 1980 there were 1 851 000 goats kept in all farming enterprises of this zone. They market annually 125 t of cashmere, which is more than 50% of the national total.

Zone 2 - mohair production: Tajikistan, Namangan region in Uzbekistan, Turkmenia, Semipalatinsk, Taldy-Kurgan, Chimkent and Jambul regions in Kazakhstan, and also small goat populations in Transcaucasia, in North Caucasus and in Tuva ASSR. The total goat population in 1980 was 1 670 000 including 1 162 000 on private plots.

Zone 3 - mohair and cashmere production. It includes some regions of Uzbekistan, Osh region in Kirgizia, Alma-Ata, Aktyubinsk and Ural regions in Kazakhstan. Farms in this zone raise goats of the Soviet Mohair or Don

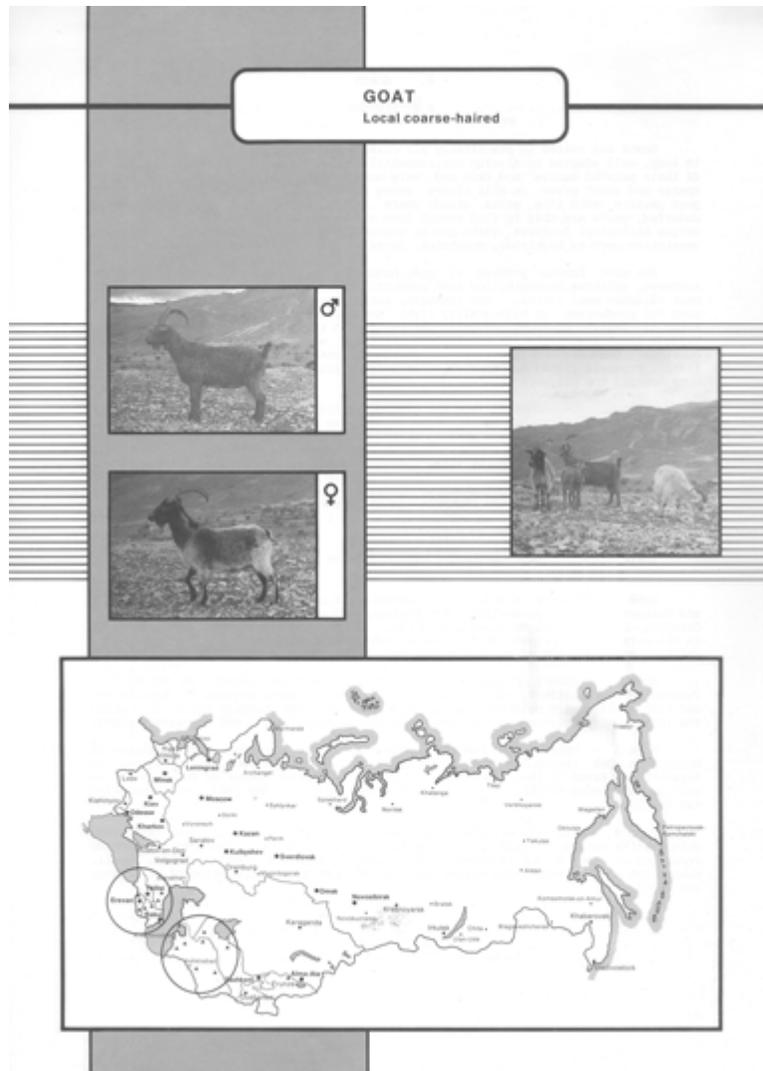
breeds, as well as indigenous Kazakh, Kirgiz and Uzbek wool breeds. The 1980 goat population was 980 000.

Zone 4 - milk production: North-Western, Central, Central-Black Earth and Volga-Vyatka economic areas of the RSFSR, as well as Georgia and some autonomous republics of the North Caucasus. The major breeds are Russian White, Gorki, Mingrelian and improved local varieties. In 1980 the total population of milk goats was 1 003 000.

In recent years several high-quality breeds and breed groups have been produced in the USSR, such as the Soviet Mohair and the Altai Mountain. Work is in progress to improve Uzbek Black, Kirgiz and Dagestan wool goats.

Based on the main product, goat breeds can be classified as follows: cashmere - Don, Orenburg, Altai Mountain, Uzbek Black and Kirgiz cross; mohair - Soviet Mohair; milk - Russian White, Gorki, Mingrelian and local breeds. Local coarse-haired goats, found in practically all parts of the country, should be regarded as a special group. Their main products are meat, milk and goatskin.

Our national goat breeds are well adapted to local environments, and, given adequate feeding, have a good productivity. Cashmere productivity depends on the undercoat/outercoat ratio, length of fibres, their density and fineness. As regards cashmere and mohair goats, the objective of selective breeding is to improve productivity, breed characteristics and wool quality.



LOCAL COARSE-HAIRED GOATS (Mestnye grubosherstnye kozy)

A general idea about local goat breeds had already been formed before the Revolution; however, the systematic, in-depth study of their populations started only during the Soviet era.

These studies showed that indigenous goats have a relatively compact body and a good hair coat. Most animals were noted for large horns with rough matt surface. Up to 99% of goats in Uzbekistan, Tajikistan and Turkmenia have horns. In Kirgizia and eastern Kazakhstan 90-94% are horned and in Gorno-Altai 82-90%.

Local goats in mountainous areas of the Caucasus and Transcaucasia, and in Central Asia are predominantly black. In all Soviet republics one can find grey goats; their guard hair is uniformly grey, not fading with age or season. Somewhat fewer is the number of tan and pied animals with black head and neck. All goats have a well-proportioned body; the sacrum is 1-2 cm higher than the withers, and oblique body length is 1-2 cm more than height at

sacrum, or equal to it. Measurement ratios also indicate a pronounced compactness of the body.

Animals of both sexes are characterized by late maturity; the growing period for females is 6.5 years and for males 4-5 years. Kids grow slowly; their weight gain during suckling is low. Sexual dimorphism is clearly manifested: males are 1.5 times heavier than females.

In live weight and measurements, Central Asian local goats are superior to those in other parts of the country. Live weight of adult females after summer fattening is 43-45 kg in Uzbekistan and Tajikistan, 40-45 kg in Turkmenia, 41-45 kg in Kazakhstan, up to 44 kg in Kirgizia. Live weight of some female goats reaches 60 kg. Live weight of male goats from improved herds in Uzbekistan was 60-65 kg and in commercial herds 56-58 kg.

The coat of local goats has a mixed composition. There is a clear distinction between long straight lustrous guard hairs and a short soft undercoat (cashmere wool). Guard hair grows evenly over the whole year and reaches an average length of 15-17 cm; diameter of fibres is 70-90 μm and more.

Wool undercoat grows during autumn and winter; its length is 4-5 cm and fineness 13-14 μm (in Central Asian goats). When the warm days are back again, the undercoat gets cotted and is shed.

Average wool yields from improved goat herds in Uzbekistan are: yearlings -120 g; 2-year-olds and older - 140-146 g. For Turkmenian goats the corresponding figures are 108 and 115-117 g. An average yield from goats in southern and eastern Kazakhstan is 140-150 g, in Kirgizia 120-140, Gorno-Altai 140-160 (females) and 170-230 (males), Kabardino-Balkaria 30-50, Dagestan 60-70 g.

The taste of the meat is good. Animals used for meat are castrated males (*serke*), culled females and kids.

The lactation period lasts 5-6 months, from April to October. Average milk yields are in the range of 90-160 kg. Goats with twins produce 10-15% more milk than those with singles.

Local goats are good material for producing new breeds, and therefore the protection of this genetic resource is an important task of goat breeders in our country.

Cashmere Breeds (Pukhovye porody)

These are very important for the national economy, because, together with the much valued wool fibre (cashmere), they also produce such industrial products as goatskin, as well as meat and milk.

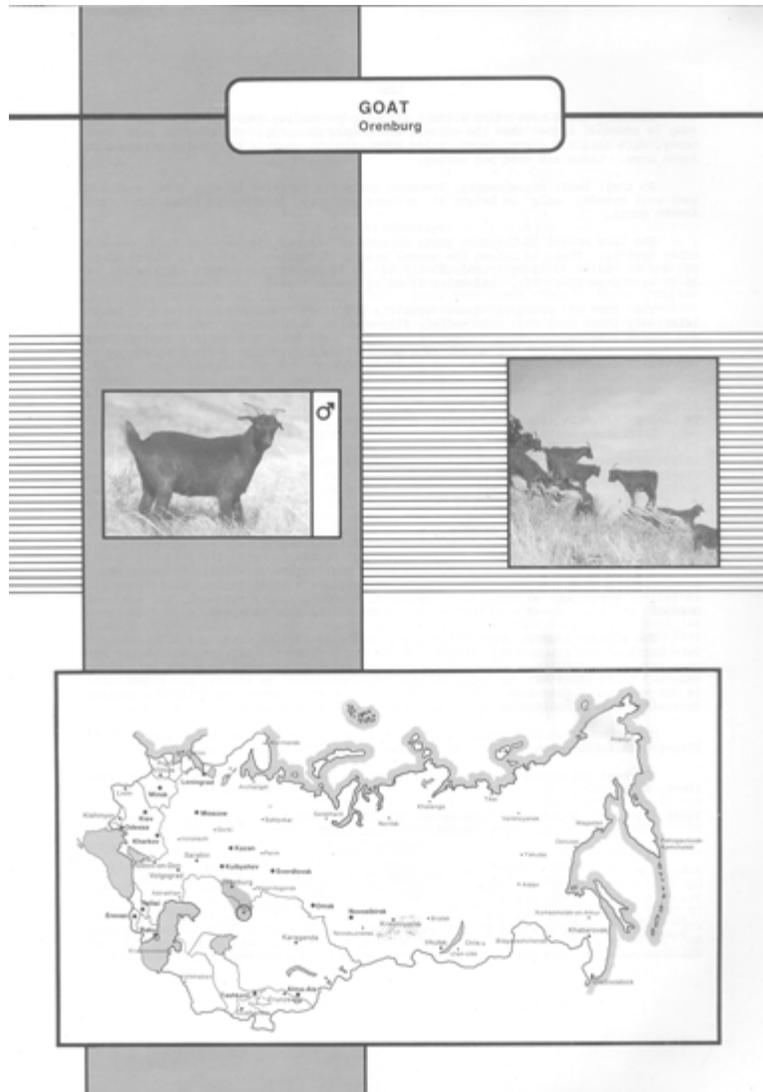
According to the breed survey, on 1st January 1980 the USSR had the following populations of purebred and grade (crossbred) goats:

cashmere (wool) goats total	443	182
including:		
Don goats Altai	87	205
Orenburg goats	157	978
Mountain goats	197	999

Wool goat breeds in the Soviet Union are second to none in their yield of cashmere.

As regards the composition of the fleece, wool breeds can be divided into two groups. The first group includes goats in which the wool is shorter than

the guard hair. In this case the wool can be defined as undercoat because, before shedding, the wool fibres form a lower layer normally hidden in long thick guard hair. Orenburg goats and their crosses are in this group. Goats in the second group have wool which is longer than the guard hair. This feature is characteristic of the Don breed and its crosses as well as the Altai Mountain breed and Uzbek Black goats. The fleece of these goats may be of various colours depending on the season. In winter, when the wool sticks out beyond the guard hair, goats are dark or light grey; but in summer, after combing out the wool, they are left with only dark bright guard hair, which is dark chestnut or black.



ORENBURG (Orenburgskaya)

This is a native breed secured after a long mass selection for cashmere production on private plots in Orenburg region. The present type of goat was formed by selection of animals with fine elastic fibres and is found in Orenburg, Chelyabinsk and Aktyubinsk regions.

Orenburg goats are predominantly large, active animals with well-developed skeleton and strong constitution. In contrast to other breeds, these goats have one-colour coats. Nearly 90% of them are black, and only 10% are tan, grey or pied.

Orenburg goats have sharp withers slightly protruding over the back-line. The rump is somewhat higher than the withers and slopes abruptly. The head is small, not heavy, with slightly dished face. Males have rather a coarse head, with straight or Roman nose. Limbs are thin and strong. In their basic measurements, Orenburg goats are superior to many other wool and semi-wool breeds; only in height at withers are they inferior to local Uzbek and Kazakh goats.

The live weight of Orenburg goats depends on season, adequacy of feed, age and other factors. Thus, in autumn the normal weight of females is 44-45 kg (range 42-65 kg) and of males 70-75 kg (range 55-110 kg); in spring the weight of females is 36-38 kg (range 28-45 kg), and males 55-65 kg (range 45-85).

The coat of Orenburg goats consists of long coarse bright guard hair, relatively short wool and intermediate fibres which some authors call coarse wool, and others fine hair. Fleece weight is moderate; excluding the wool it is 320-350 g for females and 580-610 for males. The most valuable product of Orenburg goats is the wool. The usual yield is 250-380 g with an overall range of 180-400 g.

The average diameter of wool fibres in Orenburg goats is 15 μm . The wool is finest at the age of one year, then it gets coarse, but in goats older than 5 years it becomes slightly finer. There is no definite relationship between fineness and sex. Laboratory analysis showed that average diameter in females is $14.7 \pm 0.33 \mu\text{m}$ and in breeding males $15.9 \pm 0.75 \mu\text{m}$. The fineness is uniform all over the body. The reason Orenburg cashmere is so highly valued is that it is finer, softer and more elastic than that of other breeds. Moreover, it can be fluffy, thus giving to articles made from it a special beauty and softness.

In Orenburg goats the length of wool fibres is $5.7 \pm 0.5 \text{ cm}$ (range 5.4-17 cm) and of guard hair $11.3 \pm 0.4 \text{ cm}$. It should be noted that the most intensive growth of wool takes place in autumn and winter, and that of guard hair in summer and autumn.

Strength of wool is also a very important quality characteristic. The breaking strength of a single fibre in Orenburg goats averages 5.95 g, and may vary from 4.1 to 10.1 g, depending on fineness. In relative and absolute strength, the wool of Orenburg goats is superior to that of Don goats of the same fineness.

The average kidding rate of Orenburg goats is 130-140 kids per 100 females. Twin births occur frequently; there are sometimes triplets, rarely quadruplets and very rarely quintuplets. Most often twins and triplets are born by goats not older than 6-7 years (50-65%) The twinning rate for 2-year-olds is 10-15%, for 3-year-olds 16-20% and for 4-year-olds 25-40%. From the age of 7 years, prolificacy usually decreases, but in some animals it remains high till 8-10 years.

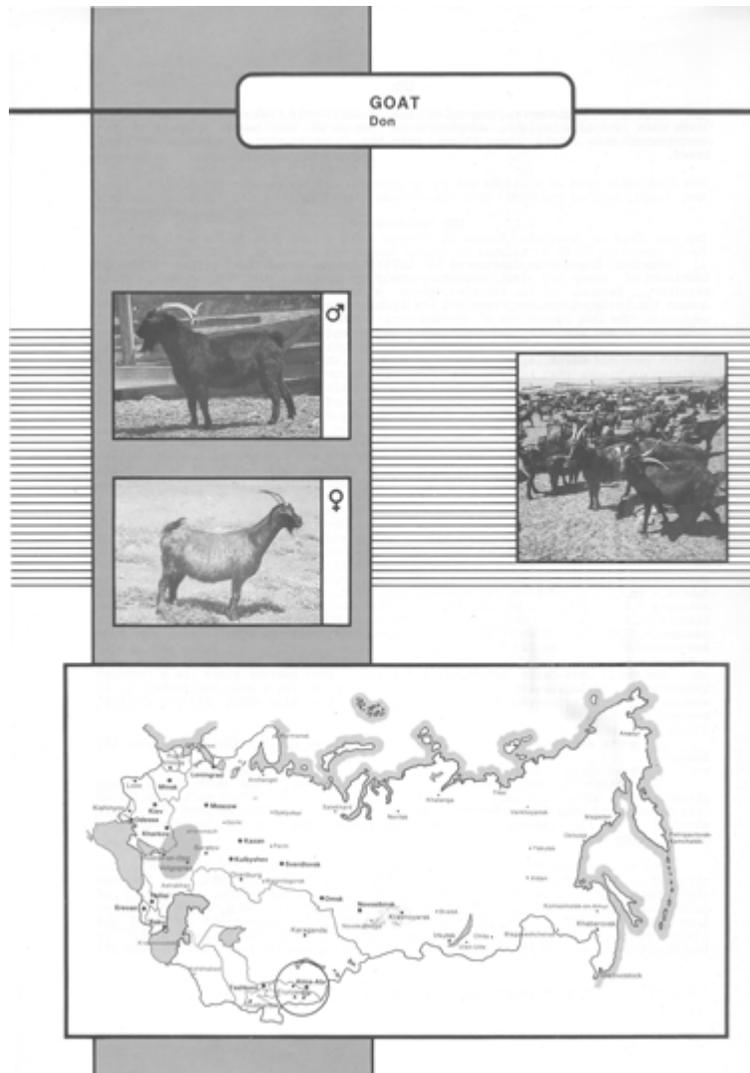
Milk production of Orenburg goats is relatively low. It is in the range 85-110 litres with fat content of 3.9% (range 3.2-6.1%).

The best enterprise raising these goats is Gubernlinski state breeding farm (Table 6.1).

Table 6.1 BASIC PRODUCTION CHARACTERISTICS OF ORENBURG GOATS
FROM GUBERNLINSKI STATE FARM (1982)

	Live weight (kg)	Cashmere yield (g)	Cashmere length (cm)	Fineness μ	Hair/wool ratio %	Fertility rate %
Stud males	86.5	527.0	6.0	16.7	43.7	-
Females	47.3	367.0	5.5	15.9	42.3	137.0

High quality cashmere, one-colour coat, relatively high cashmere production, large size and live weight, adaptation to the harsh continental climate of the southeastern zone - all these things make the Orenburg goat a valuable national breed.



DON (Pridonskaya)

The Don breed was discovered in 1933-34 by an expedition of the All-Union Institute of Sheep and Goat Husbandry studying goats in the former Lower Volga territory. Because of its location, these goats were named "Don"; their habitat covers the basin of the Don river and its tributaries (Volgograd, Voronezh and Rostov regions). The Don goats are of medium size; they have strong constitution, good conformation and adequate undercoat wool on the body, neck and belly. Males are larger than females and have a greater live weight. The average live weight of 3.5-4.5 year-old males is 70 kg (range 65-85 kg). The body shape is roundish and the skeleton is bigger than in females. Horns are large and variable in shape. Males also have a longer and wider beard and abundant hair on chest, neck and back. The back is long, straight and wider than in females. The average live weight of adult females is 36 kg (range 35-40 kg). Kids weigh 2 kg at birth, 14 kg at weaning, 27 kg at the age of 1.5 years and 30 kg at 2.5 years.

Don goats are predominantly black, but they are sometimes white. Adult females have the following measurements (cm): height at withers 60.3, height at sacrum 62.1, oblique body length 64.5, chest girth behind shoulder blades 81.7, chest depth 30.7, chest width between shoulder joints 15.9 and width at hips 19.5.

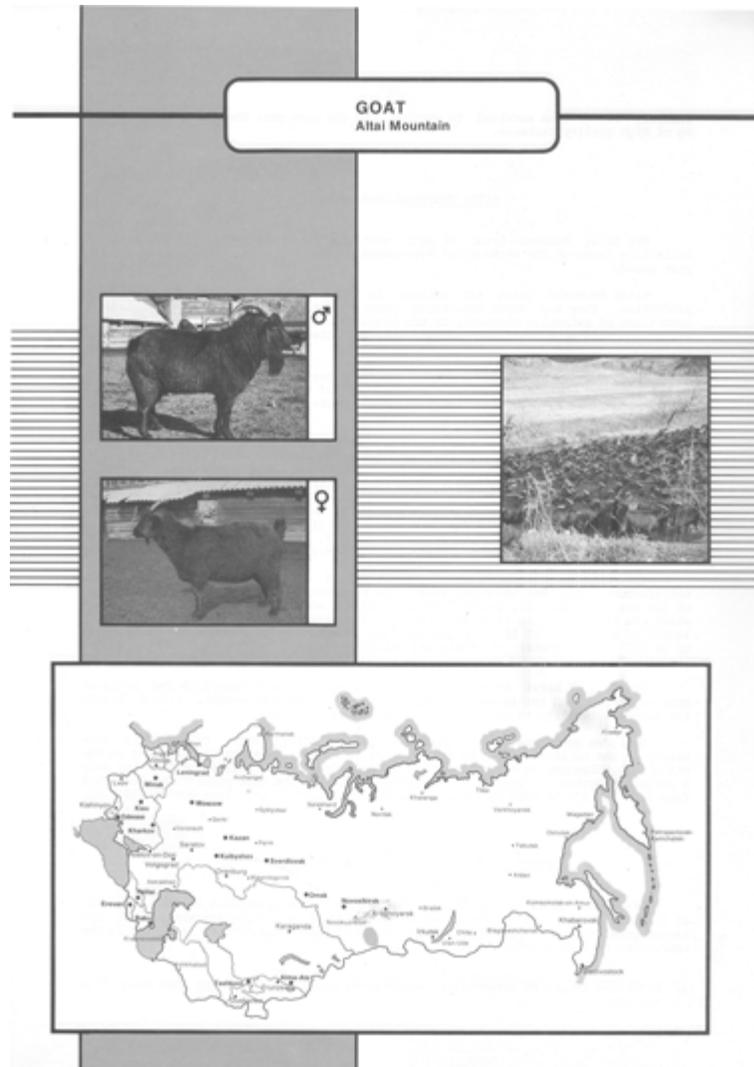
Don goats have the highest wool production among all goat breeds, though with significant individual deviations. The average wool yield from females is 500 g (range 330-1430 g); from bucks it is 1015 g (range 550-1600 g). The average wool content in the fleece is 79.4% (range 61.5-92.2%). As is known, in all other cashmere breeds and related varieties the guard hairs are much longer than the wool fibres. In this respect Don goats are an exception. The true length of wool fibres averages 9.8 cm, and that of hair 5.2 cm; that is, wool is 4.6 cm longer. Another feature of Don goats is that, compared with other breeds and varieties, the wool is coarser and not uniform in fineness. The average fineness of wool fibres, both fine and coarse together, is 22 m.

Don goats are quite satisfactory milkers. The average yield in a 5-month lactation period is 130-140 litres. The milk is noted for a high fat content - an average of 4.6% (range 3.3-8.2%). In the first two days after kidding the fat content is 7-12%.

Don goats are very prolific. An average kidding rate is 145-150 kids per 100 females.

The goatskin is mainly used for low-grade footwear. The pelt of Don goats slaughtered in autumn has good fur quality determined by the structure of the fleece (its density and wool fibres longer than guard hairs). They can be used as a basic material in the fur industry. In their fur quality Don goats are comparable with Romanov sheep which produce the best sheepskin.

The major enterprise for Don goat breeding is the collective farm Svetly Put situated in Oktyabr district of Volgograd region. On 1st January 1984, this farm had 6500 goats which were characterized by a high classification, uniformity of production type and wool quality. Wool yield from males is 1160 g, maximum 1600 g; from females 560-630 g, maximum 1500 g. In 1982 the average yield per head was 639 g. The bulk of the herd are goats with dark grey wool. Fertility is high: up to 140-150 kids per 100 females. In 1982, the average was 114 kids born for each 100 females; 103 of them survived to weaning. In the same year the farm produced 5000 kg of high quality cashmere.



ALTAI MOUNTAIN (Gornoaltayskaya)

The Altai Mountain breed of wool goat was formed between 1944 and 1982 on collective farms of the Gorno-Altai Autonomous Region; it is kept on pasture all the year round.

Altai Mountain goats are uniform in colour, size, conformation and wool production. They are noted for strong constitution and adaptability to the severe conditions of extensive husbandry in the highlands. They have a relatively high live weight and good meat qualities and are able to fatten rapidly during a short summer period.

Altai Mountain goats are superior to local ones in live weight (5-10 kg more) and wool yield (3-4 times more). Live weight of males is 65-70 kg and that of females is 41-44 kg. However, like local Altai goats, they mature rather slowly and grow till the age of 5-5.5 years.

Wool of Altai Mountain goats has high technical qualities and is a valuable commodity for light industry. The guard hair is black and true wool dark grey. Laboratory data show that the true length of wool fibres in pedigree

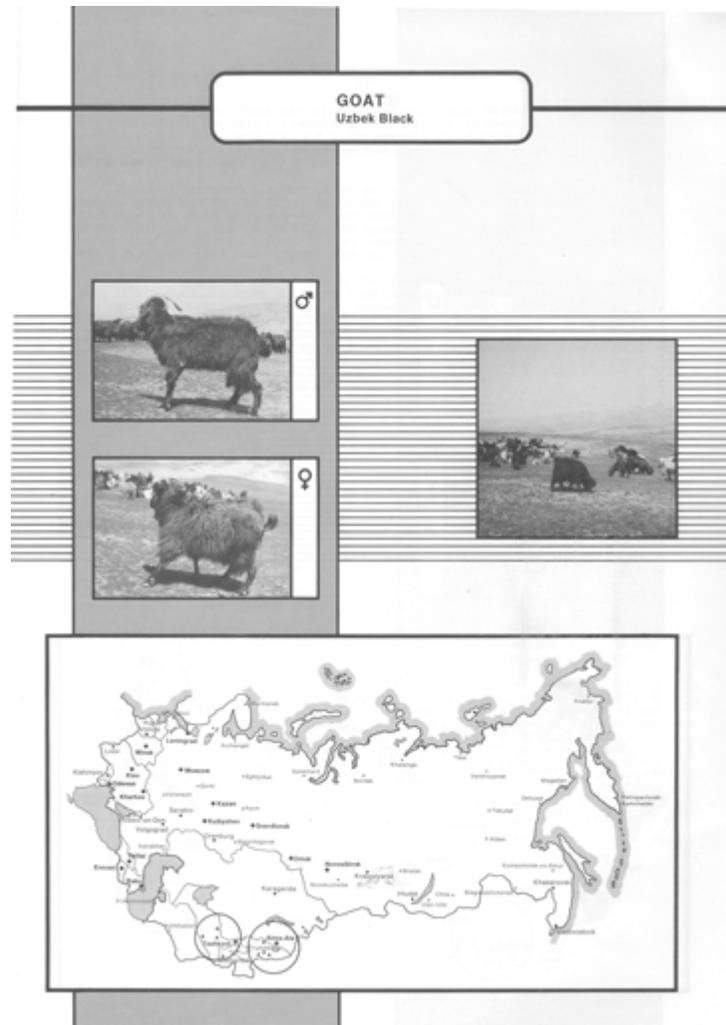
goats is 7.5-10 cm. The average diameter is 16-17 μm in adult goats and 15-16 μm in young animals. There is no apparent difference in wool fineness between flanks and thighs. Guard-hair diameter is 75-90 μm . Wool content in the fleece of pedigree animals is 65-70%. Uniformity between flanks and thighs is satisfactory; the difference in wool content between them is not greater than 10%. Wool yields are 600-900 g for males and 450-600 g for females. Fibre length is 8-9 cm for both.

The viability of goats in conditions of extensive husbandry is quite satisfactory. The year-round maintenance on pastures does not lead to deterioration of the quality (strength, length, fineness) of the wool, because it grows in seasons which are favourable in terms of feeding. For Altai Mountain goats, the breaking length ^v of wool (with 16-20 μm diameter) is 9-9.5 km. For comparison, Merino wool up to 23 μm in diameter is considered strong enough if its breaking length is not less than 7 km.

Breeding of Altai Mountain goats is directed to enlargement of the pedigree goat population and to increase of wool production and live weight, without losing the good adaptability to the special conditions of Siberia.

Pedigree goats are also raised for sale to other farms. This work is done mainly in the collective farm 50 Years of the USSR in Kosh-Agach district and in the state farm Edigansky in Shebalin district. In recent years this state farm has made a certain progress in raising young pedigree goats. The goat population increased from 7700 in 1970 to 9900 in 1983, and cashmere production rose from 2600 to 3840 kg.

^v Predicted length of fibre which would break under its own weight when hung from one end.



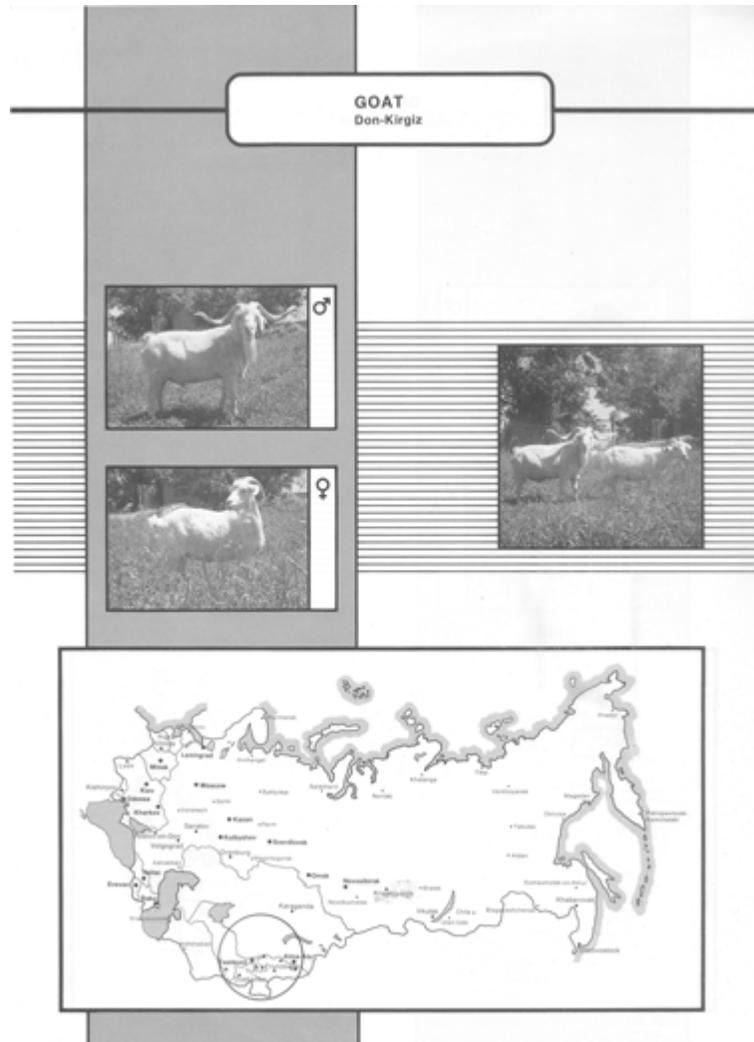
UZBEK BLACK (Chernye pukhovye kozy uzbekistana)

Black wool goats in Uzbekistan were produced as a by-product in the formation of the new breed - Soviet Mohair goats. Mating of predominantly white first and second generation crossbred females with purebred white Angora males resulted in the appearance of 1-2% of black kids, After 4-5 years, there were already several hundred black wool goats; they were gathered into one herd and females were mated only to black males. Such mating produced in the first year 64% and in the second 74% of black kids; others were white, tan, grey, etc. Later, due to positive assortative mating, it was possible to obtain 94% of black kids.

The black goats are similar to Don goats in such aspects as fleece structure, physical properties of wool fibres and productivity. In contrast to Orenburg goats, which have long guard hairs and very short wool fibres, Uzbek goats have wool fibres longer than guard hairs, except along the spine where the latter are very long. Hair is not shed in spring but wool is shed abundantly, starting from the first warm spring days when goats pass to grass feeding.

Wool is combed out selectively at the time of moulting and, as a rule, only once, in mid-March. Average yields per head in collective farms vary from 280 to 440 g. While the length and fineness of fibres depend on the level and quality of feeding, wool yields are actually determined by the time of combing out the moulting fibres. Shedding is very rapid and 5-10 days delay in combing results in 20-40% loss of wool. In females, the average wool length is 8-9 cm and in males 9-10 cm, irrespective of age. The extreme limits are 6 and 12 cm in females and even more in males. Fibre diameter is within the range 15-24 μm ; the average for females is 19 and for males 22 μm . In the young, wool is 1-2 μm finer than in adults.

The state farm Baisun in Namangan region of Uzbekistan has a goat herd of 10 000 head and is considered one of the best enterprises for raising black wool goats. Average wool yields are 450 g from females, 700 g from males and 600 from castrates. Wool goat husbandry in this state farm is very profitable and cost-effective.



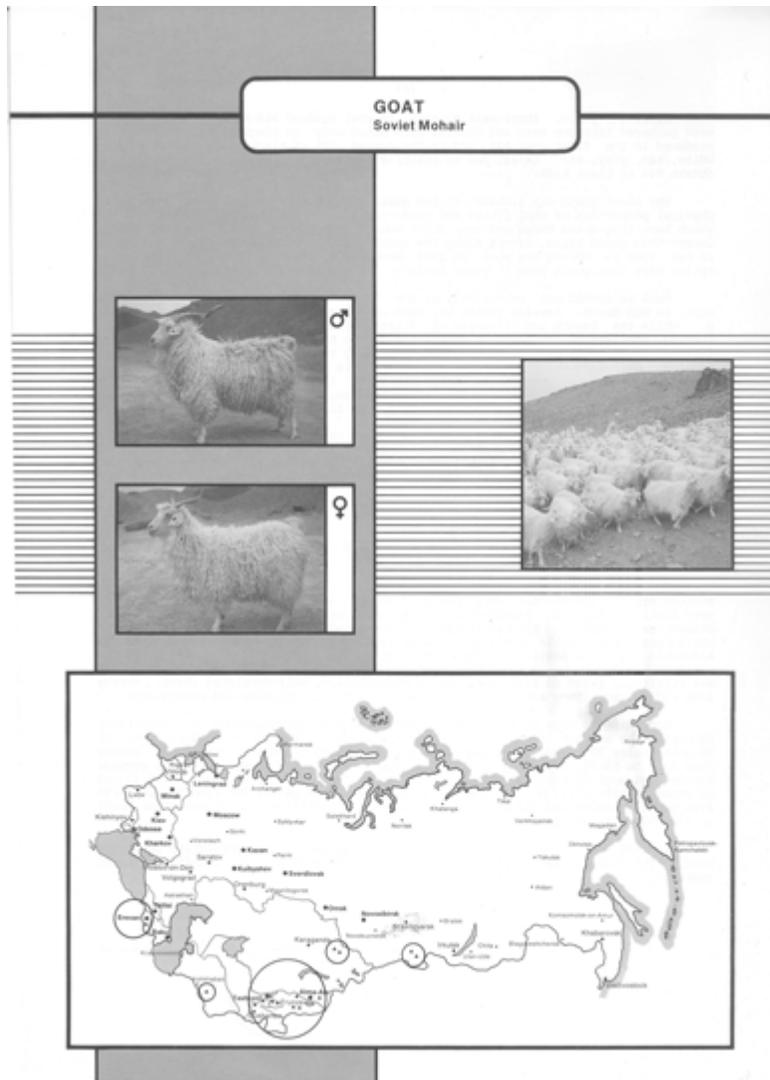
DON-KIRGIZ CROSS

Local coarse-haired goats have been raised in many parts of Kirgizia since ancient times. These goats were used as a source of milk and meat; they produced very little wool. To improve them, they were crossed with Don bucks specially brought to Kirgizia. The Don-Kirgiz crossbred had quite satisfactory production characteristics. While wool goats are raised mainly in Batken, Jangi-Jolsk, Ala-Bukin and Alai districts, most Don-Kirgiz crossbreds are concentrated in the state farm Kysyl-Tu in Jangi-Jolsk district of Osh region. The goats in this farm are relatively large in size, have strong constitution, well-developed chest, strong legs and hooves. They are very well adapted to the local climate and environment.

According to data from the Kirgiz Institute of Animal Husbandry and Veterinary Research, the average live weight of males in autumn is 58.6 kg, of females 40 kg, of 18-month males 39 kg and of young females 28 kg. Wool content of the fleece varies from 54.5 to 89.2%, depending on the class-type, feeding and management. The average fineness of wool in breeding males is 18.1 m, of females 16.6, of young males 17 and of young

females 15.7 m. Average yields are 550 g from males, 360 from females, 255 from yearling males and 325 from yearling females. Fertility rate in seedstock herds is 120-150 kids per 100 females.

In 1981, the state farm Kysyl-Tu in Osh region had a goat population of 55 000 head. The bulk of wool sold to the state is of high quality (63-65% of first combing).



SOVIET MOHAIR (Sovetskaya sherstnaya)

During 1936-37, 700 Angora goats were imported from the USA for crossing with local and Angora goats in Central Asia (Uzbekistan, Tajikistan, Kazakhstan and Turkmenia). By selective breeding of the crosses under conditions of extensive husbandry a new breed was produced which was recognized in 1962 under the name "Soviet Mohair".

Soviet Mohair goats are characterized by sufficiently strong, dry constitution and small size. They are energetic, active and easily tolerate long-distance drives.

Goats of this breed have a light narrow head covered with short hair.

Female goats have small thin horns; in males the horns are much better developed. Ears are usually large and drooping. The neck is thin. The body is moderately long, flat and covered with a long fleece, hanging down in curls or screw-like locks which touch the ground. The limbs are clean, strong, with regular position in most animals, and covered with short hair up

to the hock and knee joint. The skin is thick and pliable, loosely covering the body.

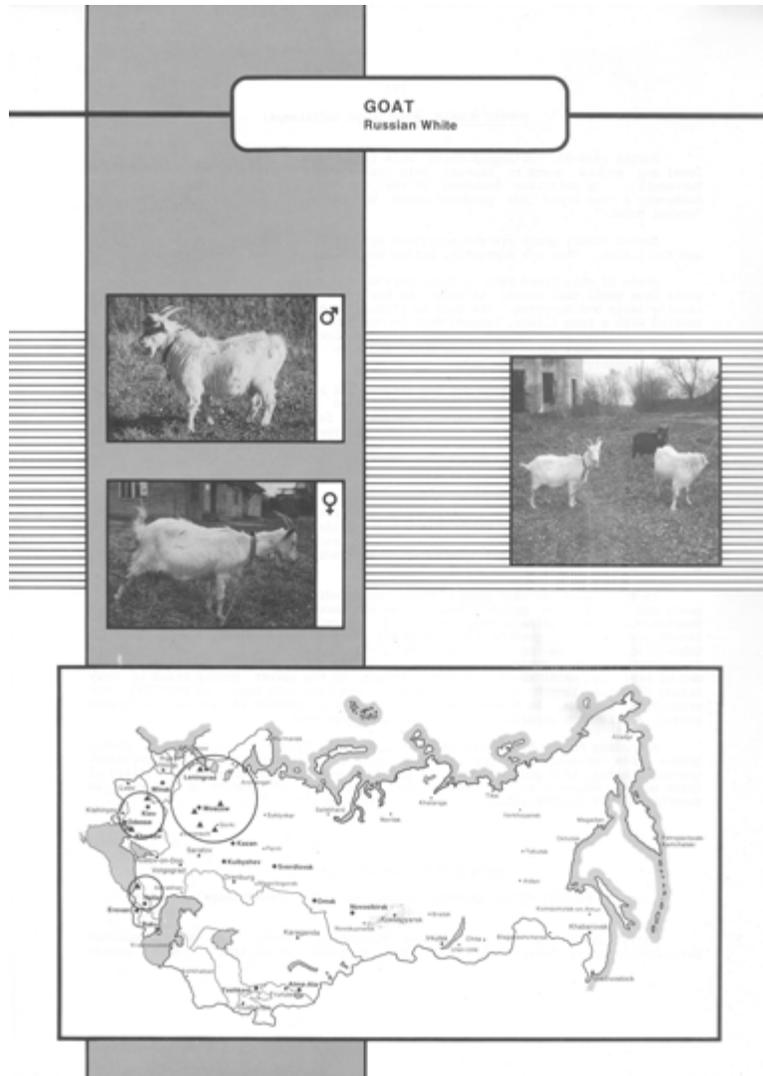
At birth, male kids weigh 3.1 and females 2.8 kg. Twins weigh 10-15% less than singles. Over 4-5 months of lactation, with good feeding and management, females produce nearly 120 kg of milk, which is sufficient for normal growth. Soviet Mohair goats, elite and first-class, have the following live weight: in Uzbekistan, females 37 kg (range 25-40 kg), breeding males 52 kg (range 40-60 kg); in Tajikistan 38 (37-43) and 59 (58-62) kg respectively; in Kazakhstan 39 (38-43) and 60 (58-65) kg respectively.

Soviet Mohair goats produce homogeneous semi-coarse mohair of Angora type, consisting of long twisted lustrous staples, very strong, elastic and resilient. On the best breeding farms in Uzbekistan mohair yields are as follows: adult elite females 2 kg, first-class 1.8 kg; elite female yearlings 1 kg, first-class 0.8 kg; male yearlings 1.1 and 1 kg respectively. From adult elite breeding males average mohair yield is 2.9 kg, first-class 2.5 kg.

In Tajikistan, average mohair yields on breeding farms are 1.9 kg from female goats and 2.3 kg from breeding males. In Kazakhstan they are 1.8-2.1 from adult females; the best animals give 2.8-3.1 kg. Pure fibre yield is 75-85%. Staple length for one year's growth, in adult goats is 18-20 cm in Kazakhstan, 19-22 cm in Uzbekistan, 18-20 cm in Tajikistan and 16-18 cm in Kirgizia. Fibre fineness decreases with age. Mohair of yearlings is 56-58s quality, of adult females 44-46s and of breeding males 40-44s quality.

Mohair of the Soviet Mohair breed is very strong (breaking length 12-14 km). It gets stronger with age: in yearlings the strength is 13.8 km, in 5-year-olds 15 km. In this respect it is equal to Angora mohair, and is much superior to sheep and local goat wool.

According to the breed census, on 1st January 1980 there were 509 153 Soviet Mohair goats on collective and state farms. Their mohair in all its technical characteristics, is a good raw material for the manufacturing industry. Fertility of these goats, however, is not high: the average per 100 females is 118 kids in Kazakhstan, 109 in Uzbekistan, 116 in Tajikistan and 115 in Kirgizia.



Dairy Breeds (Molochnye porody)
RUSSIAN WHITE (Russkaya belaya) and GORKI
 (Gorkovskaya)

Dairy goats, of the Saanen and Toggenburg breeds, have been imported periodically from Switzerland and other European countries; these breeds undoubtedly contributed much to the formation of various groups and varieties of goats specialized in milk production. In addition, people in both the European and Asian parts of the USSR have been raising milk goats for centuries. Separate groups of goats have formed under the influence of various feeding and management methods, and on the basis of different origins. Dairy goats in central and northwestern Russia, have strong, dry constitution and a harmonious conformation characteristic of the milk type. They have a light and narrow head. The neck is long and straight and the sacrum wide. The udder is big and smooth; quarters are proportionally developed and teats are wide-set. The legs are strong. The position of the front and hind limbs is regular. The skeleton is strong. The coat is

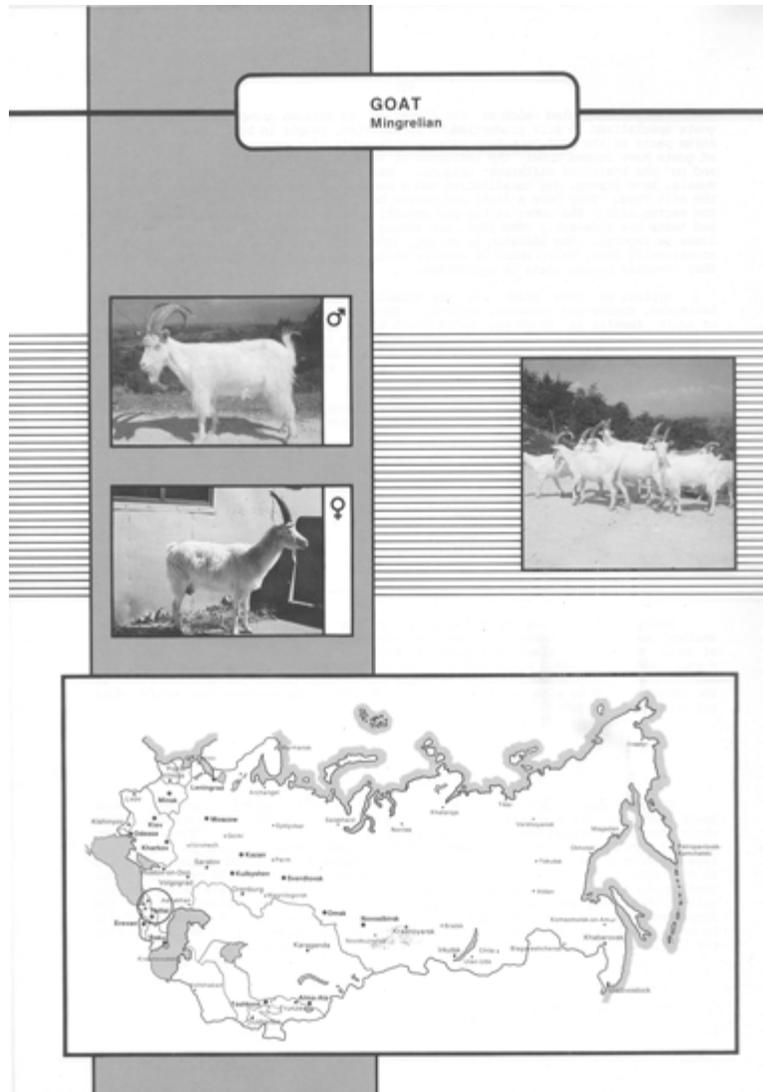
composed of coarse short, or occasionally long, hair, which is usually white. Animals may be hornless or horned. They resemble Saanen goats in appearance.

Typical of this group are the animals found on private plots in Gorki, Leningrad, Moscow and Yaroslavl regions. They are typical milk goats. Live weight of adult females is 50-60 kg, males 60-75 kg. They average 550 kg of milk per lactation and the best animals up to 1 000 kg. Fat content is high - 4.2-5.3%. Milk goats are prolific: 100 females give birth to 190-220 kids. Some goats kid twice a year. Cases have been recorded of up to six normal kids at one kidding.

Table 6.2 MEASUREMENTS OF MILK GOATS FROM THE CENTRAL PART OF THE RUSSIAN FEDERATION (cm)

Area of raising	Height		Oblique body length	Chest girth behind shoulder blades	Width	
	at withers	at sacrum			between shoulder joints	at hips
Gorki region	61	63	67	75	-	15
Tatar ASSERT	61	64	63	75	14	14
Yaroslavl region	64	65	66	75	-	-

Dairy goats in the North Caucasus, Crimea and Central Asia are somewhat smaller, have hair of various colours but are inferior in productivity to the goats of Gorki, Moscow, Yaroslavl and Leningrad regions. There are goats there which have a wool undercoat and, consequently, double utility: they are milked and, in addition, yield about 100-150 g of wool per head. Milk yields per lactation are in the range 250-400 kg with a fat content of 3.5-5.5%. The average live weight does not exceed 40-42 kg.



MINGRELIAN (Megrelskaya)

Somewhat apart stand the dairy goats raised in private plots in Georgia. These goats belong to the Mingrelian breed, because they are natives of Mingrelia, from where they have spread over practically all districts of Georgia. There are two distinct types among Mingrelian goats: highland and lowland. Goats of the former type are mostly large animals. Live weight of females is 45 kg and height at withers 65 cm; live weight of males is 60-70 kg and height at withers 70 cm. In summer these goats are pastured in the high mountains; in winter they are driven to the valleys where they are also kept on pastures and only in bad weather they are fed supplements of coarse concentrates. In 5-6 months of lactation they produce 200-250 kg of milk. Fertility is not so high as in the Russian White goat, normally 160 kids per 100 females. They are usually horned but are occasionally polled. Animals of the second type are raised mainly in valleys and lowlands in urban and rural settlements. They are kept in small fields and regularly receive additional feed in the form of vegetable residues and concentrates.

Goats of this type are small. Females weigh 35-38 and males 45-50 kg. In a 7-month lactation they produce an average of 300 kg of milk. However, many of them can produce up to 500 kg. A characteristic feature of Mingrelian goats is the shortness of the coat. The length of guard hair does not exceed 3-4 cm and undercoat is practically non-existent. Their colour is brown, varying from light to dark. According to the breed census, on 1st January 1980 the population of Mingrelian goats on collective and state farms was 14 170.

Relatively low milk yields are characteristic of the majority of the dairy goat population in our country. These goats are concentrated mostly in private plots and, consequently, are not involved in efficient selection programmes.

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BREEDS OF THE USSR

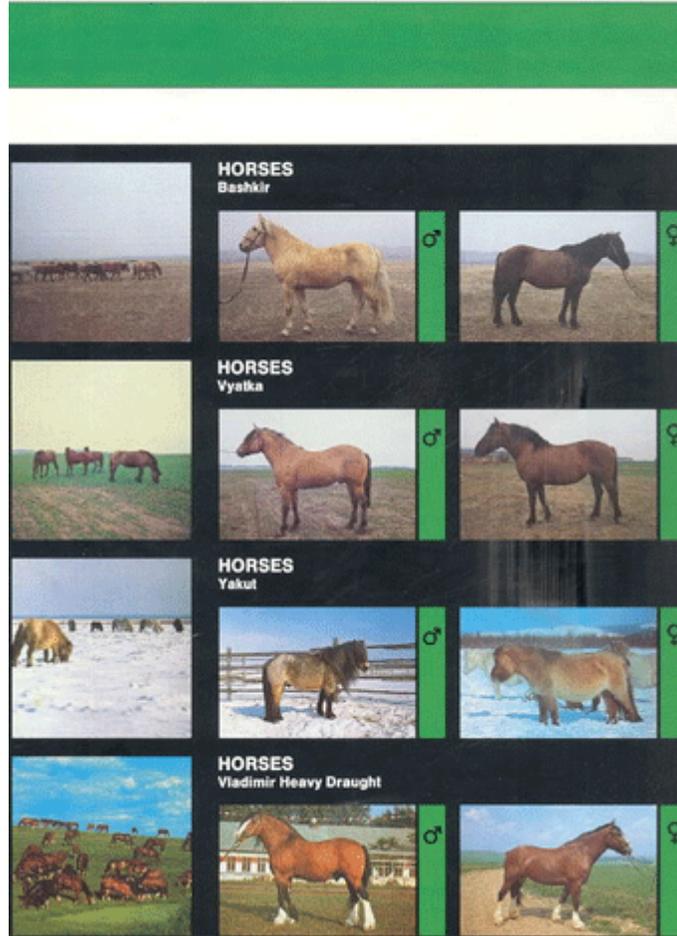
BREEDS OF THE USSR 

	CATTLE Bushuev	 ♂	 ♀
	CATTLE Bestuzhev	 ♂	 ♀
	CATTLE Gorbatov Red	 ♂	 ♀
	CATTLE Kostroma	 ♂	 ♀



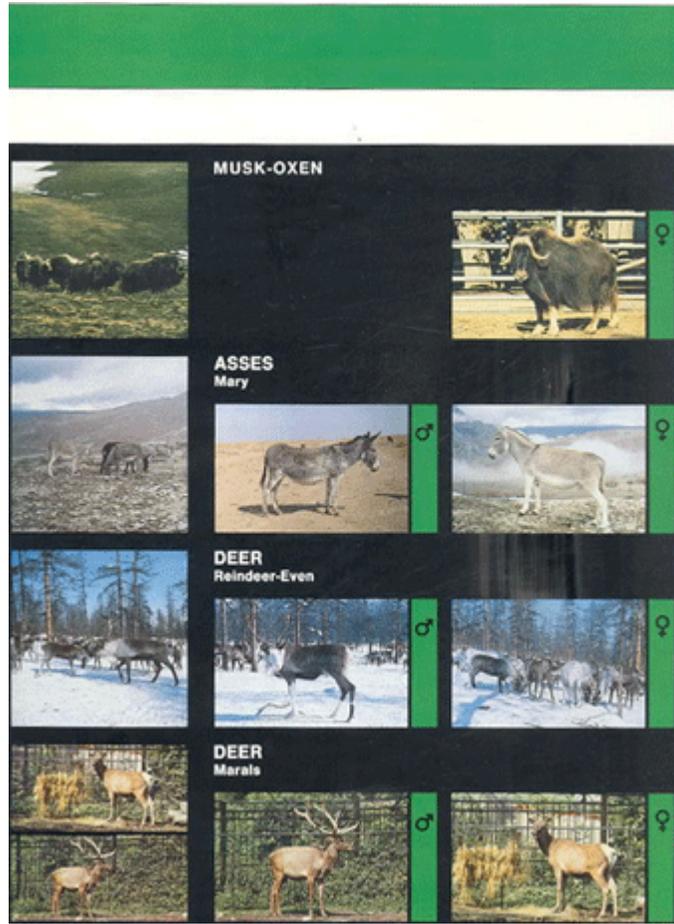


	SHEEP Edilbaev	 ♂	 ♀
	HORSES Akhal-Teke	 ♂	 ♀
	HORSES Budyonny	 ♂	 ♀
	HORSES Orlov Trotter	 ♂	 ♀





	HORSES Russian Heavy Draught	 ♂	 ♀
	BUFFALOES Caucasian	 ♂	 ♀
	TWO-HUMPED CAMELS Kalmyk	 ♂	 ♀
	YAKS	 ♂	 ♀





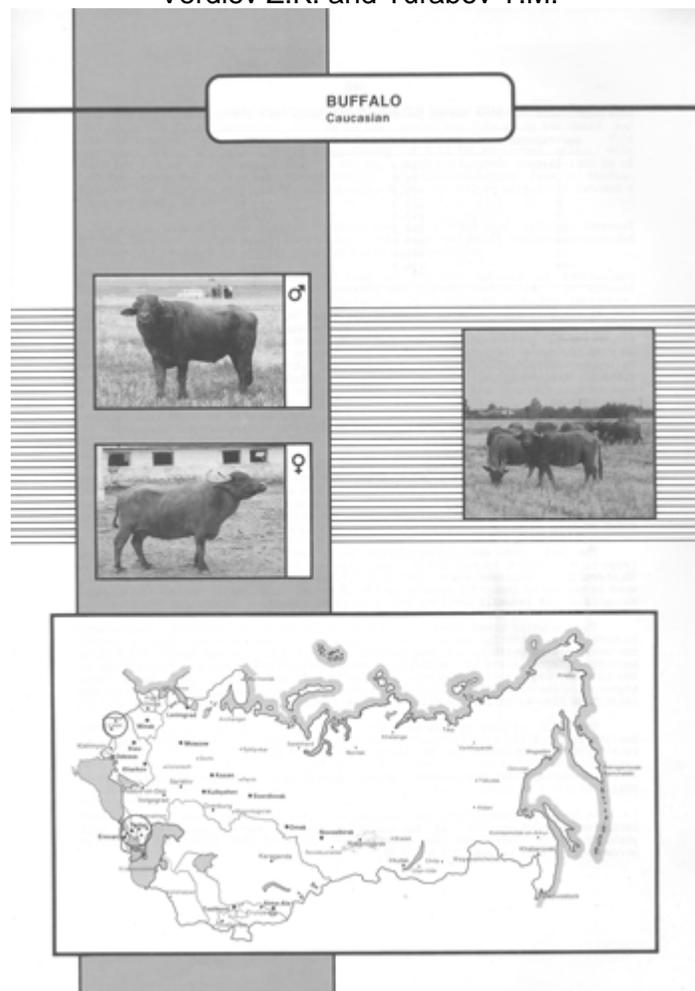
	DOMESTIC FOWL Kuchino Jubilee	 ♂	 ♀
	DOMESTIC FOWL Yurlov	 ♂	 ♀
	DOMESTIC FOWL Uzbek Game	 ♂	 ♀
	DOMESTIC FOWL Zagorsk Salmon	 ♂	 ♀



	GOATS Soviet Mohair		♂		♀
	GEESE Javakhetian or Bogdanovski		♂		♀
	TURKEYS Georgian Local		♂		♀
	GUINEA-FOWL Grey Spotted or Silver Spotted		♂		♀

7. BUFFALOES

Verdiev Z.K. and Turabov T.M.



In the USSR Asian buffaloes (*Bubalus bubalis*) are kept in Transcaucasia and in the lowland areas of Dagestan, Checheno-Ingushetia and Ossetia (Table 7.1); in the past they were raised in the Crimea and in some districts of Stavropol. Azerbaijan accounts for more than 70% of the entire stock of buffaloes in the country. The bulk of these animals are concentrated in the northwest and southeast of the Republic, in the lowland and piedmont zones. They are especially widespread in the Sheki-Zakataly area (23.8%). (see Table 7.2)

**Table 7.1 BUFFALO POPULATION IN THE USSR
(1 January 1985)**

Azerbaijan	308	200
Georgia	49	500
Russian Federation (North Caucasus)	23	400
Armenia		600
Ukraine (Carpathians)		500

In Georgia buffaloes amount to 10% and in Armenia to 5-6% of the cattle populations. Buffaloes are water-loving animals; therefore they are kept in areas with a profusion of water (rivers, ponds and other water bodies).

Table 7.2 BUFFALO STOCK IN AZERBAIJAN

Year	Total number	% of cattle population
1980	365 612	22.22
1981	335 103	20.00
1979	337 867	23.00
1982	322 337	18.73
1983	309 865	18.00

Buffaloes in the Soviet Union are of Indian origin but they have existed in Transcaucasia from the earliest times as testified by archaeological findings of skulls and other bones dated to the 1st millennium B.C. Caucasian buffaloes are similar to some Indian breeds e.g. Nili-Ravi. The buffalo population of the Caucasus and Transcaucasia is a product of popular selection. Under the impact of specific economic conditions different buffalo types were formed. In areas where there was an active trade in agricultural products and other goods, a buffalo type having a coarse constitution and long strong legs developed. Some authors considered this a large-sized type. It was a perfect draft animal and was used as such in all parts of Transcaucasia. A small buffalo type developed in the Shirvan and Mugan regions; it had good milk and meat features and because of the latter it became widespread.

Buffaloes in the southeast of Azerbaijan were, in the past, influenced to some extent by the Iranian buffalo.

The local buffalo had, according to I.I. Kalugin's data, the following faults in conformation: roof-like back, sloping rump, crooked legs, underdeveloped udder (goat-like and round forms), short trunk, high crest and poorly developed forequarters. This primitive type prevailed in the population. The milk yield of buffalo cows was 700-800 kg, the butterfat content being 7.5% and the fat yield totalling 53-60 kg per lactation. According to A.A. Kalantar (1885), the best cows in Azerbaijan yielded 640 kg of milk. The live weight of mature buffalo cows was 410 kg, the slaughter yield reaching 42-45%.

Because of the all-year pasture management of buffaloes, their sexual activity and calving was seasonal: calving occurred in summer. The calving interval was often 450, sometimes 500 days, the service period being 150 days or more and lactation length 150-180 days. Buffalo cows were notable for their strong maternal instinct, typical of primitive animals. Milking of

cows, especially of first-calf heifers, was a most difficult business. Very often cows calving for the first time did not allow milkers to approach them for a long time.

All this required a radical transformation with the aim of improving productivity and overcoming serious conformation faults. Much effort was needed to eliminate features which are characteristic of wild forms (not permitting milking, for example).

To carry out effective breeding work, in 1935, Kirovobad state buffalo breeding station was set up in Azerbaijan because this republic has the greatest number of buffaloes. Within reach of the station special buffalo breeding farms were set up. Directions for buffalo breeding have been worked out and implemented, including judging guides, standards for animal appraisal and recording in herdbooks, instructions for artificial insemination and for rational feeding and stall barn housing, measures to prevent barrenness and to promote productive buffalo breeding. The long selection work created the Caucasian breed, which is noted for its high milk and meat production. This breed was approved (recognized) in 1970.

The main prerequisites of this breed were adaptability to local conditions, resistance to diseases and strong constitution. Buffaloes tolerate foot-and-mouth disease better than cattle; they are not affected by anthrax - no cases of this disease have been recorded - nor by gadflies; brucellosis can be detected but only clinically; no miscarriages have been observed.

In developing the breed, pure breeding of local buffaloes, including inbreeding, was used. The work was done through selecting and matching the best specimens and providing for optimal feeding and management.

Evaluation and selection of the young stock was done according to origin, live weight at birth and at later ages. Both positive and negative assortative mating were used.

The buffalo breeding farms in Azerbaijan at present use the tied stall system in winter and camp and pasture management in summer. Calves are reared en masse by group suckling. Machine milking is practised.

The conformation of the Caucasian buffalo breed is as follows: large head with coarse features and narrow forehead; large well-developed thick horns, occasionally polled; long broad ears; long neck; back short or of medium length, broad, slightly roof-like or straight; the small of the back is long, broad and straight; the rump is raised and the belly voluminous. Buffalo cows of the Caucasian breed have a rounded and bowl-like udder with well-developed glandular tissue; teats are long and correctly set. The hair coat is not dense. The prevailing colour is dark brown to black; some individuals have a white spot on the forehead. The tail tip is white. Legs are long and thick. Among the faults of conformation are: front legs too close together, sloping and roof-like rump.

Table 7.3 LIVE WEIGHT FOR AGE OF BUFFALO CALVES (KG)

Age (months)	Males	Females
Birth	26.2	25.3
1	41.8	40.0
3	73.9	71.2
6	121.3	113.9
9	167.5	154.4
12	212.1	191.6
18	287.1	255.6
24	345.7	300.4
36	436.0	376.0

Animals of the Caucasian breed differ from the original form in their taller stature, well-developed brisket, middle and hindquarters. The build is well proportioned. More than half the cows have a bowl-shaped udder, as compared with only 11-12% among the original stock, udder girth at the base being 97-100 and 70-73 cm respectively. Udder weight is 4.2 kg. Cows of the Caucasian breed have 70% of glandular tissue in their udder, whereas the original strain has only 60%. The measurements of cows are as follows (cm): height at withers 132-136.1, width of chest 40.7-43.7, oblique body length 144.1-144.5, depth of chest 70.0-75.3, heart girth 194.5-196.6 and shank girth 20.3-20.8 cm. The animals have acquired greater massiveness and length of body, while cases of acute hindquarters have lessened.

In breeding Caucasian buffalo herds, three constitutional types can be distinguished: strong with high milk yield and butterfat content; compact type, similar to the milk-and-meat type of cattle, and the rangy type with gaining ability. The milk yield of cows of the strong type is 1 694 kg in 305 days with a fat content of 8.01%, as against 1 223 kg and 8.16% in the rangy type. In a number of pedigree farms the milk yield of high-yielding strong constitution cows is 2 000-2 500 kg with 8.0-8.1% fat. This is equivalent to 4 000-5 000 kg of 3.6% fat-corrected milk.

The local population uses buffalo milk for making such products as gatyg (yogurt, sour milk), kaimag (cream), shor, kyasmig (curds, cottage cheese) and airan (buttermilk). In recent years buffalo milk standardized to 3.2% butterfat is being used in the dairy industry, as well as for producing high-quality cheese and kaimag, which is packed in small portions and is in great demand.

The Caucasian breed surpasses the initial strain (local buffaloes) considerably in milk yield, butterfat content and live weight. In the third and later lactations the average milk yield in 305 days is 1352 kg, with 8.11% fat and fat yield of 109.4 kg; live weight is 473 kg. Milk yield of Caucasian breed cows in breeding farms is 536 kg (66%) higher; fat content is higher by 0.6% and total fat yield 48 kg (79%) higher. In the big buffalo-breeding farm, Dashyuz in Azerbaijan, milk production has risen from 1100 kg in 1981 to 1400 kg in 1985, while butterfat content is 8.1%.

The yield of cows in the selection groups is increasing continuously. The average yield of 141 selected cows in the herd of the state breeding farm Dashyuz in 1963 was 1435 kg while in 1983 the yield reached 1927 kg.

Fat content changed insignificantly, namely from 8.09% in 1963 to 8.17% in 1983.

In a large population, the average milk yield (of 25 cows) in the third lactation or above was 1787 kg, fat content being 8.1% and fat yield 145 kg. Milk yield of the best specimens fluctuated between 2080 and 3760 kg and the butterfat percentage in milk between 7.7 and 9.3%.

The milk yield of buffalo cows, after steaming up and udder massage, averaged 1547 kg in the first lactation, 1837 kg in the second and 2109 kg in the third and later lactations, fat content being 8.27%, 8.42% and 8.40% respectively. This represents 3620, 4278 and 4643 kg respectively of 3.6% fat-corrected milk. Milk yield per 100 kg of live weight was 450-460 kg, which corresponds to 1160-1200 kg of 3.6% fat-corrected milk. At Nizami buffalo breeding collective farm in Khanlar district the lifetime yield of the cow Shykhly-31 was 19 874 kg with 8.24% fat and a total fat yield of 1585 kg.

Lactation length of Caucasian buffalo cows is 270-300 days, calving interval 350-400 days and service period 60-100 days. The live weight of adult cows recorded in the state herdbook is 500 kg; that of bulls is 650-700 kg.

Buffalo meat plays an essential role in the meat balance of Azerbaijan.

Buffaloes are known for their good grazing and feeding abilities. On natural pastures their average daily gain is 600-700 g; it is 800-1000 g during fattening. Slaughter yield is 43-53%. At the age of 18 months animals weigh 300-320 kg and 350-360 kg after intensive fattening. Hides are valuable raw material for leather production. The average hide weight is 25-30 kg and the maximum 50 kg; the thickness is 4-9 mm. The flesh of adult buffaloes is less palatable than that of cows and oxen, being coarse-fibred. The meat of young buffaloes, slaughtered at the age of 1.5-2 years, is notable for its good taste, juiciness and high protein content.

Buffalo cows of the Caucasian breed are known for their good reproductive ability: calving rate averages 85%, whereas in the original strain it is only 60-70%. With artificial insemination the conception rate is 84% or more.

One essential for improving the Caucasian buffalo is- the selection of cows adapted to machine milking (as regards udder shape, rate of milk flow and equal development of the quarters).

Milk yield of buffalo cows in test farms in the first lactation is 1150-1250 kg, in the second 1250-1500 and in the third and later lactations 1500-2500 kg, with a fat content of 8.0-8.1% and protein 4.7-5.0%. The live weight of mature cows is 480-500 kg, the speed of milk flow 0.7-1.01 kg/min and the udder index 40%.

In recent years the Caucasian breed is being improved by sires of Indian x Bulgarian breeding imported from Bulgaria. The results obtained are promising and are improving the Caucasian breed in early maturity and milk yield. It is possible to mate the crossbred heifers at the age of two years instead of three or more.

The main method being used at present to improve the Caucasian buffalo breed in Azerbaijan is intensive individual selection of bulls on the basis of their progeny test for conformation, constitution, milk yield, protein and fat content. At the same time blood of the Indian Murrah breed, which has a higher milk yield, is being introduced to produce a new type which better meets the requirements of industrial technology.

The development of buffalo breeding in Azerbaijan is the basis for promoting this species in areas where ecological conditions are suitable and can be put to better use i.e. lowlands with abundant bodies of water in Georgia, Armenia, Dagestan, Ossetia, Checheno-Ingushetia and in some southern regions of Ukraine. These zones previously had many buffaloes and are now resuming buffalo rearing as a complement to dairy cattle raising.

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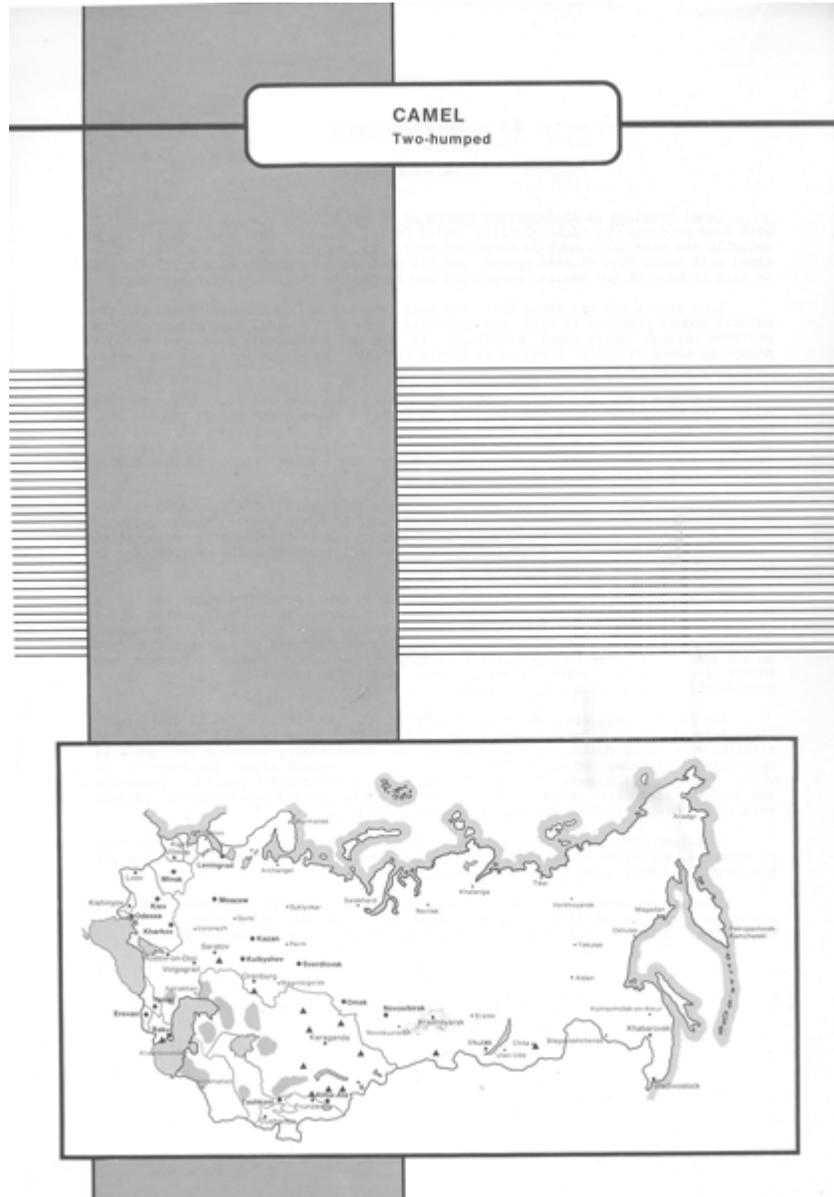
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8. CAMELS

8.1 TWO-HUMPED CAMELS

A. Baimukanov



Camel breeding is an important branch of animal husbandry which provides people with food products of high calorific value (milk, shubat, meat) and industry with valuable raw materials, such as hides and hair. In addition to high calorific value camel milk has a high vitamin content and its proteins have a high digestibility; it is said to have unique healing properties and is used to treat digestive disorders.

Long experience has shown that the most rational and comprehensive use of the natural fodder produced in arid and semi-arid areas with minimal

expenditure can be achieved through dairy camel breeding. It can be intensively developed without damage to sheep or horse breeding as camels can live on plants which are not eaten either by sheep or by horses. On 1 June 1984 the total stock of camels in the USSR was 241 000; of this number the Kazakh SSR accounted for 123 000 or 51%, Turkmen SSR for 87 000 or 36%, Uzek SSR for 21 000 or 8.7%, RSFSR for 9 000 or 3.7%, Azerbaijan, Kirgizia and Tajikistan for 1000 or 0.6%. The main camel breeding areas in the USSR are thus Kazakhstan and Turkmenia. 135 000 head of the camel stock belong to the public sector. Breeding females account for 37% of the population.

Domestication of the camel took place about 5000 years B.C. According to the zoological classification they belong to a suborder of Artiodactyla, named Tylopoda (Greek = callous feet). There are two forms of these Camelidae: , dromedaries (Camelus dromedarius) or one-humped camels and Bactrians (Camelus bactrianus) or two-humped ones.

The Bactrians are distributed, in the main over areas characterized by a monotonous desert relief, low precipitation, great insolation and very scarce cover of drought-resistant vegetation. The camels endure well the sharply continental desert climate with hard frosts in winter and high temperatures in summer. They feed on the specialized desert vegetation - halophytes, wormwood, shrubs, subshrubs and thorny plants - can drink brackish water and, when necessary, can go for a considerable time without water or food. The plant camels are particularly fond of is camel thorn (Alhagi camelorum). It is a legume which flowers twice a year and its food value is higher than that of alfalfa, especially during the flowering period. Particularly valuable for camels is ephemeral vegetation, on which they quickly put on weight after the scarcity of winter pasture. In summer, towards the beginning of the drought period, ephemerals and grasses are burnt up and their place is taken by drought-resistant plants: shrubs, subshrubs, various species of legumes and halophytes.

In autumn and winter, when the supply of grass diminishes sharply, camels feed on thistles, subshrubs and shrubs, wormwood and camel thorn. They skilfully pick out the tender and nourishing parts of the plants.

There is no other agricultural animal which combines, like the camel, high milk production, working ability, meat and hair production and adaptation to desert conditions. This is due to their peculiar body structure and biological features.

The camel's body is deep and comparatively short; legs, especially hind ones, are long. With such a build, camels have a sweeping pace and are good pack carriers. At the end of their long legs they have no hoofs, but cloven paws. The padded soles of the feet widen on treading the ground. This structure of the feet facilitates walking through quicksands and soft snow but hampers movement on muddy and slippery ground. Unlike hoofed animals, camels do not trample pastures, which is beneficial for grasslands. Camels can quickly put on weight and store a large amount (100-150 kg) of fat in their humps, which provides much more energy per unit of live weight than does food and acts as an insurance against times of food shortage. In winter camels become covered with thick hair, which protects them from cold. In the spring it sheds and in summer they lose their hair coat. The hair coat has an important adaptive property: it protects from overheating, diminishes evaporation and preserves moisture. The shorn camel loses

through the skin surface much more water than before shearing. The camel can survive losing water to the extent of over a quarter of its live weight; man perishes if he loses even half this amount.

All this shows the camel's high adaptation to desert conditions. The camel also possesses the ability, which is rare among homoiothermic animals, to alter its body temperature most significantly: from 34 C at night to 42 C at noon. This enables the animal to reduce the loss of moisture which would occur if it sweated to maintain a lower body temperature.

The breeding season is January to May and during this time females come into heat one, two or three times. For a fertile mating it is essential to know the time of ovulation. Ovulation occurs towards the end of the heat period. Oestrus lasts about 8 days and the entire sexual cycle takes 16 days. To ensure a high conception rate female camels are served twice: on the second day of heat and again 2-3 days later.

Sexual maturity of Bactrian females is reached at the age of 1.5 years but they are not served until 2-3 years, when their live weight reaches 70% of the weight of lactating animals. At the age of 2 years males are separated from females, but they are not used as sires till 4 years of age at the earliest, and then very sparingly.

The gestation period of Bactrians is 415 days and birth weight is 40-45 kg. The foetus develops in the left horn of the uterus. Suckling camels grow quickly. Deposition of fat in the hump of the young, provided they develop normally, starts at the age of 1.5 months. The live weight of a Bactrian calf of the Kazakh breed reaches 200 kg at the age of one year and 350-400 kg at two. Such a high weight gain under range conditions is unparalleled.

The lactation period lasts for 18 months and therefore the output of young per 100 females and the farm economic return, as far as reproduction of stock is concerned, are summed up once in two years.

The number of Bactrians in the USSR is 147 000. They are represented by the Kazakh, Kalmyk and Mongolian breeds, which are raised for meat and wool production.

The Kazakh breed, which numbers 132 000, is reared in Kazakhstan, Uzbekistan, Kirgizia and Astrakhan, Saratov and Volgograd regions of the Russian Federation. As for body conformation they have a long-coupled body and a wide chest. Well-fattened males have a live weight of 692 kg and sometimes reach 1000 kg. Meat yield is 60% and hair clip from 8.5-9.5 to 13 kg. The live weight of females is 500-607 kg; meat yield is 57% and hair yield 5-7 kg. In a 12-month lactation they give 1750 litres of milk with a fat content of 5.8-6.5%. Some give 6-8 litres of milk with thrice daily milking. The best camels of the Kazakh breed are reared in Chimkent, Kzyl-Orda and Mangyshlak regions of Kazakhstan.

The young stock of this breed is destined for meat production with an average live weight of 400-450 kg and meat yield of 65%. In addition they produce 4.5 kg of first-grade wool.

The Kalmyk breed (11 000 head) is considered an improved one. They are big animals with well-developed skeleton, musculature and hair cover and have a great capacity for carrying loads and for work.

The females have a live weight of 650-700 kg, net meat yield 56.8%, wool yield 8 kg. Their milk yield is 10-15% less than that of the Kazakh breed and the fat content is 5.5%. The average live weight of breeding males is 760 kg (maximum 1042 kg); meat yield is 60% and hair yield 10-13 kg.

Kalmyk Bactrians are reared in the main in the Kalmyk ASSR, Astrakhan region of the RSFSR, and in Guryev, Mangyshlak, Ural and Kzyl-Orda regions of the Kazakh SSR.

The Mongolian breed of Bactrians is an imported one. They are smaller than the Kalmyk and Kazakh breeds but have a great depth of body, endurance, liveliness and a good hair coat. The hair yield of females averages 5.3 kg and lactation milk yield is 400-500 litres. The live weight of males is 500-550 kg and of females 500 kg.

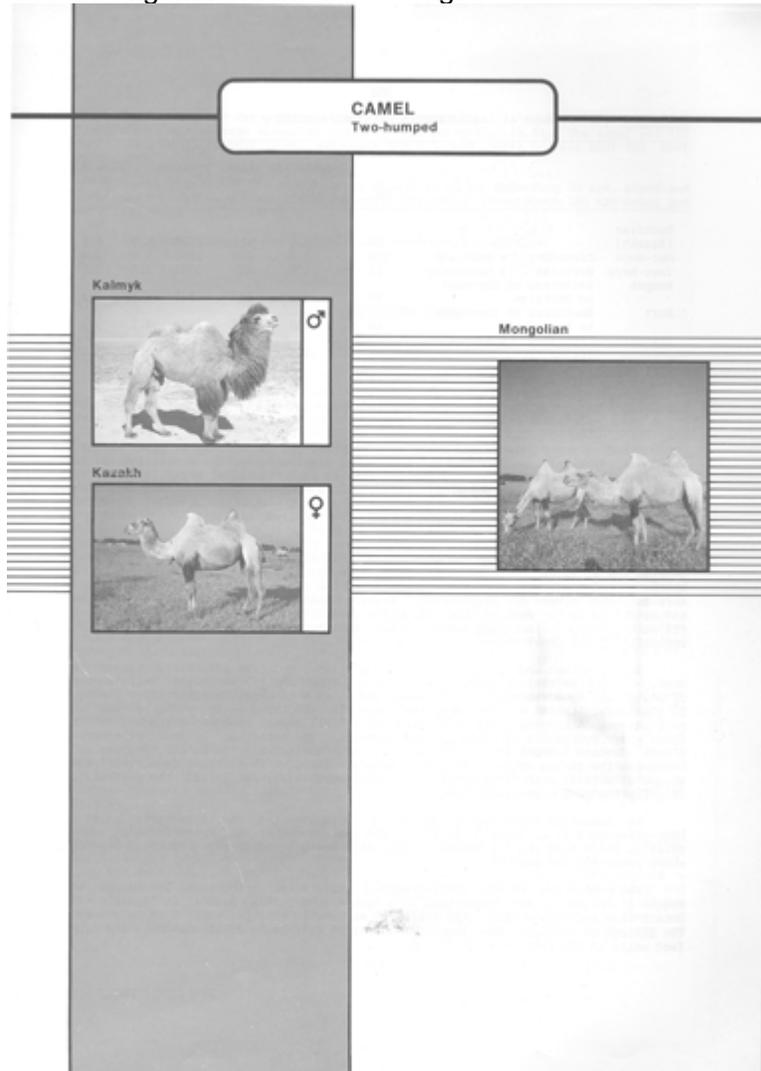


Table 8.1 AVERAGE MEASUREMENTS OF MATURE BACTRIAN FEMALES OF DIFFERENT BREEDS (CM)

Breed	Height between humps	Body length	Chest girth	Shank girth
Kalmyk	186.0	158.1	226.0	20.0
Kazakh	179.1	155.6	236.1	20.1
Mongolian	166.1	146.5	207.0	1802

In order to breed high-producing animals and to provide the shubat (sour milk) producing units with females with high milk yield, the author and specialists of state animal breeding farm Timurski in Chimkent region of the Kazakh SSR used pure breeding, crossbreeding and interspecific crossing. Pure breeding makes it possible: to improve the breeding and productive qualities of camels as well as working towards the breeding of a stud type Kazakh Bactrian (BK) and of a Dromedary (DK), with the creation of new strains, such as Kara-Bura, Ak-Bope, N 5484 and others; to work out methods of breeding young stock with a satisfactory conformation, strong constitution, high productivity and the ability to transmit the economically beneficial traits to the progeny.

Crossbreeding is aimed at obtaining crosses of the second and third generation. Breeding of the crosses inter se fixes the type of the improved camels with increased live weight, hair cover and viability.

First crosses between Bactrian and dromedary have a single hump with a small depression at the front towards the top. Backcrosses begin to resemble the purebred Bactrian or dromedary.

The investigations of interspecific hybridization, carried out for a number of years by the author, have shown the impossibility of maintaining hybrid vigour by breeding the first generation hybrids inter se or by grading to either of the initial species. Maintenance of heterosis through criss-crossing has given positive results: criss-crosses (Kez-nar and Kurt-nar) had higher milk yields and good meat characteristics. About 70-75% of hybrid females came on heat again 20-25 days after calving, which meant 20-30 extra calves from 100 females in the next year.

Table 8.2 PERFORMANCE OF CAMEL HYBRIDS

		NO.	Gestation length (days)	Live weight (kg)	Milk yield in 12mo (kg)	Fat %	Fleece weight (kg)
Bactrian (Kazakh)		80	415	611	1750	5.8	6.0
Nar-maya	Dromedary x Bactrian	105	410	670	2955	4.6	4.9
Iner-maya	Bactrian x Dromedary	10	400	605	3563	3.5	3.5
Kospak	Backcross of Nar-maya to Bactrian	59	390	644	1925	4.6	5.2
Kurt	Backcross of Iner-maya to Dromedary	46	380	535	2544	4.1	3.2
Kez-nar	Dromedary x Kospak (criss-cross)	23	385	650	3876	4.6	5.0
Kurt-nar	Bactrian x Kurt (criss-cross)	15	387	640	4565	4.5	3.7
Dromedary (Turkmen)		10	385	558	4000	3.5	3.1

Breeding the criss-crosses inter se, however, led to decrease of live weight. This made necessary continuation of the work, consisting in the investigation of different methods of crossing of hybrid females with the sire, Kurt IV, also of hybrid origin, to find out possibilities for maintaining the

heterosis and obtaining high milk yielding animals giving 4500 litres of milk, with the average butterfat content of 4.5% or more and preserving the desired qualities in subsequent generations as well.

Experiments prove that the progeny of the sire, Kurt IV, (produced by four generations of inter se breeding of the Kurt hybrid) is markedly different after 6 months of age from their test contemporaries of the same age by greater live weight, more intensive growth and development. Provided that the pasture fattening in spring and autumn is good, each of them can boast 1500-2000 g average daily weight gain. The well-developed lactating females thus obtained are an important reserve for replenishing the camel stock.

To strengthen and promote valuable qualities, positive assortative mating is used. To combine characteristics of different types and to compensate deficiencies of one parent by advantages of the other, use is made of negative assortative mating. In commercial farms a two-stage selection is practised - on pedigree and on performance. A progeny test is carried out at all animal breeding farms and other farms where systematic breeding records are kept. The selection by pedigree ensures a more adequate transmission of valuable parents' characteristics to the progeny and increases the fixing of the genotype. Timely evaluation facilitates forming of the groups of animals with similar qualities and productivity, and raises the percentage of offspring of the desirable type.

In commercial herds high-producing improvers are used, and in pedigree herds -high-class ones (i.e. progeny tested). The maximum number of females for the young sires is 10-15 head and for adults 25-30. All breeding males are given full feeding while preparing for service.

The experience of the camel-breeding state farm Kzyl-Uzenski in Mangyshlak region of the Kazakh SSR shows that in a specialized milking herd it is possible to obtain from one female 1000- 1500 litres of marketable milk per year, with an average fat content of 4.0-6.5%, the input per 100 kg of milk being 10-11 man-hours and 1.5 feed units in addition to range forage.

The carcass and fat weight of a well-fattened camel is equal to the weight of 12-15 sheep, the average slaughter yield of meat being 61.7-65.8%. The input per 100 kg of camel meat is only 76-80 man-hours and 6.5 feed units or half that for beef production.

The hair yield of one camel varies from 3 to 16 kg, depending on age, breed and genotype, as well as the method of shearing, the input being about 188 man-hours and 89.2 feed units per 100 kg of hair.

These data indicate the high efficiency of camel production.

8.2 ONE-HUMPED CAMELS

B. Meredov

All dromedaries in the Soviet Union belong to one breed, whose Turkmen name is Arvana, i.e. purebred. For the nomadic Turkoman population living in the Kara-Kum desert the Arvana has been for millennia almost the only animal supplying milk, meat, wool and transport. Rock drawings of one-humped camels, probably domesticated, have been found in the northwest foothills of the Sultan-Uizdag in northern Turkmenistan in the settlement of Byash-Tyube which dates to 3000-1500 BC. Some rock drawings in the Chendir ravine in the western slopes of the Kopet-Dag in southwest Turkmenistan depict domesticated dromedaries and riders and date to the beginning of our era. We cannot exclude the possibility that dromedaries were independently domesticated in Turkmenistan and in Arabia 5000-6000 years ago. From time immemorial Arvana dromedaries have been used for breeding strong hybrids capable of great endurance. The best hybrids were obtained by crossing Arvana sires with females of the Kalmyk Bactrian breed. However, the Turkmens never bred from hybrids.

The Arvana is a typically milk-yielding, pack-carrying and smooth-riding breed of camels. The present-day qualities have been achieved by long selection: special attention was paid to the use of sires out of high milk yielding females. Arvanas have the highest milk yield of all breeds in the world. Since 1930 selective breeding has been carried out by Sakar-Chaga and Jebel camel-breeding farms and Kazanjik state breeding centre in Turkmenia.

At the present time the Arvana breed is widely used to improve milk and meat production of the Kazakh Bactrians, and a Kazakh type of the Arvana breed has been developed from the cross. As improvers of dromedaries they are much in demand in the republics of Central Asia and in countries of the Near East.

Arvana dromedaries are reared in all parts of Turkmenia, as well as in Uzbekistan, Azerbaijan and the southern districts of Kazakhstan. They are also found in Turkey, northern Iran and Afghanistan, where they may have been introduced by Turkmen migrants in the 12th century during the conquest of these countries by the Seljuks.

Arvana dromedaries are reared in the hot and arid climate of the Kara-Kum and Kyzyl-Kum deserts and Ustyurt semi-desert in Central Asia with sandy areas, saline soils, takyrs ^{1/} and tablelands. Dromedaries are kept on pasture all the year round. They can feed on the desert vegetation which is rejected by most other animals -shrubs, subshrubs and saline herbage - and are often satisfied with saline and brackish water. The herbage productivity of the pastures typical of the Kara-Kum desert varies between 150 and 600 kg of dry feed per hectare. During autumn and winter the camels feed on Haloxylon aphyllum and H. persicum, Salsola gemmascens and s. orientalis, Astragalus and Aristida karelinii and A. pennata. In the spring the desert is covered by ephemerals. Near the oases various grasses and camel thorn abound. At this time the camels graze well and recover their condition. They store in the hump up to 40-60 kg of fat which they use when lacking feed.

^{1/} Large, smooth plant-free areas.

Arvana camels are not adapted to severe winters. In zones of high humidity they are susceptible to parasitic blood diseases and helminthiasis and are defenceless against bloodsucking insects.

In recent years the stock of camels in public farms of the Turkmen SSR has increased and reproduction rates in the herds have improved considerably. Four new camel breeding state farms have been organized and complex dairy units, specializing in the production and processing of camel's milk, are being set up. The number of dromedaries in public farms in the USSR has grown in the last ten years from 54 000 to 72 200 head, while the total stock in all categories of farms now amounts to 109 800 (see Table 8.3).

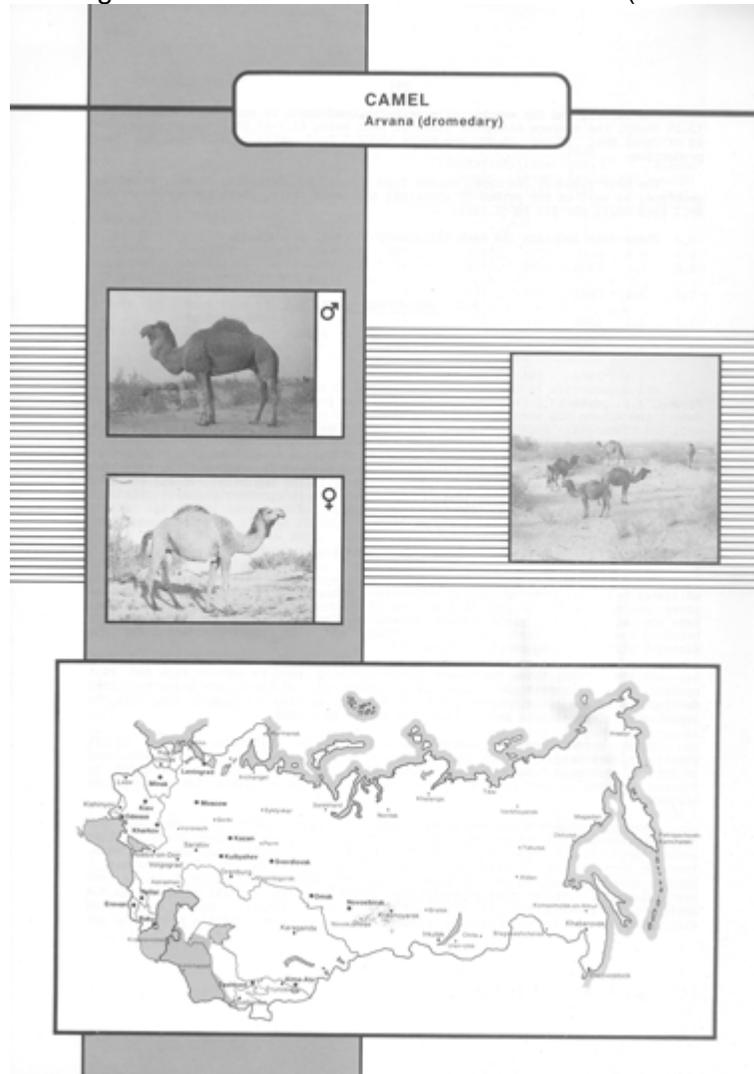


Table 8.3 NUMBERS OF ARVANA DROMEDARIES (1000 HEAD)

Republic	1984	1964	Year 1974	1980	1984
Turkmenia	78.7	72.4	86.4	83.3	85.7
Uzbekistan	55.2	23.7	22.8	20.3	21.2
Kazakh, Azerbaijan and Tajik SSRs	11.8	1.2	0.5	2.9	2.9
USSR Total	145.7	97.3	109.7	106.5	109.8

Dromedaries of the Arvana breed have a good conformation and strong body build. Their head is lean, neck long, chest wide and deep. They have a compact hump rising sharply in the middle part of the back. The legs are correctly set and the callous soles afford traction and facilitate walking on quicksands.

Arvana camels are brown in colour varying from light red to dark brown; occasionally they are white, roan or mouse coloured. Their wool cover is curly. Beard and mane are developed only on the upper and lower parts of the neck. Near the shoulder blades they have "epaulettes" i.e. long (8-12 cm) and slightly curly hairs.

Arvana dromedaries rarely suffer from infectious diseases such as tuberculosis and brucellosis while cases of leucosis have never been observed. Bovine brucellosis has been recorded in places with sick cattle and sheep.

While belonging to the same breed, Arvana dromedaries in different regions differ from each other in body build. The largest type inhabits the east of Turkmenia, which has a number of districts with abundant vegetation. The western (Jebel) type has an average height, stocky build and meat type, and is highly adapted to year-long pasture management. The eastern (Sakarchagin) type is characterized by large stature, dry constitution, good conformation, voluminous udder and high milk production. This type is an improver for the entire Arvana breed. Crossing sires of the eastern type with females of the western improves the conformation, milking capacity and the volume and form of the udder.

Arvana camels are early maturing: they reach maturity before the age of two years; the females are mated when they reach three years of age and have a live weight of 350-400 kg. Males are used for service from 4-5 to 15-16 years of age. Breeding is restricted to the season from January to April. Gestation period is, on average, 385 days and the females give birth about every two years. Shortening the calving interval as practised in Turkmenia makes possible two calves in three years.

The live weight of calves at birth is 38-40 kg. Their rapid live-weight gain is maintained during the first year of life, the average daily live-weight gain being 950-1030 g. Weaning is done at the age of one year.

The milk yield of Arvana dromedaries approaches that of dairy cows. The lactation period lasts 15-18 months. For a group of females in the camel breeding farm Sakar-Chaga average milk yield was 4387 kg in 18 months, the yield of the first calvers being 3117 kg. The average daily yield of some animals amounted to 15 kg, the top yield being 19 kg. In addition to the amount needed for suckling calves, females can give 1718 kg of marketable milk with 4.13% of fat in a 12-month lactation.

Females are milked by hand 2-6 times per day depending on the yield. Machine milking is also practised.

Dromedary milk, consists of 13.6% dry matter, 3.5% protein, 4.9% lactose and 0.7% ash. Acidity of the fresh milk is 20-25°T 1>/. The high bactericidal properties of camel's milk retard the development of acidity and facilitate storing (at 30 C) up to 24 hours so that it remains fresh during transport. The peoples of Central Asia have been since the earliest times well acquainted with the high nutritive, dietetic and curative properties of camel's milk and its products.

Arvana dromedaries easily put on weight when grazing and produce good and palatable meat; yield at slaughter in 2-3 year-old animals of average fatness is 54.2%.

The average wool clip of males is 3.28 kg and that of females 2.10 kg. The fleece wool of adult Arvana camels totals 91.2% of the clip (the rest is threads and tips) and the clean wool yield of fibres is 78.6%. Fibre diameter is 12-27 μ m and length 4-12 cm. Dromedary wool possesses a number of valuable technological properties, such as low heat conductivity, softness and strength. Out of it a wide range of technical and warm fabrics are manufactured. The local population uses camel wool for the production of natural yarn and knitted wear.

The main advantage of camels as beasts of burden consists in their ability to traverse deserts and in being cheap load carriers. In an 8-10 hour working day Arvana camels can carry packs weighing 200-300 kg for a distance of 30-35 km.

Since 1947 the Turkmen Republic has introduced the Republic Herdbook of the Arvana breed which has registered 2000 elite and first-class camels.

There is considerable activity in breeding Arvana dromedaries at the camel breeding complex Sakar-Chaga, in the state camel breeding pedigree farm Turkmenistan as well as in seven other camel breeding pedigree collective and state farms in Turkmenia. More than 12 000 high-class breeding animals are concentrated in these farms, of which more than 5000 are females.

Purebred animals on state and collective farms totalled 31 000 in 1980.

Leading lines are Batly 6-64, Gok-Kaplan 4-156 and Shatlyk 8-49.

$\frac{1}{2}$ The Turner's degrees ($^{\circ}$ T) of acidity stand for the number of millilitres of 0.1N alkaline (KOH or NaOH) solution required to neutralize 100 ml of milk dissolved by the same quantity of distilled water, with phenolphthalein being used as indicator.

Arvana camels are chiefly improved by selection within the pure breed. In recent years the improvement work is being carried out on the basis of a pedigree selection plan worked out in the Turkmen Institute of Animal Husbandry and Veterinary Science. To form a nucleus on breeding farms, preference is given to animals possessing strong constitution, heavy weight, high indices of productivity and belonging to a well-known line. Great attention is also paid to adaptive qualities i.e. ability to maintain condition and productivity in the extreme conditions of year-long pasture management.

The programme of selection is worked out with due account of the types existing within the breed. Within each type new sire lines, families and crosses are being created on the basis of outstanding specimens. These breeding methods promote the maintenance of the breed's genetic diversity

and the development of intra-breed types as well as improving breed characters and performance of the entire stock of Arvana dromedaries.

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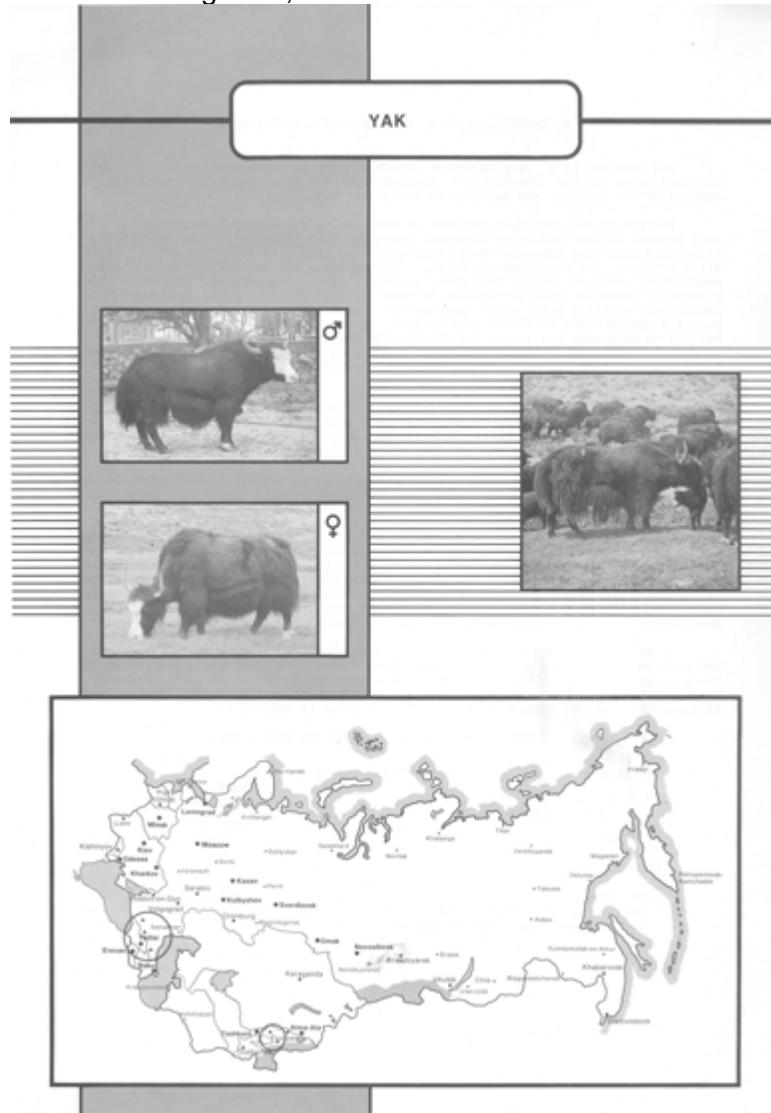
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9. YAKS

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Yak breeding is a very important branch of the national economy in the high-altitude areas of the republics of Central Asia and in a number of northwestern regions of the country, and has been so for a long time. The yak is an even-toed ungulate of the bovine sub-family Bovinae and is the sole species of the genus (or subgenus) *Poephagus* - *P. grunniens*. The majority of scientists hold that domestic yaks originated from the wild *Poephagus mutus*, which still inhabits the mountains of Tibet. Subsequently the species spread to other mountainous areas in Asia. This view is supported by craniological studies - the cranium of domestic yaks is similar to that of wild Tibetan yaks. Moreover, the habitat of domestic yaks which are remote from Tibet, are connected with it by mountain chains along which the yaks spread. It can be assumed that in the past the habitat of wild yaks was larger and covered the mountains of Kun Lun and the northern

slopes of the Himalayas. Gradually with the coming of people to new lands the yaks had to escape high in the mountains and thus became restricted to severe mountain habitats in Tibet.

It is not known for sure when yaks were domesticated. Some scientists hold that they were domesticated in prehistoric times while others believe it happened in the historic period. The latter is more probable and would explain why yaks can thrive under extreme conditions and without any interference from man.

Yaks have a number of biologically valuable characteristics which facilitate their keeping and breeding. They are highly resistant to cold thanks to a very thick hide and subcutaneous fat, and dense hair. These impede heat exchange and thus contribute to the preservation of energy. Yaks are exceptionally resistant to hypoxia and tolerate well the low oxygen content in the air of high mountains. They have a narrow muzzle and mobile lips which make it possible for them to graze the more nourishing low-growing vegetation which cattle and other domestic animals cannot graze. Thus they are biologically adapted to the scarce and low-growing vegetation of the high-altitude deserts and steppe and the steep rocky slopes which form their natural habitat. In winter yaks feed on dry and half-dry plants. They can get their feed only if the snow is soft and not deeper than 10-12 cm.

At present yaks are bred in Kirgizia, Tajikistan, Buryatia, in Altai territory, and in high-altitude regions of the Tyan Shan. There are small herds in the North Caucasus and Yakutia. There are large numbers in the Mongolian People's Republic, Tibet, northwest China, and Nepal and smaller populations in India, Bhutan and Afghanistan. The yak population in the USSR is shown in Table 9.1.

Table 9.1 CHANGES IN THE YAK STOCK IN THE USSR ('000)

Republic	At the beginning of the year			
	1970	1975	1980	1984
	Total	Total	Total	Total
Kirgizia	41.2	68.8	67.5	59.4
Tajikistan	17.4	16.7	17.5	16.8
RSFSR	17.4	45.2	45.6	59.1 ^u
USSR Total	88.9	130.7	130.6	136.0

^uThis total includes 32 400 in Tuva, 16 300 in Altai, 6700 in Buryatia and 3700 in North Caucasus.

Between 1970 and 1984 the total yak population increased by 52.6%. The population of yaks in Kirgizia increased 1.44 times during this period while in Tajikistan it decreased slightly. In 1984 about one-third were breeding females.

Buryatia and the Altai mountains have long been the habitat of yaks. From these regions yaks were taken to Yakutia in 1971, 1973 and 1974. Yaks from Kirgizia were brought to the North Caucasus in 1972-73.

In Kirgizia and Tajikistan there are vast mountain and high altitude pastures situated at 2500-3500 m or more above sea level. These pastures are exceptionally good for yak breeding. The geobotanical survey by the Kirgiz Design Institute for Land Management showed that the total land area in Kirgizia situated at more than 4000 m above sea level amounts to 1 200

000 ha. On average, these pastures produce 400 kg of dry feed per hectare.

The herbage on these pastures consists of mixed stands of: Festuca sulcata/Artemisia or forbs, Cobresia/Carex, Bromopsis/Artemisia, Carex/Festuca pratensis, Stipa/Festuca sulcata, Poa/other grasses, Festuca sulcata/Cobresia, Poa/forbs. In summer 100 kg of absolutely dry matter of fescue with Artemisia, and Cobresia with sedge fodder contain 77.2-93.3 fodder units and 3.03-7.67% of digestible protein; in winter these figures are 32.8-34.9 and 1.80-2.24 respectively. Therefore winter pastures are very poor in digestible protein, particularly if the herbage is predominantly grasses with a small amount of Artemisia. The average content of digestible protein in dry grass is 1.76% with a range from 1.38 to 2.21%. Yaks thrive in severe weather and climatic conditions -they reproduce normally and use the vegetation of alpine and subalpine pastures to the maximum.

Despite their relationship and general similarity to cattle, yaks differ considerably from them in conformation. They have a characteristic hump formed by elongated spinous processes of the thoracic vertebrae. The average height of the hump in females is 4 cm while in males it is somewhat higher. Quite often the back is sway. The hump intensifies this deflection. The height at the rump is somewhat greater than or equal to the height at withers, which testifies to well-developed hindlegs. This is a result of the adaptation to grazing on steep slopes. The animals have a large chest depth.

Table 9.2 BODY MEASUREMENTS OF ADULT YAKS (CM)

Measurement	Males	Females
Height at withers	122.77+0.88	109.21+0.36
Height at rump	120.39+0.93	109.00+0.36
Chest width	36.70+0.90	35.58+0.37
Chest depth	68.85+1.11	66.21+0.30
Heart girth	177.85+2.16	164.93+0.68
Oblique body length	137.13+1.59	124.52+0.46
Shank girth	19.30+0.30	16.10+0.09

The forelegs are short but as thick and strong as the hindlegs. The neck is short. The udder is not large, has short teats (2.5-4 cm) and is covered with thick fine hair. The fore udder is less developed - the udder index is only 36.2%. The hide is thick and has a dense hair coat. The sweat glands are less developed and the subcutaneous fat is more developed than in related animals. These traits characteristic of yaks allow them to preserve energy, to adapt well to the severe conditions of their habitat and to reproduce at low temperatures. Yaks do not require any particular care and can be kept in the open all the year round.

The colour of their coat is usually black. Among 258 test animals there were 211 (81.8%) with pure black or white-spotted black coats, 22 (8.5%) with greyish brown or pale yellow coats and 9.7% of other colours.

In the best yak breeding farms of Kirgizia the live weight of yak cows is 285-330 kg and that of bulls 400-550 kg. The live weight of 3-4 year-old bulls bred for meat under satisfactory conditions of maintenance and feeding is

320-350 kg. At slaughter the meat and internal fat amount to more than 52%.

Newborn yaks are smaller than cattle calves both absolutely and relatively. In different breeds of cattle the weight of newborn calves varies from 6.5 to 8% of the live weight of adults while for newborn yaks the figure is 5.9%. The average live weight of yaks at birth is 9-16 kg, at the age of 1 month 21-22, 3 months 33-35, 6 months 57-60, 9 months 140-145, 12 months 150-160 and 16 months 175-180 kg. Yaks bred in Kirgizia are considerably larger than those of Tajikistan. This is because in Kirgizia yaks are not milked as they are bred exclusively for meat.

Yaks produce meat, milk and wool. The authors recorded their fattening and meat characteristics in the state farms Alai and Son-Kul in Osh and Naryn regions in 1983. The animals selected for fattening grazed on natural pastures situated at 3500-5000 m above sea level. The herbage on the pasture was predominantly *Festuca* and *Artemisia*.

The average yield of the herbage was 310 kg dry matter per ha. In addition the animals were given 60-80 g of fodder salt per animal per day. Over the grazing period all the animals had a good daily weight gain and at the age of 3.5 years they had a high live weight and were in good condition for slaughter. Castrated yaks at the age of 3-4 years had the heaviest carcasses. Besides meat, the yaks produced hides to be used as raw material by the leather industry.

Table 9.3 CHANGES IN THE LIVE WEIGHT OF YAKS DURING THE FATTENING PERIOD

Number of animals	Age in months:		Average live weight:		Average weight Total (kg)
	Beginning of fattening	End of fattening	Beginning of fattening	End of fattening	
248	18	30	169.2	275.7	106.5
87	42	54	253.7	380.1	126.4
11	66	78	391.8	483.6	91.8

Table 9.4 SLAUGHTER CHARACTERISTICS OF CASTRATED YAKS

Number of animals	Age in years	Live weight prior to slaughter	Carcass weight		Hide weight	
			kg	%	kg	%
5	2	226.0	130.2	57.0	17.4	7.7
5	3	298.6	170.3	57.0	22.1	7.4
5	4	326.0	185.0	56.8	21.8	6.7
2	5	338.0	197.9	58.6	22.1	6.6

In the carcasses of 3-year-old yaks the bone content was 15.7-18.6% while that of the muscular tissue was 70.6-75.4%. Chemical analysis showed that the highest protein and fat content is found in the meat of yaks over 3 years of age and its calorific value is also higher. It is expedient to slaughter the animals at this age provided their live weight is not less than 300 kg.

The milk production of yak cows is not high - the average milk yield varies from 858 to 1066 kg a year. This figure depends very much on availability of feed, age, season of calving and other factors.

Table 9.5 CHEMICAL COMPOSITION AND CALORIFIC VALUE OF YAK MEAT

Age in years	Content in the meat (%)					Calorific value of 1 kg (Kcal)
	dry matter	water	protein	fat	ash	
2	38.53	61.47	21.7	16.75	0.08	2447.5
3	44.54	55.48	23.6	20.84	0.08	2656.3
5	40.10	58.82	22.54	18.55	0.09	2906.5

The milk yield of first-calf heifers is 54% of that of adult cows; it slowly increases till the animals are 9 years old after which it begins to diminish. The average lactation period is approximately 256 days with variations from 82 to 388 days. The fat content (5.3-8.6%) and the protein content (5.1-5.3%) are among the highest figures characterizing different breeds of cattle. Butter made from yak milk stores well and has a pleasant flavour. A characteristic of yaks is their thick hair cover which is different on different parts of the body. It is shortest on the neck and sides and consists predominantly of soft fine hair through which coarse guard hairs project. The underside is covered with long coarse hairs which form a fringe; the outer sides of the legs are covered with the same type of hair. The backbone on the neck and spine as well as the occipital and frontal parts of the head are also covered with coarse hair which however is much shorter. The tail of yaks has no switch like that of cattle and is similar to the horse's tail. Long hair grows along the tail and often reaches the ground; therefore the yak's tail is much thicker than that of horses. The hair clip of male yaks aged 3 years or older varies from 0.3 to 0.9 kg; at 2 years it is 0.4-0.5 kg and under 1 year 0.5-1.3 kg. For female yaks 3 or more years old and 2 years old the figures are 0.2-0.6 and 0.3-0.5 kg respectively. The hair of yaks is used in the felt industry and that of yak calves in the textile industry for the manufacture of high-quality thick cloth.

The hide of animals slaughtered for meat is a valuable raw material for the tanning industry and meets the standards for cattle hides.

The demand for beautiful bijouterie, hand-made articles and souvenirs made of natural materials obtained from yaks has become greater of late both in this country and abroad. Their wool, hair and bones are widely used by the community service centres of Kirgizia to make wigs, chignons and different articles of wool and horn. Yaks have not lost their importance as pack animals since they can easily traverse passes in the mountains of Kirgizia and Tajikistan where other animals cannot tolerate the low oxygen levels.

Scientists of the Kirgiz Animal Breeding and Veterinary Research Institute developed for the first time in 1972 evaluation specifications for yak breeding. These specifications reflect the main principles underlying the breeding of pedigree stock, indices of productivity, conformation and constitution which allow the evaluation of animals by a set of characteristics and specify the minimal live weight. The specifications contain standard constitution indices for yak cows bred in different zones.

At first calving the live weight of yak cows should be not less than 255 kg, at the second and subsequent calvings 295 kg. Bulls at the age of 1.5-3 years

should have a live weight of 340-420 kg, at the age of 4-5 years 480 kg or more.

To create highly productive lines and a gene pool of yaks a number of pedigree stock-breeding farms were set up in the areas with large yak stocks - in the Kalinin collective farm of the At-Bashi region, in the state farm Alai of the Alai region and elsewhere. The stocks at these farms are formed from well-developed animals.

Yak heifers reach puberty at different ages - from 16 to 40 months.

According to the data of Denisov (1958) the age depends on whether their mothers were also being milked while suckling. If the young got little milk because their mothers were milked they developed worse and reached puberty at a later age - 71.9% at the age of 24-30 months and 12.4% at 36-40 months. When the cows are not milked and their young get all the milk, they reach puberty earlier, mostly at the age of 16-18 months. According to the data of Ivanova (1951) and Aksenova (1947), in Altai and Buryatia yak heifers reach puberty at the age of 18-24 months. The heifers usually calve for the first time at the age of three years.

Yaks acclimatized in Yakutia often become pregnant at the age of 18 months, which is at least a year earlier than in the areas where they were originally bred. Yaks in Mongolia reach puberty at the age of 27-30 months, when their live weight is 190-200 kg, i.e. 73.5% of the average live weight of adult yak cows. Most yak heifers in China reach puberty at the age of 18-24 months. In rare cases heifers may come in heat at the age of 8-10 months but no fertilization has been observed at this age.

Yaks are seasonally polyoestrous. The beginning of the breeding season of Kirgiz yaks depends on the natural and climatic conditions as well as on the altitude. In the Tyan Shan at altitudes of 2400-2500 m mating begins in late June. Sometimes it begins in early June. Mating continues till late October, in rare cases till December or January. In the Alai valley of Kirgizia at the altitude of 3000-4000 m where the natural conditions are more severe mating begins in mid-July and ends in early October.

The physiological condition of the animals determines to a great extent the manifestation of heat during the breeding season. Barren cows come into heat in June-July while calved cows are in heat from July till September, depending on the time of calving. Thus if a cow calved in March it comes again into heat in 131 days, in April in 124 days, in May in 89.6 days and in June in 75.3 days.

Oestrus in yak cows lasts for 2-4 days with an overall range of 10 to 118 hours; in some cases it may last for 5-7 or 8-9 days. Prolonged non-ovulatory heat is frequently observed in yak cows which graze on southern mountain slopes.

Manifestations of heat in yak cows are similar to those in domestic cattle. On coming in heat the cows get excited, stop grazing, begin to sniff other animals and try to jump them. In mid-oestrus they search for males and mate. Their physiological condition is characterized by an increase in body temperature of 0.5-1.2 C, and a higher pulse and respiration rate. The neck of the uterus is opened and it discharges transparent fluid mucus which later becomes more viscous. In young animals heat is shorter and less strongly expressed than in adults. Yak cows ovulate 3-6 hours after heat is over. Unfertilized cows come into heat again after various periods - 7.6% in 3-5 days, 50.7% in 6-20 days and 41.7% in 21-40 days.

On high-altitude summer pastures the mating of yaks is more successful on cooler days. The conception rate in yak cows kept on high-altitude pastures in Mongolia is 75.8% while in those kept at lower altitudes it is 66.7%. Keeping yaks on summer pastures in the Tyan Shan at 2600-3400 m increased the conception rate to 82.9% and in the Pamirs at 3900-4200 m the conception rate was 97.8%. The author notes that one of the most effective ways of decreasing the number of barren cows is to drive the yak herds to high-altitude summer pastures at the earliest possible time. The nervous system in yaks is highly reactive. They easily get excited and quickly react to changes in the environment. The sexual activity of yak cows is suppressed by heat, lower altitudes (or a higher oxygen content in the ambient air), low-growing grasses in the pasture and other unfavourable factors. Even the presence of a herdsman in the vicinity of the animals interferes not only with the reflexes of the animals but also with their grazing. Yaks try to keep out of sight of man; their sexual reflexes are suppressed in man's presence. Therefore prolonged driving of the animals and other factors which may bother them should be avoided during the breeding season.

The average gestation period is 257 days with a range from 224 to 284, which is 30 days less than in domestic cattle. The shorter gestation period and lower weight of newborn calves are a result of the adaptation of yaks to their habitat. Calving takes place mainly in spring (from March to May) at pasture without any intervention by man. Cows which calve after August usually remain barren which is a result of the autumn conditions - air temperature drops sharply, oestrogen content in the feed diminishes and spermatogenesis in male yaks is reduced after the high sexual activity during the breeding season.

The age of puberty in male yaks depends on the conditions during rearing. If their mothers were milked when they were suckling they mostly reach puberty at the age of 2 years and if their mothers got better feed in the suckling period, at the age of 15-18 months. At the age of 12-13 months spermatids are found in the seminal ducts of the testis while at 14-16 months an increasing number of spermatozoa are observed. Under the conditions of free mating and year-round keeping on pasture the sexual activity of male yaks depends on their age and sexual load. They are most active at the age of 1.5-4 years. At 6 years yak bulls become less mobile and sexually active than cattle bulls. As the mating period is short and bulls have to serve many cows, only 2-4-year-old bulls should be used for mating. The number of cows served by one bull should not exceed 10-12.

On the basis of the pedigree and breeding value a group of dams is selected for every yak sire. Each of these dam groups with a sire attached should be given an isolated pasture to prevent mingling of the groups. Stand-by bulls are kept separately from dam herds and groups to be serviced. After mating, dams are gathered into herds with 130-150 animals in each. Herds of different quality are kept on different pastures.

The experience of the best yak breeders over many years shows that timely mating, the use of young bulls with a limited number of mates (10-12), the keeping of the animals during the mating period on pastures with good herbage and situated at not less than 3000 m above sea level as well as proper management of calving ensure a higher weaner output per hundred cows.

The work at the Kirgiz Animal Breeding and Veterinary Research Institute on the adaptation of young yak males to a lowland environment (the elimination of wild state reflexes) has shown for the first time that it is possible to obtain intact semen from yaks, to store it deep frozen by the methods developed for cattle and to use it for artificial insemination. The first batches of frozen yak semen were sent in 1983-84 from Kirgizia to Dagestan and Yakutia where yaks had been brought for acclimatization. The organization of the semen pool is a necessary condition for the introduction of artificial insemination into yak breeding. Another problem is to develop a method of oestrus synchronization in female yaks and thus enable artificial insemination to be carried out over a short period of time on special grounds directly on mountain pastures. Laboratory and field tests have shown that the sexual system of female yaks is very sensitive to the administration of sex hormones and biologically active substances (prostaglandins) which synchronize sexual reflexes. The introduction of artificial insemination in yak breeding will allow the fuller use of economically valuable characteristics of yaks in their hybridization with cattle.

Yaks are susceptible to the same diseases as cattle - brucellosis, tuberculosis, foot-and-mouth disease, anthrax, blackquarter and some other contagious and parasitic diseases. Foot-and-mouth disease in yaks is much less morbid than in cattle. Individual cases of necrobacillosis have been recorded in yak calves and adults. Generally yaks are not subject to pyroplasmosis when high in the mountains. When driven down in the warm season, they become susceptible to haematozoal diseases. This is also true of the subcutaneous gadfly strike. The larvae of gadflies are found less frequently under the hide of yaks than of cattle kept together with yaks. The yaks are susceptible to many helminths. The examination of the viscera of animals slaughtered at meat-packing plants showed that some animals had fascioliasis and lung and liver echinococcosis. In practical yak breeding cases are registered of monieziosis, telasiosis and brain coenurosis. The diagnosis, prevention and treatment of the above diseases in yaks is similar to those in cattle.

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The last great glaciations in the late Pleistocene (60 000-10 000 years ago) resulted in the emergence on the glacier-free plains of Europe and Siberia of a broad, cold zone with a rich steppe and tundra-like vegetation. At the time musk-oxen and other Arctic species, migrating further south, reached the latitudes of Britain, France, Moldavia and the Ukraine in Europe, and Lake Baikal and the River Amur in Siberia. At the end of the Holocene (12 000-10 000 years ago) the environmental conditions in which the mammoth fauna existed, began to change. Ice sheets began to melt and retreat. Tundra-like and steppe grasslands became marshy areas. These landscape transformations resulted in the destruction of the mammoth fauna; many of the species, including the musk-ox, became extinct. In Scandinavia and most parts of northern Eurasia the last mammoths and musk-oxen still existed 9000 to 10 000 years ago. The fossil musk-ox, *Ovibos palantis*, survived longest in the north of the Taimyr Peninsula, which was probably unaffected by glaciation. Recent studies by the radiocarbon dating method at the Geological Institute of the USSR Academy of Sciences on samples provided by the authors, show that fossil musk-oxen became extinct there some 3000 years ago.

In North America, during the last Wisconsin Glaciation, the musk-ox reached present-day Pennsylvania and Kansas. Later it died out there but survived on the margins of the ice sheet and in glacier-free areas, in particular in Alaska, the northern part of Greenland and some islands of the Canadian archipelago. When the ice sheets retreated musk-oxen gradually colonized the entire northern portion of North America and many Arctic islands.

At present native populations of musk-oxen exist in the north and northeast of Greenland, most islands of the Canadian archipelago, and the tundras of mainland Canada between latitudes 64° and 83° N. Until 1865 the species existed in the north of Alaska but later musk-oxen were entirely destroyed there.

As an ungulate species the musk-ox is valued because it has survived from prehistoric times and therefore is the carrier of a unique gene pool. During its long evolution the musk-ox has become extremely well adapted to severe environmental conditions and developed a number of specific traits in its conformation, morphophysiology and way of life. The musk-ox is the only ruminant that can exist in very high latitudes and subsist on sparse forage. There is another valuable aspect of the musk-ox: the young are easily domesticated and therefore can be raised on farms, producing high-quality wool, hides and tasty meat.

Musk-oxen are rather large animals. The body is compact, low-set and slightly elongated. They have large heads, short, thick necks, and short legs. At the crest, there is a hump over the nape. The tail is short, from 10 to 14 cm, concealed by the long hair coat. The ears are of medium length (up to 15 cm), pointed and usually noticeable. The dimensions of mature males are as follows: body length 225 cm, withers height 135 cm, live weight some 300 kg. Females are smaller by one-third. Wild females reach the live weight of mature animals at the age of 5-6 years, and males at the age of 6-7 years. On farms, when adequate feeding is provided, individual five or six-year-old males had live weights of 635 and 658 kg. The largest known wild male musk-ox weighed 408.2 kg.

The two main claws of the hoofs of the musk-ox are rather large and dark brown in colour. They are rounded in shape and slightly protuberant. The lower hoof edges are sharp, and the heels are relatively soft and broad from beneath. These features make it possible for the musk-ox to walk steadily on a thin crust of ice over snow, to avoid sliding and rapidly climb stony slopes. The front hoofs are larger than the back ones for the musk-ox has to pick out feed from under the snow. The dew claws are smaller and shorter than those of the reindeer or caribou and do not leave prints on firm snow or soil. The rounded footprints of the musk-ox, which are produced by the two main claws of the hoof, can easily be distinguished from the broader footprint left by the four hoofs of the reindeer. Musk-oxen sink in crumbly snow more easily than caribou.

Horns are present in both sexes; they are usually 70-75 cm long in bulls and 40 cm long in cows and are never shed. Broken horn tips in old animals are not unknown. Horns appear in the first year and grow sideways from the middle of the skull up to the age of four, when they reach their maximum width, and mature at the age of six. Horns are thicker and widely separated at the base; they are almost circular in cross-section along the rest of their length. In mature males, they are large, dipping downward at the sides of the head and curving upward and somewhat forward at the sharp ends. From the age of five onwards, the horn bases become thicker and resemble knobs; they almost meet at the crown and forehead (the distance between them is only 15 mm) and they develop longitudinal grooves. Horns and knobs serve as effective weapons against attackers and are used by males for fighting in the rutting season. In females horns are thinner, without thickened bases. In young and adult animals of both sexes horns are light in colour; old animals have dark horns.

The skull is massive; the cerebral and facial portions are broad and of approximately the same length. The top of the skull is very thick, slightly concave; the occipital bone is short; the eye-sockets are tube-shaped, sharply protruding sideways; ear drums are small.

The teeth are typical of bovids and well-equipped for chewing rough forage. The incisors have the shape of symmetrical blades. The dental formula is

$$\frac{i0}{3} \frac{c0}{1} \frac{p3}{3} \frac{m3}{3} = 32.$$

Calves are born with all the incisors and premolars; the first molars are hidden in the alveoli. The molars appear in the first and second year of life. The replacement of milk teeth begins at two and ends by the age of four or five.

Musk-oxen have a coat of dark brown, almost black hair. The saddle and legs, however, are whitish or light cream. Adult females, young and immature males also have white hair on the forehead and around the horns. Such white markings are particularly characteristic of the subspecies *O. m. wardi* of mainland Canada, which is sometimes called the white-headed musk-ox. Mature males differ in having a large, red mane. The mane always stands on end making the animal look bigger.

The hair covering consists of guiding and guard hair, intermediate hair, and undercoat. The guiding and guard hairs are the longest. They are dark-coloured and bright. The woolly undercoat is reddish brown or greyish brown. The guiding and guard hairs project beyond the undercoat forming a long skirt that reaches nearly to the feet. The hair coat is strong and coarse; it acts as a sort of bedding when the animal rests. In spring the coat loses

its lustre and becomes reddish brown in colour. In adult bulls, the longest locks (up to 62 cm) are found on the chin. Because of them, the Greenland Eskimo nicknamed the musk-ox "the bearded". On the sides, belly, neck and rump, the guard hair reaches 45 cm. The hair is shorter on the back and saddle. The woolly undercoat (or quiviut) accounts for 60-80% of the fleece; it is 5-7 cm long, very fine, soft, and curly. The undercoat densely covers the entire body. It is precisely because of their fine, silky quiviut, that musk-oxen are valued so highly.

The coat of the newborn calf is short, curly and dark reddish-brown in colour. It consists of the same hair categories but the guard hair is rather uniform all over the body and reaches 50-60 mm in length. The wool is shorter - 20-25 mm.

Shedding in young and adult animals lasts from May through July. The peak of shedding is in June. Males and barren cows are the first to shed. In lactating cows, yearlings, and adult males, shedding is delayed. During shedding, the old wool tears away from the skin, mingles with guard hair, and hangs on the body in the form of large shreds or strips. During this period animals have an unattractive, shaggy appearance. They try to eliminate the wool by rubbing the body on stones and trees. Numerous shreds are left on the earth when animals lie on it. Together with the wool, other categories of hair fall out. Obviously, the replacement of hair takes some time. When shedding is over, animals acquire a coat with a smooth, dark surface. The birth coat begins to shed in the middle of July and by the beginning of winter it is totally replaced by a new one. The new coat is dense and consists of thick hair over most of the body. By the next winter the coat of young animals becomes longer and thicker, and by the third winter its development is complete. Musk-oxen are resistant to low temperatures; this is achieved primarily through the insulation of the body by the thick coat as well as by the high metabolic rate. The critical temperature which musk-oxen can survive is -70 C. The rectal temperature is 38.4°C.

On the face there is a pair of orbital glands which function throughout the year, but especially when the animal is on heat. It seems that the musk-ox is so called because of the smell of the secretion produced by these glands in bulls. Some authors report the presence of foot glands between the toes. Groin glands are absent. The udder in females is small, covered with dense, short, light-coloured hair. There are two pairs of short (3.5-4.5 cm) teats with big nipples. The chemical composition of the milk is: fat 8.0-12.4%, protein 10.9-12.9%, lactose 3.6-4.2%. The milk fat contains a high content of unsaturated fatty acids (38%), particularly of oleic acid. The milk of the musk-ox has twice the fat content of sheep's milk.

In nature males reach maturity at the age of four years, females at two to four years. The dates depend on the fodder yield of grasslands. Animals mature early in the areas which are rich in forage. On farms, when adequate feeding is provided, individual females may calve down even at the age of two years and males of the same age come in season. In natural populations, females are served by males of six years old and older. Before the breeding season, in July, dominant males form their harem herds and expel their competitors. Herds usually consist of 7-9 head of adult females, immature animals, and calves. The breeding season lasts from the end of July to early October, the peak mating period being from the middle

of August to early September. Females are polyoestrous. The oestrous cycle lasts 25-30 days. Gestation lasts 8.5 months, with a variation from 8 to 9 months. In forage-rich areas mature females calve every year; in areas with poor forage they often calve only every other year, producing one calf. Two calves are born on very rare occasions. The sex ratio at birth is almost equal; however, in adult populations there are many more males than females. Calving usually takes place in the herd. The birth weight of calves in natural conditions is 7-8 kg; farm-born calves weight up to 10-12 kg. Two or three hours after birth calves follow their mothers. During their first days calves receive high and frequent milk feeding (up to 18-20 times a day). Newborn calves have extensive reserves of brown fat which is used to generate heat. At the age of one week calves become interested in grass. Milk feeding continues up to the age of 3 or 4 months, sometimes longer. Maternal guidance lasts until the age of one year.

Calves double their live weight in 32-35 days. Males grow faster than females. The one-year-old animals weigh 75-80 kg, two-year-olds 110-120 kg. The reproductive cycle in females continues until the age of 11-13 years; old cows, however, often calve only once in two years. The maximum age of calving recorded in wild populations is 23 years. Most animals die before reaching this age.

Frequent disorders of musk-oxen are contagious pustular dermatitis, actinomycosis, stomach ulcers, lung nematodes, muscular sarcocystosis, pneumonia, purulent abscesses, wounds and traumatic contusions. Potential diseases of wild and farm-raised musk-oxen are anthrax, brucellosis, rabies, and listerellosis. It is important to keep the domesticated animals isolated from parasites and infectious diseases to which they are not accustomed.

The musk-ox is an Arctic animal, well-adapted to an icy or Arctic climate. It lives mainly in the tundra zone; however, it is able to live in Arctic stony deserts and to subsist on the poorest forage. It does not like a damp climate, winter thaws with ice-covered ground, and deep snow.

Musk-oxen are gregarious animals. This trait is well pronounced in adult females and immature animals. Herds vary from 7-8 to 25-30 head. Behavioural patterns of the musk-ox are numerous and flexible, with a large set of defence reactions. The memory is good. The sense of smell and eyesight are excellent. The main enemy of musk-oxen is the wolf, and the main source of disturbance is man with his technology.

The musk-ox is a protected species of the Arctic. Its numbers are small, although musk-oxen are not rare today. Therefore it is not included in the International Red Book. Not very long ago musk-oxen were savagely killed in North America.

At present there are 45 000+1100 musk-oxen in the north of Canada, some 14 000-15 000 of which live on the mainland and up to 30 000-31 000 on Arctic islands. Particularly large herds exist on Banks, Victoria, Melville and Ellesmere islands. In Greenland, according to various sources, the stock of musk-oxen is estimated to be between 15 000 and 50 000. The actual figure is probably not less than 20 000 head. In other words the entire wild population of musk-oxen in the world today numbers some 60 000-65 000 head.

Many northern countries where the musk-ox was destroyed or became extinct have decided to reintroduce this species. The reintroduction and

acclimatization of the musk-ox in foreign northern countries began in the beginning of this century. Musk-oxen were imported to Sweden, Norway (both the mainland and Spitzbergen), Iceland, the USA (Alaska), and western Greenland. Some of these countries imported musk-oxen several times. Animals were imported from the northeast of Greenland. The reintroduction of the musk-ox into Iceland and Sweden at that time was a failure.

The efforts of American biologists to acclimatize the musk-ox were a success. In 1930, 34 head of young musk-oxen were imported to Alaska from eastern Greenland. In 1969, there were 750 head of musk-oxen in Alaska. Today there are five stable populations there. In mainland Alaska, large populations have emerged in the northwest (Seward peninsula, the Feter river) and in the northeast, within the Arctic National Park.

Also successful were the efforts to acclimatize the musk-ox in western Greenland where this species did not exist in the past. In 1982, there were some 500-600 head there.

According to 1982 data, there were some 1700-1800 head of musk-oxen acclimatized in foreign countries.

The Soviet Union has a vast Arctic region, which is suitable for the musk-ox. In 1974-75, when there was closer cooperation between USA, USSR, and Canada, a group of musk-oxen were shipped to Taimyr and to Vrangal island. On the Taimyr peninsula, musk-oxen were introduced in the vast valley of the river Bikada, to the east of Lake Taimyr. The valley lies in the latitude 74 -75°N in the southern zone of the Arctic tundra. Vrangal island lies in the Chukotka₂ sea in the latitude 70 -71 N in the zone of cold Arctic climate. The area is 7670 km²; the relief is dominated by mountains and Arctic tundras.

The first ten young musk-oxen were shipped to the USSR from Canada in September 1974. The animals had been caught on Banks Island (74 30'N) and were airlifted to the Taimyr Peninsula and introduced in the lower reaches of the Bikada river (74°40'N).

In April 1975, forty musk-oxen were brought to this country from the USA. They had been caught at Nunivak island off Alaska (60 N). Twenty animals of both sexes and different ages from this group were introduced on the Taimyr peninsula where Canadian animals were already living. The other twenty were flown to Vrangal island. There they were kept at a ranch (1.5 ha) for three weeks and were freed in May 1975.

The initial acclimatization period on the Taimyr peninsula showed that Canadian animals found the ecological conditions there very similar to their native habitat. They were moved to the same latitude and placed in an analogous subzone of Arctic tundras. For this reason the initial period of their acclimatization was more or less a success. The American musk-oxen, which had been resettled in Taimyr, found themselves in a more severe environment since they had been moved from sub-Arctic to Arctic tundra with a latitude difference of 11 -14 . There they found extremely severe climatic conditions and poorer grasslands. In both regions of acclimatization a large number of animals, chiefly young, weak and ill, died.

The first small crop of young was obtained from four or five-year-old females in the spring of 1978. Next year saw a "population explosion" in the Taimyr herd where the animals were still kept in pens. Both the American and Canadian cows calved. Thus, the initial stock was reestablished. More

calves began to appear on Vrangal island, although it took several years to reach the original number of musk-oxen there.

Ten years have passed since the introduction of musk-oxen to the Soviet Union's Arctic regions. Reassuring results have been achieved during these years. After the adaptation period ended and the animals matured more than one crop of young calves has been obtained. The numbers of musk-oxen are rapidly growing in both areas. The musk-oxen have already lived through two short phases of acclimatization. Currently, the third, longer period of naturalization is under way when a local form of the species is taking shape. The area populated by musk-oxen is growing every year. The musk-oxen which inhabit the Bikada valley and the northern portion of Vrangal island, have approximately the same feeding conditions, although the first region lies three degrees further north. In the Bikada valley there are 107 species of vascular plants which are eaten by the musk-ox. These plants account for 47% of the species that grow there (230 species). Of particular feeding value are 25 species. On Vrangal Island the ration of musk-oxen consists of 42 species of plants (out of 312). Fifteen species constitute the major feeding stock and belong to the same families. The animals eagerly consume cotton grass (Eriophorum) sedge (Carex), milk vetch (Astragalus), reedgrass (Calamagrostis), lousewort (Pedicularis), meadow grass (Poa pratensis), hair grass (Deschampsia), foxtail (Alopecurus), Arctagrostis, Arctophila, Dupontsia, Dryas and many species of willow (Salix).

After the successful adaptation to the local conditions nearly all imported females calve every year, and many young females which were born on Taimyr and Vrangal island come on heat at the age of 2 or 3 years. This is still another proof of the adequacy of the local grasslands. A similar picture is visible abroad in the areas where the feeding conditions are good - northern Norway, western Greenland and Alaska.

Harem herds in Taimyr begin to form at the end of July or the beginning of August. Harem herds usually consist of 12-16 animals. The leader of a harem herd is very aggressive and can be dangerous. The observations over a number of years show that the breeding season lasts from early August to the first week of October. The peak of the season is the end of April to mid-May. The earliest and the latest dates of calving were recorded only in 1979. They are 15 May and 25 June, respectively. The calvings occurred when the animals were still kept in stalls. As in other Arctic regions, the Taimyr females produce only one calf. However, on 6 May, 1979 a Canadian female mated to an American bull, gave birth to two female calves which did not survive.

Between the first calving in 1978, and 1984, more than 90 calves were born in Taimyr, 85 of which (93.4%) have survived. On Vrangal Island the actual increase in the population was some 30 animals over the same period.

Consequently, 115 calves were obtained over the period of seven years.

From 1978 to 1984 the numbers of musk-oxen in Taimyr increased 4.5 times, and on Vrangal Island, 2.7 times. In both regions the growth rate of the population is as high as that in similar man-created populations abroad.

Table 10.1 GROWTH IN THE NUMBER OF MUSK-OXEN IN THE ARCTIC REGIONS OF THE USSR

Year	Taimyr Peninsula			Vrangel Island			
	Total head	Calf crop	Increase %	Total head	Calf crop	Increase %	Total
1981	54	11	27.5	17	4	30.8	71
1982	66	15	29.5	21	4	23.5	87
1983	83	17	25.7	27	6	28.5	110
1984	102	22	22.9	35 1/	8 1/	29.6	137

1/ Approximate figures

The emergence of large populations of musk-oxen in the USSR will make it possible to introduce these animals into other Arctic regions of the Soviet Union and set up experimental farms for domesticated musk-oxen with a view to investigating physiological and other questions, and carrying out selection.

Domestication of musk-oxen abroad began in the 1950s. Between 1954 and 1976 five farms were established in North America. In 1969 a musk-ox farm was set up at Bardu in northern Norway. Spring and autumn calves and yearlings from various wild populations were domesticated. Young animals are easily domesticated; calves began to trust the farmhands at the age of one week.

Farms not only carry out research work but also produce qiviut. For example, the University of Alaska farm in 1981 produced 295 kg of qiviut worth 50 000 US dollars. The long, silky qiviut gives a uniform, fine, and therefore economical yarn, which is used for various warm garments. These items can be easily dyed in different colours; they are attractive and expensive. The sale of fur articles constitutes an important source of income for the cooperators who run the farms.

The musk-ox in the USSR should be regarded at the present stage as a valuable species with a unique gene pool.

We believe that in the near future male gametes of the species should be deposited in a gene bank and a reserve group of musk-oxen should be designated for the Chegre Genetic Centre in Siberia, which will be set up under the auspices of the Siberian Branch of the USSR Academy of Sciences.

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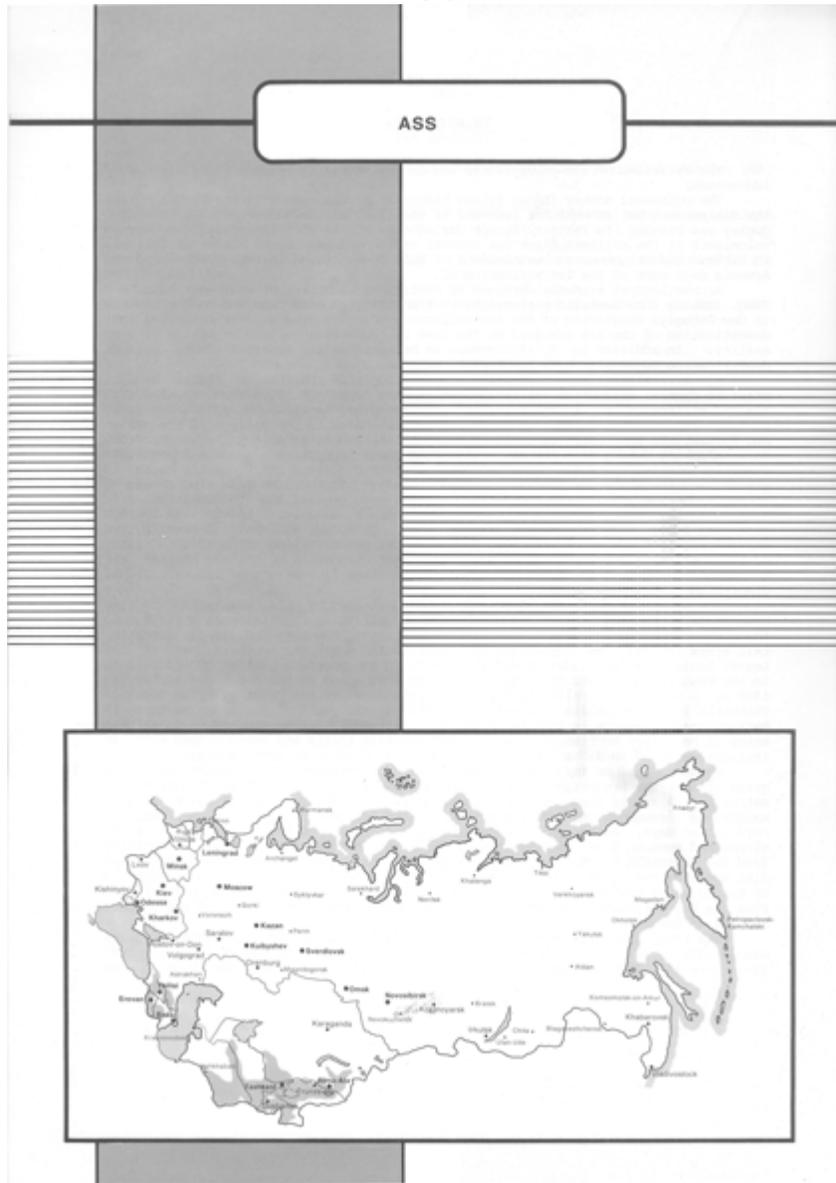
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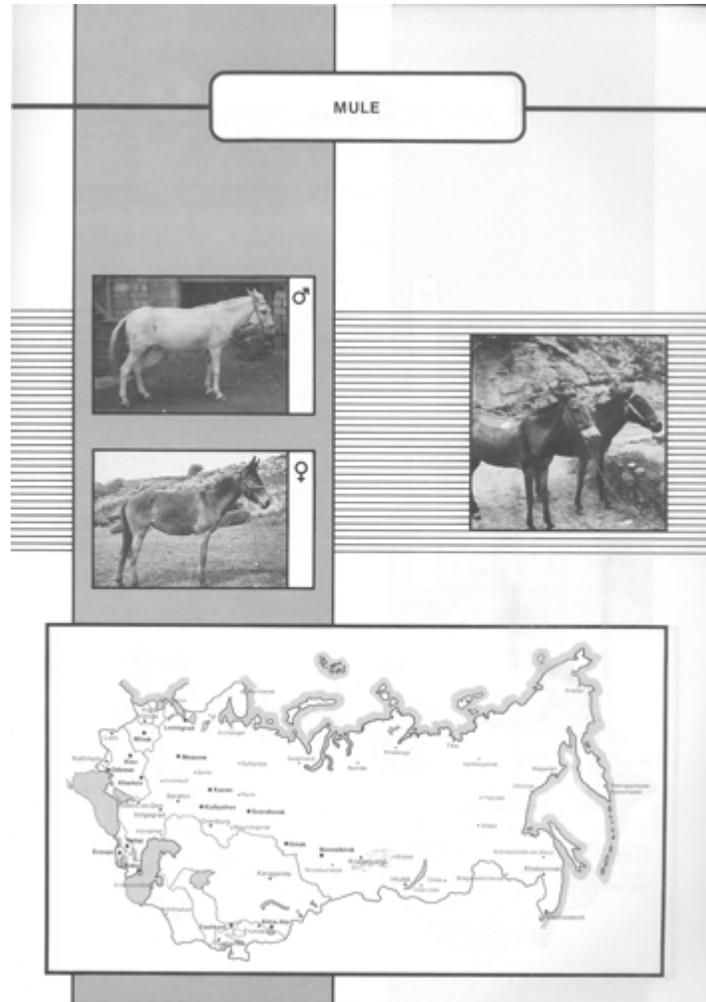
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11. ASSES AND MULES

A.A. Istomin





The varieties of ass in Caucasian and Central Asian Soviet territory are mostly indigenous.

The primaeval donkey (*Equus asinus hidruntinus*) was common in the Crimea during the Pleistocene but it was not recorded in the fauna of the Holocene. The domestic donkey was brought to Eastern Europe during the 9th to 7th centuries BC by Greek colonizers of the northern Black Sea coastal region and was found almost exclusively in cities and neighbouring settlements. Mule bones found in this region and in Armenia date back to the 1st millennium BC.

Archaeological evidence obtained in contiguous countries of southwest Asia and Iraq, ranging from Sumerian pictography to the excavated base camp of onager hunters in Umm-Dabagiya (beginning of the 6th millennium BC) gave grounds for believing that domestication of the ass occurred at the time of the Nubian culture in Africa or even earlier. In addition to *E. africanus*, in Mesopotamia in separate remote periods domestication could also have involved *E. hemionus onager*.

The arrival of a property-owning ethnic group from the Iranian plateau brought asses to Central Asia which was influenced at that time (not later than the middle of the 2nd millennium BC) by the Suiargan culture. This species was of considerable economic importance for the population of ancient oases in the valleys of the Tejen and Murgab. In monuments of

Northern Khorezm (the Amu Darya delta, the present-day Kara-Kalpakia) dating from the early years A.D., the proportion of asses among other domestic animals was 9.4%; in the 11th to 14th centuries small cattle began to prevail and the share of the ass dropped to 6.7%. Southern Khorezm also showed a steady reduction in numbers over a long period: in the 7th to 5th centuries B.C. 4.1%; in the 4th century B.C. to the 1st century A.D. 3%; in the 3rd to 8th centuries 2.8%; in the 2nd millennium 1.8%. Osteological analysis reveals two characteristic features of the material: better preservation compared with other edible species, and the absence of any significant changes in height and habitat over a long period. The Kara-Kalpak variety has an average live weight of 135 kg; sexual dimorphism is not very marked.

The plasticity of the species is demonstrated by its adaptation to the conditions of the intermediate mountain zone as well as to the seasonal migration to the Alpine zone where mountain pastures are located.

Mountain and steppe formation tall-grass savanna-like formations are distributed over the southern part of the Lesser Caucasus at altitudes of 700 to 2400 m, in the northern part at 900 to 1600 m, in the western Pamirs and Tien Shan at 600 to 2800 m and in the Kopet Dag at 800 to 1400 m. A very broken relief is typical of the areas of ass breeding. The south of Turkmenia is noted for its ephemeral vegetation: the yield of poa/sedge pasture in Batkhyz onager reserve is 400-450 kg per ha. Extremely broken country in Tajikistan makes it necessary to transport loads over mountain trails and steep slopes with an inclination of 30 to 35 as well as over temporary bridges of local design.

When employed on farm work the ass is kept on pastures with an extremely scarce grass stand. The productivity of the pastures does not exceed 500 kg of edible dry matter per ha and is thus equal to that of desert plateaux. In some areas grazing is maintained throughout the year except during the period of agricultural work and on cold winter days. Asses can feed on some of the species of xerophytes on the rocky slopes and even on some milk vetches, usually rejected by other animals. A special feed for Caucasian asses is Echinops ritro. During a short stable period the usual diet contains 5-6 kg of roughage, mostly chopped straw but also hay, and 1.0-1.5 kg of barley. The hay is made from grass in combination with sedge, legumes and forbs. From the hay the animals select 60-75% of the grass and sedge, 50-65% of the legumes and 35% of the forbs.

The total number of asses in the USSR in 1940 was 850 000, the number of mules was 10 000; in 1972 corresponding figures were 568 600 and 3200 and on 1 January 1984 there were 342 300 and 1900. The number of asses fell to about one-third in the Caucasian republics, especially in Armenia, where formerly there were 55 000. Somewhat less but still considerable change took place in Central Asia: numbers declined by 2.3 in Kirgizia and Uzbekistan, 1.7 in Tajikistan and 3.1 in Turkmenistan. 98% of asses and 63% of mules are privately owned.

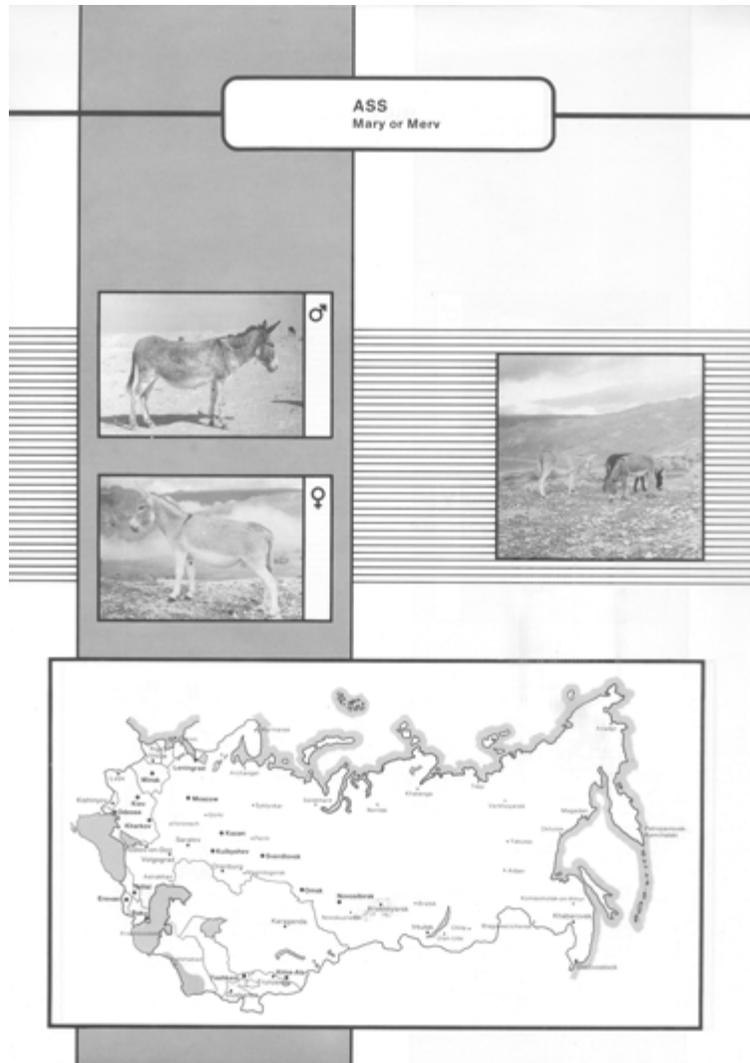


Table 11.1 THE NUMBER OF ASSES AND MULES IN THE USSR (1984, 1000 head)

Republic	Asses	Mules	Republic	Asses	Mules
Russian Federation	25.9	0.3	Uzbekistan	138.0	-
Azerbaijan	32.6	0.5	Tajikistan	67.5	0.5
Georgia	8.1	0.1	Turkmenistan	33.9	-
Armenia	5.3	0.4	Kazakhstan	17.6	-
			Kirgizia	13.4	0.1
			Total	342.3	1.9

A group of small indigenous asses with a common typical conformation and low height (80-110 cm at withers) is the most numerous and widespread. The animals of this group have a rather long and narrow coarse head with a very prominent forehead and a slightly dished face in the nasal region. Jaws are of medium width. The neck is straight and short, without marked withers. Shoulders are straight. Shallow chest is compensated by well-sprung ribs. The back is carp-shaped (in 65% of animals); sway back is very rare (2-3%). The loin is short, high and heavily muscled (92.5%). Older

working asses sometimes have a sunken loin (7.5%). The croup is usually narrow, short, in some cases (27.5%) drooping, but is always higher than the withers. Joints are well developed. Strong hoofs have steep front walls. Bow-legged or cow-hocked hind legs (33.0%), sickle hocks (18.0%) and splay-legs (10.2%) represent the most frequent defects in the exterior of asses.

Table 11.2 BODY MEASUREMENT (CM) AND INDICES (%) OF INDIGENOUS VARIETIES OF ASS (FEMALES 4 YEARS OLD AND OLDER)

Variety	Height at withers (A)	Oblique body length (B)	Chest girth (C)	cannon girth (D)	Indices	
					Format B/A	Boniness D/A
Meskhet-Javakhet	91.6	91.1	98.9	11.1	99.5	12.1
Khakhetian	93.6	94.7	103.0	12.6	101.2	13.5
Armenian	96.4	97.3	105.4	12.3	100.9	12.8
Azerbaijan	97.3	98.4	107.5	12.5	101.1	12.8
Dagestan	97.4	96.5	109.2	13.2	99.1	13.6
Abkhasian	98.2	100.1	108.0	11.6	101.9	11.8
Kirgiz	98.7	102.3	107.5	12.7	103.6	12.9
Tajik	100.0	103.6	108.8	12.6	103.3	12.6
Uzbek	102.1	102.6	106.5	13.0	100.5	12.7
Kara-Kalpak	104.2	100.8	108.9	13.5	96.7	13.0

The animals are of various colours, the most frequent (70%) being grey, from light to dark in shade. In half the animals of this colour there is a marked spinoscapular cross; in 3-5% zebra stripes are present above the knee and hock joints. Among the 15% of black animals 10% have a white belly. In the Azerbaijan and Uzbek varieties mouse colour is as frequent as grey.

Mary and Ashkhabad regions of Turkmenia breed the Mary (Merv) breed of large asses. It numbers 7600 head. The heights of individual specimens reach 130-142 cm. Their origin and economic features are similar to the Iranian Hamadan whose descendants can also be encountered in Azerbaijan. In regions where Merv asses are bred large typical specimens (male height at withers 119.5-120.0 cm, female 116.0-118 cm) coexist with smaller ones, hardly different from the Uzbek variety.

The hybridization experiments of the National Horse Breeding Research Institute involved Merv asses and heavy draught mares to produce draught-pack and pack-transport mules. The latter type (out of dams of the Lokai breed) were successfully tested in Tajikistan. Along a difficult 90-km route up to an altitude of 3000 m the speed of the animals was 6.3 km per hour. Practical mule breeding showed that the pack mule should not be very large, as in the mountains balance and efficient movement are of the utmost importance. A short pace reduces the swinging of the pack and provides for a steady movement on poor paths. In the Nagorny Karabakh autonomous

region of Azerbaijan mules with a live weight of nearly 300 kg carry packs of 70-125 kg.

Uzbek asses normally pull a load of 100-300 kg but on test they may pull a cart with a load of 1.5-2.0 tons. Maximum load pulled by the largest specimen (110 cm high at withers) among those tested was 2532 kg. The average pack weight carried over a distance of 30-35 km in Azerbaijan varies from 40 to 60 kg for males and 30 to 50 kg for females. The most enduring and strong animals can carry a load of up to 110 kg.

The diseases of the ass include the proliferation of nasal cartilage and strangles; mastitis is sometimes involved in the latter. The incidence of onchocercosis reaches 70%; it usually affects the limbs, whereas in the horse the withers are frequently involved. As a pack animal the ass often develops tendinitis and tendovaginitis. Ticks represent a certain danger as the ass is a host of adult ticks of up to 5 species of Hyalomma.

The Merv breed and a number of local varieties, e.g. Georgian, occupy a rather limited area and comprises discrete "island" populations of diminishing number. The stock is declining due to low profitability of ass breeding and the related mule production. Expeditions and mountain rescue parties require only a small number of animals.

Recently animals of this species have been used in drug production.

Frequently asses prove to be more suitable for the production of specific sera than classical laboratory species.

Transformation of the rural economy, acquisition of modern privately-owned means of transport and other factors in the second half of the current century are liberating the rural population from the need to keep draught asses. Their controlled introduction into the buffer zones of reserves of onager, Middle Asian gazelle (G. subgutturosa) and other disappearing species of wildlife is quite justified. Specific measures of protection comprise the concentration of typical specimens of individual ass varieties at genetic resource farms in Azerbaijan (for the Caucasian group) and in Turkmenistan (for the Central Asian group) and their multiplication.

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12. DEER

V.A. Zabrodin and E.K. Borozdin

The deer family (Cervidae) is widespread in Europe, Asia, North and South America and North Africa. It includes 11 living genera and 48 species. In the USSR there are four genera with six species. 1) Roe deer (Capreolus) includes only one species, Capreolus capreolus. 2) True deer (Cervus). There are three species in the USSR: European fallow deer (Cervus dama), sika deer (Cervus nippon) and red deer (Cervus elaphus) with five subspecies in the USSR - European red, Bukhara, Caspian, maral, and izyubr. 3) Elks (Alces) have only one species, the European elk or sokhaty (Alces alces). It includes three subspecies: European, American, and Ussurian. 4) Reindeer (Rangifer) has only one species (Rangifer tarandus).

Three species are domesticated in the USSR: 1) Reindeer, with 2 340 000 domesticated and 900 000 wild. 2) Sika deer which number nearly 65 000 domesticated and 15 000 wild. 3) Marals estimated at 46 000 domesticated and 40 000 wild.

12.1 REINDEER

The northern regions account for nearly 50% of the territory of the USSR. The programme for their comprehensive development and exploitation of their resources involves improving special local branches of agriculture, such as deer farming, hunting and fishing. A big role in providing food for the local population is played by reindeer breeding. The USSR (with about 2.3 million head) accounts for 74% of the world's domesticated reindeer stock. In addition, the northern USSR is inhabited by about 900 000 wild reindeer.

The reindeer (Rangifer tarandus) is the most recent genus in the family Cervidae. Researchers trace its origin to the beginning of the Quaternary period (Pleistocene) in southern and temperate latitudes of North America. It assumed its present form towards the mid-Pleistocene; later during the time of the great glaciations, when temperatures fell in the northern hemisphere, it spread widely over the north of Europe, Asia and North America.

The reindeer genus was spread everywhere during the Riss-Wurm Interglacial period, which is often termed the mammoth and reindeer period. Its habitat shrank considerably in historic times which most probably occurred not without man's contribution.

The boundaries of the reindeer habitat have changed markedly in historic times, especially the southern border which has continuously moved northwards. It has shifted from a score or two up to 500 km, and this trend is still going on, especially in European USSR.

The domestication of reindeer occurred on the territory of the present-day USSR. According to some authors it happened at the end of the glacial period after the dog; they were thus one of the first animals to be domesticated (Bogoraz-Tan, 1933). Other scholars trace the origin of reindeer breeding to the 1st or 2nd centuries A.D. i.e. to a much later period than the time of appearance of other agricultural animals.

It is commonly assumed that reindeer domestication occurred not individually but by group or herd taming. The primitive hunters followed the wild deer herds; they did not set themselves the task of catching and rearing individual animals but used the most elementary methods (crowding, slaughter of herd leaders, unconscious selection etc.) and went over gradually to the management of herds.

Reindeer supplied man with all he needed for his survival in the rigorous conditions of the North. For its domestication it needs neither stalls nor corrals; it is able to find its own food, to endure very low temperatures and, by its migratory habits, to avoid overgrazing.

The economic importance of reindeer husbandry for the northern regions cannot be overestimated. The total volume of venison produced per year is 45-50 000 tons. Venison is the main agricultural product in the northern districts of the Kamchatka, Magadan and Tyumen regions.

Reindeer husbandry has a great social significance, 22 national minorities being involved in this branch of the economy. It ensures employment for the local population and the growth of its material well-being. Reindeer husbandry provides a greater economic return than other branches of agriculture or fishing-and-hunting. It promotes the development in collective and state farms of new enterprises, such as fur farming, dairy cattle breeding and plant growing.

Reindeer supply high-quality venison, skins and furs, and young antlers containing a biologically active substance termed rantorin. Reindeer are very widely used as transport animals, but this becomes less important every year with the increasing use of mechanized vehicles.

Reindeer have a light build, long thin strong legs, a short tail, comparatively long ears and a somewhat light head. All males of the family Cervidae have antlers but in the genus Rangifer the females have them as well. Antlers grow from pedicles on the frontal bone of the skull; they are shed every year, after which they regrow. Deer antlers are not covered with a horny coat like those of the Bovidae and do not build a continuous horny mass like those of rhinoceroses. During their formation the antlers are covered and protected by a furry skin with short thick hairs forming the so-called "velvet". After the ossification of the antlers this skin splits and withers away.

Reindeer have a pronounced sexual dimorphism. Males are usually bigger than females. Many reindeer have sexual distinction in their colouring as well.

Domesticated reindeer differ from their wild counterparts by more varied colouration (brown, pied, white, grey etc.), less slender body build, broader, shorter and rounder hoof soles. They graze pastures more closely, feeding not only on green herbage and lichens but on withering parts of plants as well. From each unit area of pasture they reap a much greater "harvest" than wild deer, which raises the yield of reindeer pastures considerably. All the reproductive processes of domesticated deer occur 2-4 weeks earlier than those of their wild counterparts, which means an earlier maturity of the former. The live weight of the young of domestic deer in October (i.e. towards the beginning of the winter period) exceeds that of wild ones by 30%. Important features of domestic deer are their herding instinct, absence of migratory instinct, more phlegmatic temperament as well as quick adaptation to external stimuli such as those from human dwellings.

The Far North is known for its extreme climatic conditions; the total solar radiation varies through the year from 0 to 15 kcal/cm, temperature from -64 to +38 C and the length of daylight from 0 to 24 hours.

Using a special method of cadastral survey of the entire Far Northern territory, 489 million ha of deer pastures with a reindeer population of 3 412 000 head were identified and assessed. Of this area the tundra zone and adjoining forest-tundra account for 300 million ha, with a carrying capacity of 2 500 000 head (136 ha per head), whereas taiga areas cover 189 million ha with a carrying capacity of 1 million deer (700 ha of pastures per head). The pasture area of an average deer breeding farm totals about 1 million ha.

Reindeer eat about 400 plant species, including 58 species of bushy fodder lichens (reindeer "moss"), 44 species of shrub willows and birches, 34 species of sedges, 24 species of legumes, 34 species of Compositae, 15 species of the buckwheat family (Polygonaceae), 7 species of horsetails and various species of grasses.

In summer reindeer feed on nutritionally valuable green vegetation. The content of the rumen at this time is as follows: leaves and stalks of shrubs 13-75%, various herbs 23-44%, grasses and sedges 2-17% and reindeer "moss" 16%. The reindeer eats 17-22 kg of green material per day which contains 4.3 kg of air dried matter. For 100 kg of live-weight up to 400 g of digestible protein and 6-7 feed units are needed. In autumn deer go over gradually to feeding on reindeer "moss". In early autumn the proportion of lichen in the reindeer diet averages 52.2%, that of green plants 36.1% and that of fungi, moss and pine needles 11.7%. During October-November the proportion of reindeer "moss" in the rumen increases to 71%. The amount of digestible protein needed per 100 kg of live weight falls to 150 g and the feed units to 4.78. In winter the proportion of lichen in the diet is 50-99%, that of green plants 14.4-48.1% and that of moss, twigs and dead grass 7.1-28%. If there is a shortage of lichen the proportion of green feed and of twigs increases. In spring deer go over gradually from lichens to green feed. A characteristic feature of lichen is a high content of carbohydrate and low content of protein and minerals - hence the shortage of digestible protein and of a number of macro- and micro-elements in the winter diet of reindeer.

The reindeer's ability to adapt to the rigorous conditions of the Far North is the most essential biological peculiarity of these animals. Their organism responds to changes in the feeding and climatic conditions by adaptive reactions. Changes occur in metabolism, thermoregulatory processes, reproduction, growth and development.

In summer deer enjoy the most valuable and nutritious feed and build up a store of nutrients. On average, deer feed for 39-48% and rest for 52-61% of the time. Digestibility reaches 68-70%.

In winter they expend a lot of energy in obtaining food. To find sufficient nutritious plants, they scrape away up to 70 m² of snow, executing 2490-4390 movements. About 67-75% of their active time is taken by snow digging and food procuring. Stags lose 28-30% of their live weight and hinds 10-15%. Especially great are the weight losses of skin, muscles, heart, lungs and liver, i.e. the organs with reserves of nutrients.

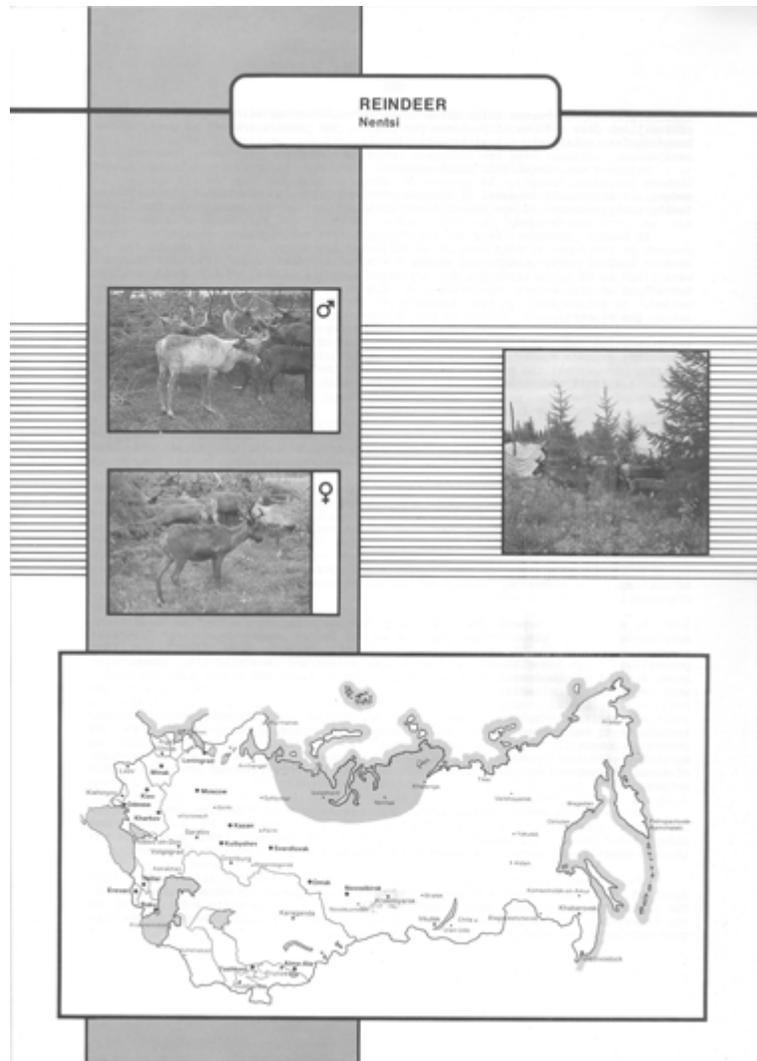
An important adaptive characteristic of deer is the seasonal nature of their reproduction and their very early maturity. The rutting season is in

September-October. Gestation lasts about 7.5 months. Offspring are born in April-May, i.e. in the most favourable period of the year. By autumn the live weight of fawns increases 7-8 times, reaching at the age of 6 months about 60% of the adult weight.

In winter the young do not grow. The next period of intensive growth occurs during the summer-autumn season. Females reach sexual maturity at 1.5 years and stags at 2.5 years. The period of active reproduction of stags lasts 9-10 years and that of hinds 12-14 years. The maximum longevity of domestic deer is 22 years.

The diploid chromosome number is 12-74. Five transferrin alleles have been detected, which occur with different frequency in different breeds and populations. The commonest is TfD, the least common TfE. The genetic similarity index, based on the transferrin locus, between taiga and tundra reindeer is 0.55, which is less than that between some breeds of other domestic animals.

Four native reindeer breeds have been identified in the USSR - Nentsi, Chukotka, Evenk and Even. They differ in productivity and conformation as well as in adaptation to specific natural and climatic conditions. All reindeer breeds are a result of selection, by various northern people.



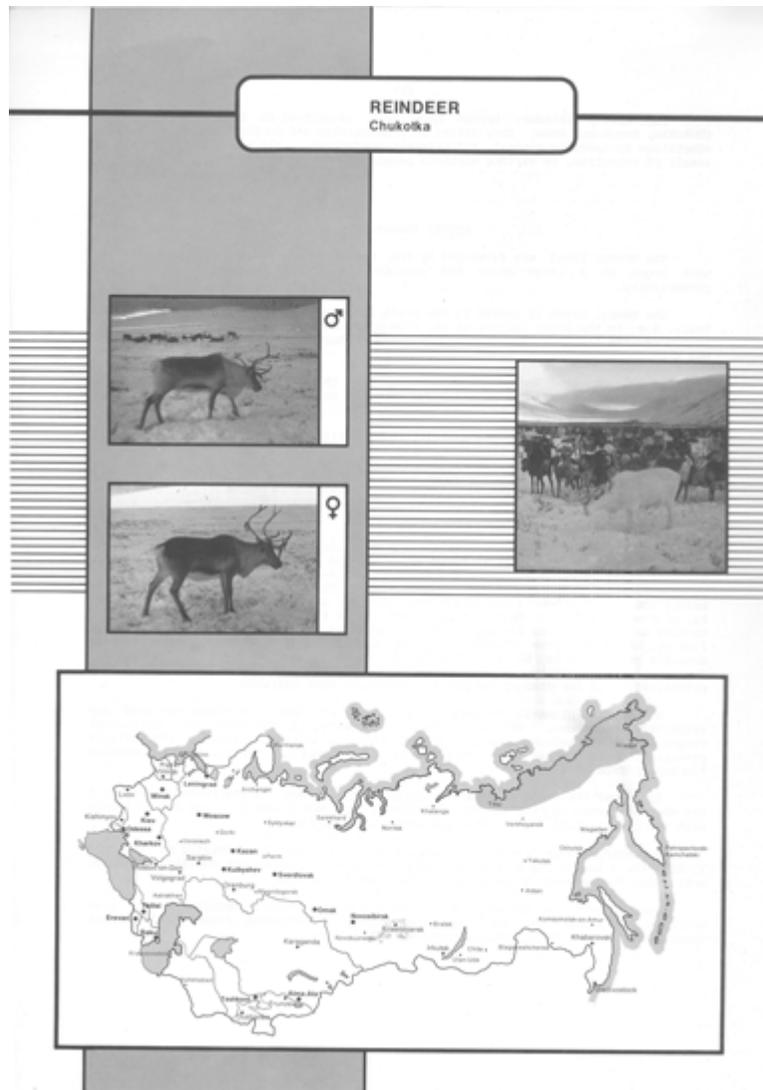
NENTSI (Nenetskaya)

The Nentsi breed was developed by the Nentsi people. In the 1930s breeding work began on a large scale and considerably increased size, strength and productivity.

The Nentsi breed is reared in the north of European USSR and to the east of the Urals, i.e. in the lower reaches of the rivers Ob and Yenisei. In the past Murmansk region was the breeding area of the Saami strain (Murmansk breed) but in the 1930s it was replaced by the Nentsi breed. At present the Nentsi breed numbers more than 850 000 head. This is a homogeneous group of animals with average size (as compared to other breeds), strong body build and mainly light brown in colour.

The skull structure of the Nentsi breed in different regions shows their common origin. The greatest skull length of adult stags is 365-384 mm and of hinds 328-353 mm, the skull width being 166-170 mm and 152-159 mm respectively. Skulls of the Nentsi breed are broad and have a short facial part. Their characteristic feature is an arch-like bend of the anterior end of

the nasal bones; the frontal bones are markedly depressed between the eyes, the occipital crests rising above the line of the facial part of the skull. Withers height of stags is 101.5-106.9 cm while that of hinds is 94.6-100.4 cm; oblique body length of stags is 109.8-115.4 cm and of hinds 98.9-106.0 cm; heart girth of stags is 122.3-128.9 cm and of hinds 114.5-123.8 cm; shank girth of stags is 12.1-12.8 cm and that of does 10.2-11.8 cm. The average live weight of stags before the rut (September) is 130-135 kg; that of adult females in October is 90-95 kg, of 6-month-old male fawns 56 kg and of their female counterparts 50 kg. The carcass weight of medium fat adult stags is 50-60 kg, that of females 42-45 kg. The live weight of pedigree animals is 20-30% higher than the average. The average dressing percentage is 50-51. Five to six month fawns are chosen for slaughter. They supply high-quality meat and valuable skins. Reindeer of the Nentsi breed are extensively used for draught but not for riding or pack carrying. Natural and climatic conditions in areas where Nentsi reindeer are bred are relatively monotonous. This is a low-lying country, in the main, with occasional ranges of low and medium mountains (the Khibini Mountains, the Urals), considerable precipitation in winter and comparatively warm summers. The average temperature fluctuates from -0.5° to 3.8°C . In summer the herds graze mainly on the Arctic coast in the tundra zone, which has abundant green vegetation, while in winter they are driven into the forest tundra with its profusion of feed lichens and protection from wind. A characteristic feature of this breed is that they feed chiefly on reindeer lichens for 8 months (from October to May). As the lichens do not contain sufficient nutrients, the animals' weight falls sharply toward spring. Rutting occurs at the end of September through October. Females usually give birth to one fawn. The fawn crop in years with favourable feeding and weather conditions is 85% and in pedigree herds up to 93%. The typical diseases of Nentsi reindeer are gadfly strike, necrobacillosis and pneumonia. Some animals are resistant to these diseases, but this question still requires proper investigation. Nentsi reindeer are perfectly adapted to local natural and climatic conditions. Transferring them to regions lying more to the south ended everywhere in failure. The animals perished within 2-3 years. The Nentsi breed is the most uniform and fixed one. Bigger animals are to be found on Arctic islands such as Kalguev and Vaigach. According to scientists this is due to favourable feeding conditions and is not due to genetic differences. The use of island sires in mainland herds did not bring about any improvement. There are 30 pedigree herds of the Nentsi breed within the area. For many years the breeding work has been carried out in experimental production farms of agricultural research institutes of the Far North, of the Murmansk experimental reindeer breeding station and of Yamal and Naryan-Mar agricultural experimental stations. The Nentsi is considered to be the most numerous and successful breed. However, because of large-scale industrial activity in a number of regions the area of lichen winter pastures is being reduced, which can have a negative impact on the local reindeer production.



CHUKOTKA (Chukotskaya)

The Chukotka breed is a result of selection by the Chukchi. It is reared in the Chukotka and Kamchatka peninsulas and in northeastern Yakutia. The total stock of these animals is about 600 000.

The Chukotka breed is considered to be the most recent and was formed not before the end of the 1st millennium A.D. Their main products are venison and skins; they are not used for transport. Even the herding was done by the Chukchi on foot. To preserve the stock, the most active specimens with a poor herding instinct were culled. As a result a characteristic feature of Chukotka reindeers appeared - their willingness to graze even poor pastures intensively and without straying from the herd. The Chukotka reindeers' ability to put on weight (fat) is surpassed by no other breed. This enables them to endure severe winters and lack of food when pastures are covered with an ice crust - a not infrequent occurrence. Chukotka skulls are small in size, the greatest skull length of stags being 358-362 mm and that of hinds 323-334 mm; the greatest skull width is 157-

167 cm and 147-157 mm respectively. They differ from the skulls of other breeds in being broader in both the cerebral and facial parts and in having a shorter muzzle.

The prevailing colour of Chukotka reindeer is dark brown. As regards their conformation, reindeers of this area have the most low-set, strong, round and slightly elongated body and shortish legs. Withers height of stags is 97.7-105.2 cm, that of hinds 90.2-99.6 cm; oblique body length of stags is 107.7-112.5 cm, that of hinds 102.4-105.9 cm; chest girth of stags is 132.6-135.3 cm and that of females 124.0-131.2 cm; shank girth of stags is 12.5-13.5 cm and that of hinds 11.3-12.2 cm.

The average live weight of stags before the rutting season is 130-140 kg and that of hinds 93-96 kg. The live weight of male fawns at the age of 6 months is 61 kg and of females 58 kg.

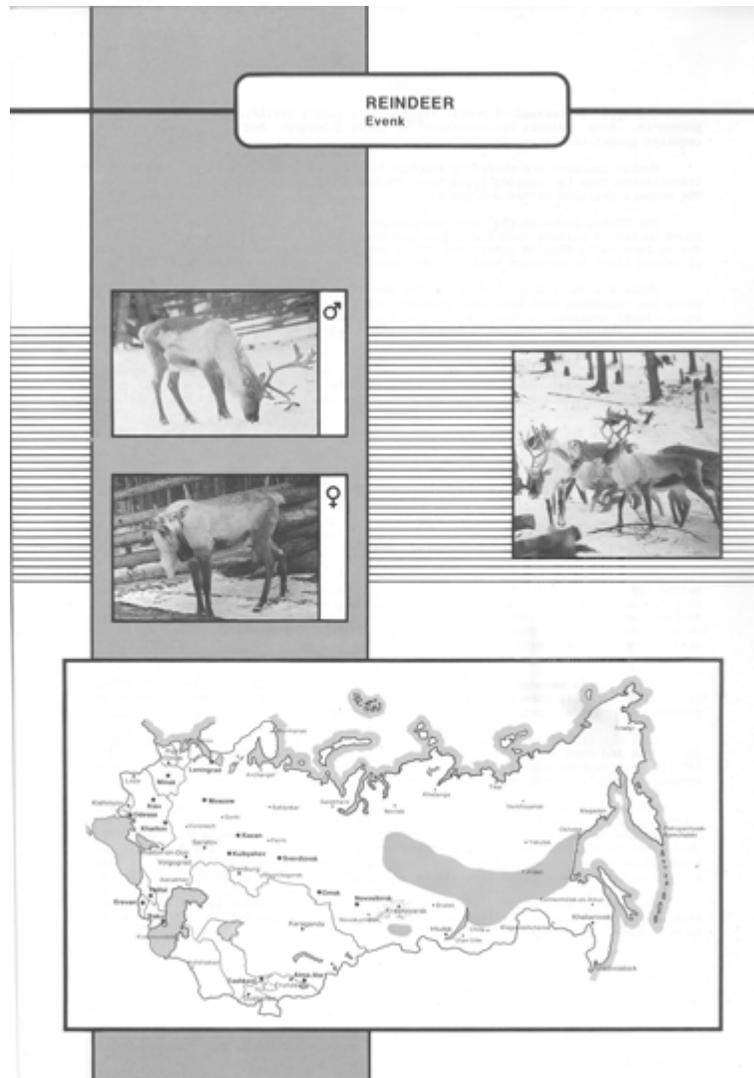
The Chukotka reindeer are known for their high meat production. Carcass weight of fat adult stags is 60 kg or more. The average slaughter yield is 53-55% and in very fat animals it can exceed 60%. Chukotka reindeer carcasses are also notable for their high meatiness.

Chukotka reindeer are adapted to the tundra plains with their short cool summers and long winters with scarce snow cover. Calving occurs 15-20 days earlier than in other breeds. They grow very quickly and by the age of 4-5 months there is already a big reserve of nutrients. Chukotka reindeer are comparatively resistant to necrobacillosis and pulmonary diseases and endure more easily the attacks of bloodsucking animals.

Three pedigree state farms for breeding Chukotka reindeer have been set up: Nizhnekolymski in the Yakut Autonomous Republic, Vozrozhdenie in Magadan region and 50th Anniversary of USSR in Kamchatka region.

Reindeer of the Chukotka breed are very popular thanks to their early maturity and adaptation to the conditions of arctic and subarctic tundras.

They have been introduced into western Yakutia and into the Taimyr peninsula and are used for crossing with other breeds.



EVENK (Evenkiiskaya)

The Evenk breed was formed by the Evenk people (or their ancestors) and is distributed everywhere this northern nationality lives. It is considered to be the oldest breed and to have been the basis for developing other breeds. Archaeological findings give evidence that deer raising for transport originated in southern Siberia (around Lake Baikal, Tuva ASSR, Altai territory), where the ancestors of the present-day Evenks dwelt. As a draught animal, which could also be used for riding and pack carrying, a large and tall deer was needed, like the present-day Evenk breed. The ancient origin of this breed is proved, among other things, by its differentiation into special strains.

The total stock of the Evenk breed amounts to about 250 000 head. They are reared in the Taiga zone of Siberia and the Far East from the Yenisei to the coast of the sea of Okhotsk and Sakhalin island. Most of them are in the Evenk Autonomous District, Yakutia, Buryatia and Tuva, Khabarovsk territory, Irkutsk, Chita and Amur regions. Large size is a distinguishing

feature of reindeer in the Tuva ASSR and Irkutsk region. According to a number of scholars, they form an independent strain -the Tuva-Tofalor type. The Evenk breed has the largest skull. The average skull length of adult stags is 409 mm (range 389-430 mm), that of adult hinds being 361 mm (range 351-369). Skull width at the widest point is 177 mm (171-182) and 161 mm (157-163) respectively. The skull of the Evenk reindeer is comparatively narrow; the transition from the facial to the cerebral part is only slightly marked and interorbital depressions are not deep. The prevailing colour is light brown but in eastern areas a considerable number of grey animals can be seen.

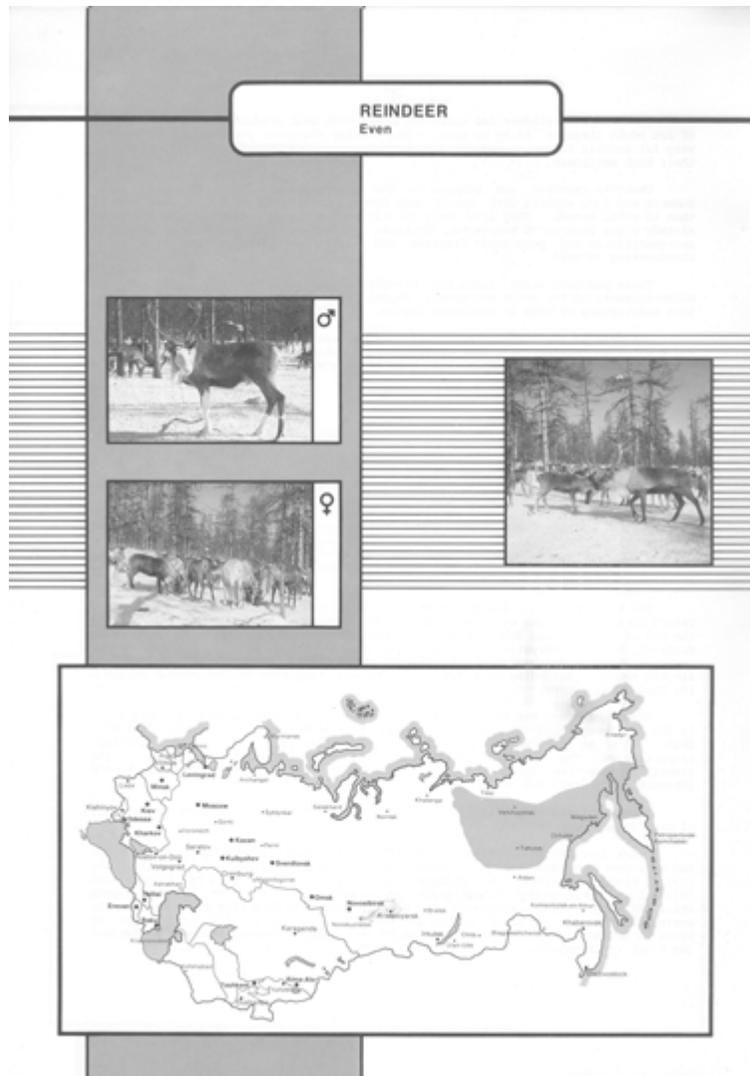
Evenk deer are tall animals with a well-developed elongated body, deep chest and well-developed muscles and skeleton. Withers height of stags is 113.0-118.3 cm, that of hinds 100.9-106.5 cm; oblique body length is 114.0-127.4 cm in stags and 107.1-115.7 cm in hinds; chest girth of stags is 126.6-143.5 cm, that of hinds 116.2-131.0 cm; shank girth is 13.3-14.8 cm in stags and 11.2-12.5 cm in hinds. The average live weight of stags before the rutting season is 140-170 kg and that of hinds in autumn 108-120 kg. The live weight of 6-month-old fawns is 68-72 kg (males) and 63-68 kg (females).

The animals of this breed are known for their high load-carrying capacity and endurance and are still extensively used for transport.

As regards meat production they are second to no other breed of reindeer. The weight of fat adult stags is 70-85 kg, that of hinds 50-60 kg, the slaughter yield being 48-49%.

The Evenk breed is well adapted to taiga conditions. In winter they easily scrape away snow to get their food and can dig holes over one metre deep. In summer and autumn the herd spreads far away from the fenced enclosures. During the rut they often stay in separate groups or herds. During the autumn slaughter two embryos are discovered in many females but in most cases one foetus is being resorbed. However, twins account for 3-5% of births, a comparatively high figure. Improved feeding and management (supplemental feeding and undisturbed grazing) can promote prolificacy considerably.

A state pedigree station, Surindinski, has been set up, where the best specimens of the Evenk breed have been concentrated. This is, actually, the only pedigree reindeer plant in the world. The entire range of breeding work is being carried out here, and the genetic structure of the population is being investigated, as regards blood groups and polymorphic serum proteins. On the basis of these data it is possible, for the first time, to establish the fawns' paternity, which permits the introduction of line-breeding.



EVEN (Evenskaya)

The Even breed is reared in the mountain taiga districts of Yakutia and of Magadan and Kamchatka regions. The total stock of the Even breed is nearly 550 000.

In type this breed is intermediate between the Chukotka and Evenk breeds. They are well adapted to mountainous areas, occupying alpine pasture in summer and river valleys and depressions in winter. Mountain areas are extremely varied; however in this zone the common feature is the comparatively short migration routes and small herd size, the latter being due to the low carrying capacity of the available pastures.

The greatest skull length of Even stags averages 381 mm, and that of hinds 355 mm, the greatest skull width being 165-172 mm and 154--162 mm respectively. Compared with the Evenk breed, the Even deer have an even less pronounced transition from the facial to cerebral part.

The prevailing colour of this breed is light brown.

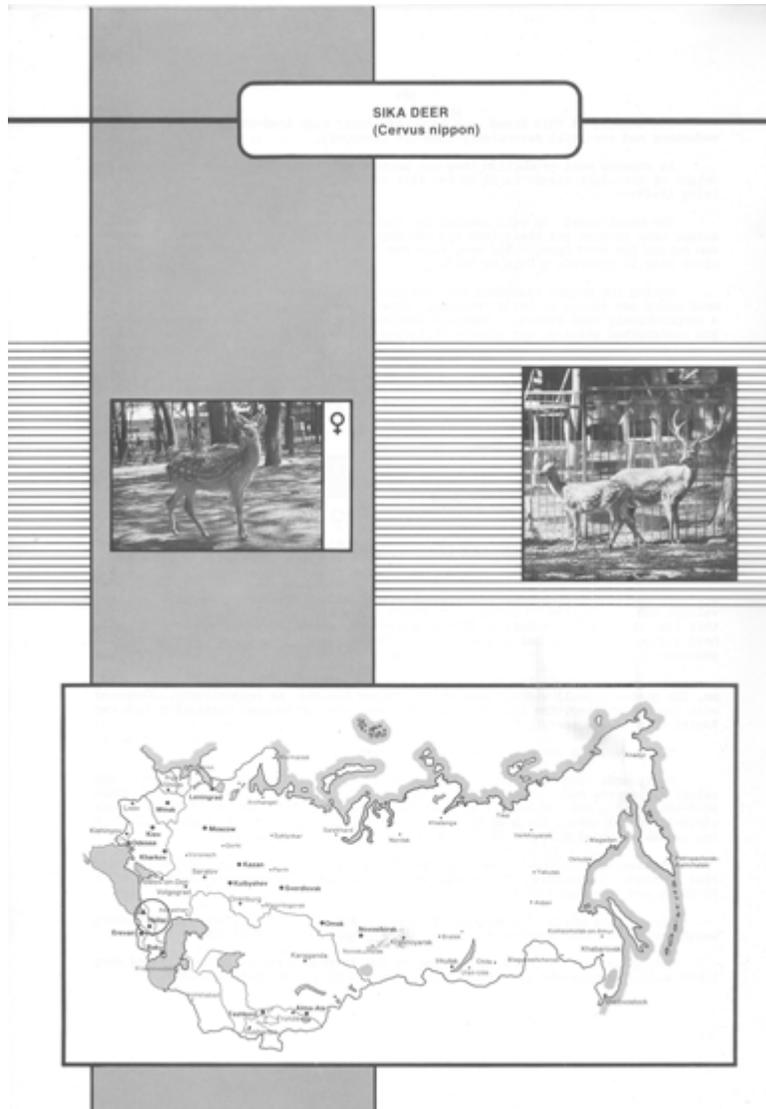
As regards conformation, the Even deer are tall animals with a long and relatively narrow body. Withers height of stags is 102.1-111.4 cm and that of hinds 96.8-101.1 cm; oblique body length of stags is 109.4-119.7 cm and that of hinds 107.5-110.0 cm; heart girth of stags is 126.9-135.3 cm and that of hinds 116.7-126.0 cm; shank girth of stags is 12.7-13.5 cm and of hinds 11.7-12.8 cm.

The average live weight of stags before the rutting season is 135-145 kg while that of hinds in autumn is 91-103 kg. The live weight of 6-month-old male fawns is 57-60 kg and of females 55 kg.

The carcass weight of medium-fat adult stags is 55-65 kg, the corresponding weight of adult females being 45-50 kg; the slaughter yield is 49-50%.

Intensive work is being carried out at the present time to further fix the Even breed and to investigate its genetic structure and biological peculiarities. Scientific and technological progress and development of the breeding work provide a new approach to reindeer production. Agricultural experiment stations and pedigree stations are now being organized, in contrast to the time when the breeding was done by traditional methods only. The latest achievements in biology make it possible to establish the parentage of fawns. So that now reindeer breeding can be carried out on a strictly scientific basis.

Thus reindeer production can maintain its special place while achieving the efficiency of other branches of animal husbandry.



12.2 SIKA DEER

The sika or spotted deer (*Cervus nippon*), which was on the brink of extinction at the beginning of the 20th century, occupies a special place in the deer family. The curative properties of drugs made from the antlers in velvet have long been highly valued in China and Tibet. At the beginning of this century the price of antlers reached 500 roubles per pound. Therefore, antlered deer were intensively hunted and the sika population was dramatically reduced. Thus, in 1919 there were barely a thousand wild sika deer in Primorski territory of the USSR.

According to palaeozoological data, the genus *Cervus* originated in southern Asia. In the course of evolution the earlier small antlerless animals increased in body size and acquired antlers. Sika deer represent the most ancient and primitive form of the genus as shown by the simpler structure of their antlers which, as distinct from the red deer's antlers, are devoid of the second supraorbital tine. In addition the adult animal retains its spotted coat.

Nevertheless sika deer are closely related to the red deer and can cross with them in any combination.

Wild sika deer are distributed in Japan, Taiwan, Korea, northeast China and southeast USSR - the Primorsky territory. There is some evidence, however, that some hundred years ago sika deer also inhabited the islands of the Minor Kuril ridge.

In the 1920s the stock of wild sika deer in the Far East numbered 900 to 1000 but by 1949 it had dropped to 300. In 1974 therefore sika deer were entered in the IUCN Red Data Book and in the Red Book of the USSR. By 1981-82 it had been possible to raise the number of wild sika deer in Primorski territory to 3500.

Acclimatization of sika deer in other suitable areas began at the end of the last century. They were brought from Ussuri territory to New Zealand where they adapted well and increased to 30 000 head. A bit later (at the beginning of the current century) sika deer were brought to western Europe. Germany and Denmark at present have a stock of more than 2000.

Introduction of sika into the European part of the USSR started in 1909 when several animals were brought from the Far East to the Ukrainian steppe (Askania Nova). After World War II more than 600 were delivered from reserves and state farm parks to be set free on moors in 14 regions of Ukraine. This activity resulted in several permanent habitats of sika deer on the Ukrainian territory. By 1980 sika deer had been introduced into 40-45 sites on the territories of 25 regions, territories and autonomous republics. The introduced stock and their descendants now total 2500 head.

Adaptation was not equally successful in all sites.

The number of wild sika deer in the Soviet Union at present is approximately 15 000.

Sika deer habitats in Primorski territory are primarily oak and broad-leaved forests of the Manchurian type with good undergrowth, and less commonly, cedar broad-leaved forests at altitudes not higher than 500 m. The animals readily feed on the shrubs that replace a burnt-out forest. The amount of winter precipitation in the form of snow should not exceed 800 to 1000 mm, the snow should not be deeper than 30 cm and the snow period should average less than 45 days. Southern and southeastern slopes of coastal ridges are most suitable places. In the western part of the USSR sika deer are primarily found in deciduous and mixed forests and in pine forests when the snow is deep.

In the Primorski sika habitat there are more than 129 plants in their diet, with bushes and twigs constituting its major portion (up to 70% by volume). The main feed comprises acorns, leaves, buds and browse as well as shoots of oak, Manchurian aralia and lime. Besides, sika deer eagerly feed on Lespedeza, Acanthopanax, Manchurian nut, Amur grape, elm, maple, ash, sedge and umbellifers in summer. During the second half of winter when the snow is deep the animals browse on willows, Chosenia, bird cherry and alder. On the seashore they feed on *Zostera* and *Laminaria* seaweed which contain salts.

In trans-Ural and European USSR sika deer have more than 390 species of plants in their diet with only one-eighth of them the same as in Primorski territory; 15 species represent excellent fodder while 173 are good. It is worth noting that the summer diet contains less shrub and tree feed as compared to Primorski territory as the animals graze high grasses at this

time. In winter they browse on filbert, oak, aspen, willow, pine shoots, elm, Euonymus, buckthorn and fir tree bark. Deer readily eat hay as supplementary fodder.

Domestication of sika deer began much later than that of marals. Ponosov was the first to begin breeding them in Primorski territory in 1781. He bought sikas from hunters who had caught them alive and in a few years he had a herd of 500 head in the Valentine bay area. A number of other farms followed his example. The first large sika breeding farm, however, was set up by Yankovski on the Sidimi peninsula in Peter the Great bay, on the coast of the Sea of Japan. At the time there were wild deer in the peninsula. In 1908 a large area exceeding 2000 ha was fenced and by 1914 Yankovski's farm could boast 2000 sikas. Almost at the same time another large private farm for breeding sika was set up on Ascold island to be followed a little later by farms on other islands in the Sea of Japan. Two main types of sika breeding have emerged: in domestic deer sheds and in parks. The conditions in domestic deer sheds were unsatisfactory because of insufficient area per animal and inadequate quality of feed. The animals in the sheds were given stored food throughout the year and were not allowed out to graze.

In larger farms there were both sheds and parks so the deer could spend the whole year on pasture. Supplementary feeding was provided only in case of very severe winters. With adequate park area (2 to 3 ha per animal) the deer had sufficient green fodder even in winter. In the course of several years, however, the quantity of feed in the winter parks fell drastically due to the slow regeneration of browsed trees and bushes, which led to a considerable loss of deer. With the exception of several well-managed privately-owned farms, the majority of deer were kept under unsatisfactory conditions.

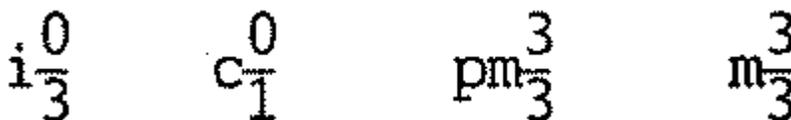
During the early stages of domestication even elementary pedigree breeding was lacking; the animals were untamed, all stags and hinds were kept together and inbreeding was practised which reduced viability. The deer stock on private farms developed diseases, live weight and productivity declined and barrenness increased. Some of the breeders formed the opinion that domestication of deer inevitably leads to their degeneration. Others believed that it was possible to avoid degeneration by allocating larger areas to the animals - up to 10 ha per head. Evidently, the breeders did not realize that the process of domestication should not imitate blindfold the conditions of the deer's natural habitat. A drastic change was necessary in the management of sika breeding; this change was brought about by the organization of state farms. It is worth noting that domestication of the sika deer followed the example of reindeer domestication, that is taming of the herd rather than of individuals. The first state farm to breed sika deer was set up in the Far East in 1924 to be followed by others in 1929-30 and later. The state farms worked out the system of deer management and feeding, developed extensive pedigree breeding, radically improved veterinary aid and perfected the technique of cutting off velvet antlers. This allowed the sika deer stock to be increased by 72% and the output of the major commercial product, velvet antlers, by 282% in the period from 1932 to 1939 alone.

The sika deer is of relatively moderate size. Live weight of adult males is 120-140 kg, that of adult females is 70-100 kg. It is slenderly built, very

mobile and graceful. The head is of medium size, light, somewhat narrow in the facial part. The ears are large with little hair inside. The medium-sized neck has a well-developed mane. The body is short with a rounded rump and a tail longer than in many other species. Thin, graceful and muscular legs end in small sharp hoofs. Males have antlers with not more than 5 tines.

The summer coat of adults is predominantly bright red with a large number of white spots on the sides. The lower the spots the larger they are. A black crest goes along the back from the occiput to the tail. The prevailing colour of the winter fur is grey or brownish (to dark brown) in males and light grey in females. The spring moult occurs in April and the winter moult in September.

Maximum cranial length of a sika reaches 320 mm. Cranial width between the eye sockets and antlers is less than its width between the supra-auricle tubercles. The posterior ends of the nasal bones are located at the level of the anterior ends of the eye sockets or somewhat in front of them. The dental formula is:



Sika deer reach maturity at the age of 16-18 months. Rutting starts in September and lasts 1.5-2.0 months. Oestrus in females lasts several days. Repeated matings occur at short intervals. Hinds that fail to get pregnant come on heat for a second time. The gestation period is 218-223 days (7.5 months). Females usually produce one fawn; twins are exceptional.

Newborn fawns weigh 4.75-6.95 kg and are up to 50 cm high. The fawns immediately start to suck and begin to walk several hours later. The fawns are usually weaned after 5-6 months of suckling; if not, the suckling period can last till the next calving. During their first year young animals grow fast, particularly in summer and autumn; they cease to grow after their second year. Nevertheless, they continue to lay down fat and males and females reach their maximum weight at the age of 7-10 and 4-6 years respectively. The life span of the sika deer is 18-20 years.

Velvet, i.e. unossified, antlers are the main product from sika deer. They are first cut at the age of two, prior to the completion of the antler's growth. The older the animals the sooner their antlers grow and the earlier they can be cut off. The antler weight increases from 389 g at the age of two years to 1436 g at the age of 10 or more.

Velvet antlers are used to produce a valuable drug, pantocrine, which primarily affects the nervous system resulting in complex functional changes in the organism. It is a highly potent tonic with a therapeutic effect on various diseases.

Apart from velvet antlers sika deer yield high quality meat and skin. The carcass weight of an adult male is 60-100 kg. Secondary products comprise tails, tendons (of knee and hock joints down to hoofs), male genitalia with testes and 2 or 3-month embryos.

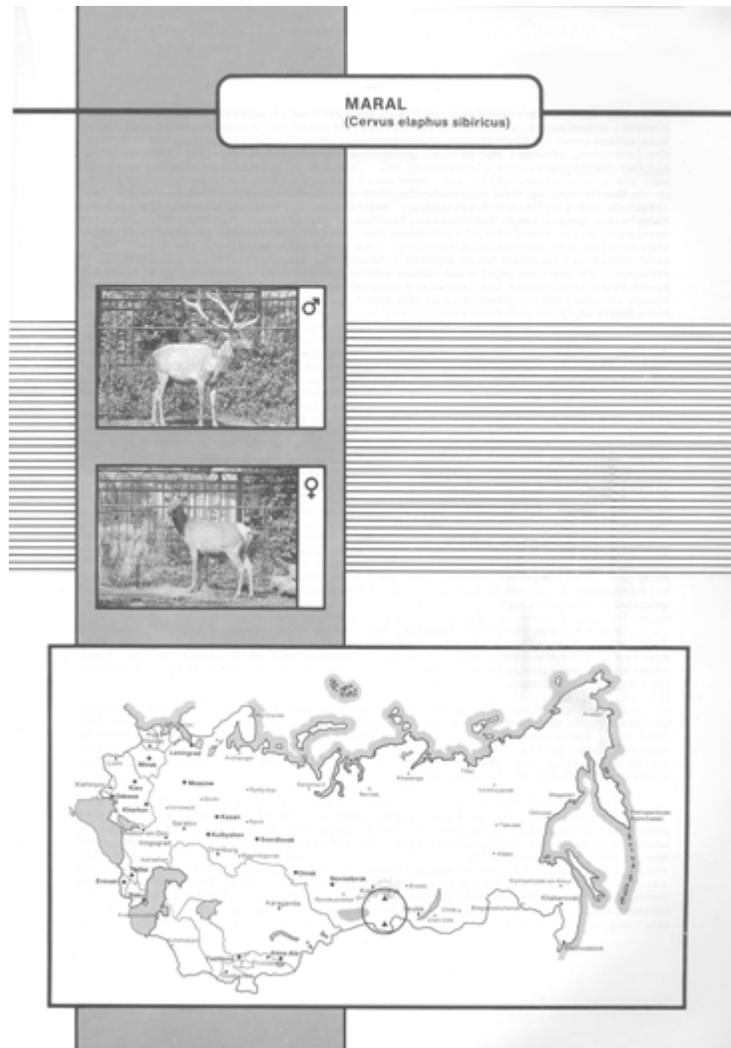
Breeding is aimed at increasing the yield of the main product, i.e. the weight of velvet antlers. The farms keep records of pedigree stags and carry out their evaluation. All stags are divided into four classes: elite, 1st, 2nd and 3rd class. Pedigree breeding involves the animals of the elite and the 1st

class. Each farm sets up a pedigree nucleus that comprises healthy, well-built hinds aged 3-10 years with a body weight exceeding the average (over 85 kg) and sires of the elite class aged 5-10 years. In order to fully exploit the best sires they are given valuable hinds in a series of controlled matings.

The data on sika deer breeding on the steppe (Askania Nova) demonstrate the high adaptability of these essentially woodland animals. This is confirmed by the results of the introduction of 222 sika deer from Primorski territory into the Gorno-Altai autonomous region where they produced more offspring than in their original habitat. On the Altai farms, the stock has grown 23 times in 33 years and the fawn crops and the yield of velvet antlers during this period were higher than in the Primorsky territory. Greater productivity of sika deer in the Altai region was achieved by maintaining sex and age groups separately in so-called gardens, separate pasture corrals, and adequate feeding. During late autumn, winter and early spring the diet of the sika deer should contain silage, hay, browse and twigs, and concentrates.

Sika deer bred on farms number 65 000 animals. Further increase in productivity depends on the adequate organization of pasture maintenance, appropriate feeding throughout the year and the level of pedigree breeding. The results of 50-70 years of domestication of sika deer on the farms of the Primorsky territory as well as the data on their breeding in other zones, especially in the Altai region, show that the best representatives in advanced farms considerably exceed their wild counterparts in all parameters. The time has come to develop a breed of sika deer and to use outstanding pedigree specimens for large-scale improvement. There are now sufficient grounds to recognize the Altai breed group of the sika deer. Such infectious diseases as foot-and-mouth, rabies, blackquarter, necrobacillosis, haemorrhagic septicaemia (pasteurellosis), anthrax, tuberculosis and leptospirosis are encountered in sika deer. In addition, there have been cases of ringworm and coccidiosis. Dicrocoelium helminths have been found in deer in various places. Farmbred sika deer displayed 4 species of flatworms, 3 species of tapeworms and 29 species of roundworms. Wild sika deer may be hosts for ticks (Dermocentor, Ixodes and others). Great trouble and damage is inflicted by flies (Simulium maculatum), dermatitis, horsefly (Hippoboscidae) deer ticks (Lipoptena cervi), Trichodectes and other ectoparasites. On farms, rhinopharyngeal gadfly proved to be very harmful.

Keeping in parks and adaptation of deer to different zones of the USSR do not diminish the importance of protecting the wild population. Sika deer suffer from deep snow and have a lot of enemies: wolf, tiger, leopard, lynx, brown bear and wild dogs. Wolves represent the main danger and account for 25% of deaths. Industrial and agricultural development of the territory also produces an unfavourable effect on the indigenous deer population. Vigorous efforts are necessary for better protection of the wild population of sika deer and for the preservation of the original gene pool of this valuable animal species.



12.3 MARALS

Marals or Siberian red deer are the largest red deer of Eurasia. Their useful characteristics have long attracted man. Of the greatest value are their velvet antlers which are used to manufacture pantocrine, a substance used in medicine. Pantocrine regulates the functioning of the cardiovascular system and the gastroenteric tract, stimulates regeneration processes and is used as a tonic.

Preparations obtained from the velvet antlers of marals have long been used in Tibetan medicine and have met a ready market in China. As a result the maral population in the Altai and Siberia was drastically reduced by the end of the 19th century. These valuable animals have been saved from complete extermination by the ban on their hunting, introduced during the first years of Soviet rule.

The maral was classified by N.A. Severtzov as a separate species. Later, however, a number of taxonomists classified the maral as a subspecies of red deer. This species can be divided into three groups - Western, Central

Asian and Siberian. The last group includes the marals, *Cervus elaphus sibiricus* and the izyubrs, *Cervus elaphus xanthopygos*.

The habitat of wild marals in the USSR covers the area limited by 71-115° east longitude and 41-57° north latitude. Marals inhabit Altai territory, the Sayans, Kazakhstan, Baikal and Transbaikal regions. At present no accurate data are available on the exact boundary between the habitats of marals and izyubrs. Where they overlap (the conventional boundary runs along Lake Baikal and the River Irkut) individuals can be found which possess intermediate characteristics. According to Fedosenko the population of wild marals exceeds 40 000 while that of izyubrs amounts to 99 340; these data are from the Registration Service of Glavokhota (the Central Agency for Hunting and Reserves) of the RSFSR. Besides the USSR, wild marals are also found in China and Mongolia.

Marals and izyubrs live mainly in mountains. They prefer broken country and forests. Marals find suitable biotopes in juniper, spruce, spruce and fir, and birch forests and shrubs on mountain slopes as well as in birch and aspen groves in river valleys, and in deciduous, cedar and pine forests. In summer the stags leave the forests and go up to alpine meadows and high-altitude tundra.

In summer marals feed mainly on grass and to some extent on willow browse and leaves. In autumn they eagerly browse on twigs. In winter the proportion of tree feed in their diet increases considerably and reaches a maximum sometime in March. Marals thrive on the bark and twigs of rowan trees, willows, cotoneasters, black currants etc. Among green feed they prefer rhubarb, *Astragalus*, dandelion, great plantain, cocksfoot grass, the leaves of *Eremurus altaicus*, *Pedicularis*, Tyan Shan dock, foxtail, *Corydalis*, thistle and other herbs. The diet of marals and izyubrs in different places includes more than 100 species of plants.

The Chinese began to buy the velvet antlers of marals hunted by Russian settlers in the Altai region in the 1560s. High prices of velvet antlers stimulated deer hunting, which soon resulted in a considerable decrease in the maral population. Each year hunting deer became more laborious and less effective. Under such circumstances it proved better to catch live animals and keep them in captivity to get their velvet antlers.

Domestication of marals began in the 1840s. The Sharypov brothers were the first to catch marals. Maral keeping first occurred in the south of Altai region to spread later to the north and northwest. The domestication of marals in the Sayans (Krasnoyarsk territory) began in the 1890s and by the end of the century 3000 animals were kept on 200 farms.

A new impetus to maral breeding was given by the introduction of a novel method of cutting off the velvet antler in live animals. Like the velvet antlers taken from dead deer, these cut-off antlers not used before, soon met a ready market, though at somewhat lower prices. The benefits of the new method were obvious - while antlers can be taken only once when the animal is killed, the cut-off antlers can be taken every year till the animal gets old.

At first maral keeping developed mainly through catching wild stags, which soon led to a decrease in the wild population. The scarcity of stags made catching them ever more difficult. It became necessary to produce offspring from the females, which required their domestication also. Thus maral keeping entered a new stage and became true breeding with the extensive

catching of wild hinds and keeping them with stags. Gradually the percentage of hinds in the herds increased. Thus, in the region of the river Bukhtarma in the south Altai, in 1877, there were, on the average, 72% of males and 28% of females in the herds, while figures for 1928 were 50 % and 50%.

In the early stage of domestication marals were kept in enclosures. One cage 11 x 6.5 m in size with a fence 2.25-2.5 m in height housed two deer. The animals were kept on this small fenced area all the year round and did not graze on natural pasture. The negative effects of such housing soon became manifest in the large number of animals culled due to disease, low productivity etc. Therefore, in the second stage of maral breeding special farms were set up throughout nearly all the breeding area. These farms were virtually fenced pastures usually situated on mountain slopes with small rivers or brooks running through them to provide water. In winter the animals were given hay and stags growing their antlers were given small quantities of concentrated feed.

Maral breeding on private plots was not effective. Frequent contacts with domestic animals caused a high incidence of disease and a high rate of disposal. The driving of herds when the stags were chased to have their velvet antlers cut was particularly hazardous. Breeding was actually non-existent. The animals could hardly be called domesticated. Later maral breeding became an activity of state and collective farms which drastically changed the system.

The first state farm specializing in maral breeding, Katon-Karagaiski, was set up in 1924. Later, in 1929-30, a dozen similar farms were set up in Altai and Krasnoyarsk territories. These specialized farms crucially changed the management and feeding of marals as well as methods of cutting and processing antlers. The area of the farms grew considerably and land management was carried out everywhere. Many labour-consuming processes, feeding and transport in particular, were to a great extent mechanized and qualified personnel were trained.

At present the grazing areas for marals are divided into several sections in order to keep stags, hinds and their young separately. The hazardous driving of herds to cut the antlers is eliminated. Partitioned corrals make it possible to manage rutting and fawning. Special facilities where the animals can be driven in and immobilized in stalls facilitate zootechnical and veterinary treatment. In winter the animals are divided into groups and kept on limited sites equipped for wintering with feeders and sheds. Differential feeding has been introduced.

Late spring and summer is the best time for marals since they get all the necessary nutrients from pastures. In autumn, winter and early spring they are given hay, silage or concentrates, according to age and sex. Since the organization of specialized state farms rutting has been a controlled process, managed by specialists. Only the best stags are used for mating. Large-scale breeding activities go in parallel with thorough studies of maral breeding.

Extensive work carried out over a comparatively short period has resulted in a complete reconstruction and rapid development of maral breeding. It has now become a highly profitable and promising branch of animal husbandry in the USSR. During the period from 1932 to 1939 alone the stock of marals on state farms increased by 51% while the output of their main commercial

product - velvet antlers - increased by 82%. The mortality rate dropped to 2-3% a year. The average weaner output per hind in the state farms of Altai territory was 55.1-59.9%.

These figures are much better than those characterizing the best private plots. In subsequent years the output of young stock increased on the majority of the farms while individual farms reached a figure of 72-74%. It is important to note that since state farms were set up to breed marals these animals have become better domesticated which allows more effective breeding activity. This together with better feeding and management results in higher productivity. Successful farms have highly productive herds where the best specimens far surpass their wild kin in useful characteristics.

Stags of the elite class, whose live weight is 350-380 kg, give velvet antlers weighing over 15 kg. We are witnessing the evolution of a new breed of domesticated marals, which deserves the special attention of both scientists and practical breeders.

The maral herd on state farms now totals more than 30 000 animals. The live weight of adult males is 250-400 kg and that of females 150-250 kg; they measure 150-155 cm at the withers.

The head is relatively small and narrow in front. There is a slight depression in the forehead between the eyes. The lacrimal fossae are quite noticeable. The muzzle is hairless and the nostrils are wide and dark in colour. The ears are rather large and wide. The head is 44 cm long and 21 cm wide. The dental formula is:

$$i \frac{0}{3} \quad c \frac{0-1}{1} \quad pm \frac{3}{3} \quad m \frac{3}{3} = 32$$

There is a well-developed mane on the neck. The withers are high, the back nearly straight, the loin long and the rump short, rounded and drooping. The tail is short. The legs are strong, muscular, lean and slim. The hindlegs are cow-hocked. The hoofs are small and pointed in front.

In winter the coat of stags is greyish brown on the back and sides, while the head, mane, legs and the underline are darker. A more or less noticeable dark line runs down the neck and back. In summer the colour of the coat is darker and more uniform. The females are steel grey or smoky in winter and brown in summer. The coat is shed in spring and autumn.

The antlers are very large and have 6-7 tines. The stems grow wide apart. Marals shed their antlers from late March till early May. The clean shedding of the velvet begins in late August and ends in September. New antlers begin to grow in March-April and they become fully developed in summer. Mating begins in late August or early September and continues for 4-7 weeks. Hinds are in heat for 1-2 days and if they are not bred they come into heat again in 15-20 days. The gestation period lasts for 242-248 days, i.e. 8-8.5 months. Fawning begins in May and ends in June. Newborn marals weigh 12-14 kg. Their coat is spotted. They remain lying down for some days and then get up to follow their mothers. Marals reach puberty at the age of 15-16 months. The length of life is up to 20 years. The diploid chromosome number is 68.

The main product of maral breeding is velvet antlers. These are considerably larger than the antlers of sika deer. Two-year-old marals have

velvet antlers that weigh about 3 kg and when the animals are ten years of age or older the weight of their antlers can amount to 16 kg. Some stags grow antlers exceeding 20 kg in weight. The velvet antlers of marals, however, are somewhat less valuable than those of sika deer. Besides the antlers, marals give high quality venison and skins. Their skin is used to make chamois leather.

As with sika deer, the breeding activities with marals have the aim of increasing the output of the main product i.e. of increasing the weight and improving the quality of velvet antlers. The serious breeding work at many maral breeding farms has resulted in high productivity. Often more than 30% of stags are graded as elite class with the antlers weighing more than 10 kg.

The ecological adaptability of deer is a great asset for further improvement of the breed. This can be easily seen in the successful acclimatization of the hybrid obtained by crossing the Altai maral with the Crimean red deer (with an infusion of blood of other forms) on the island of Biryuchy in the Azov-Sivash preserve. The hybrids can live in this area which is lacking in fresh water. The high adaptability of marals should be used to develop economically useful characteristics in new breeds, for which concerted effort is required in the near future.

To date such contagious and helminth diseases are registered in marals as tuberculosis, necrobacillosis, dictyocaulosis, elaphostrongylosis, setariosis and some others. Lower productivity and slower growth of the stock are brought about mainly by tuberculosis. As for sika deer, blood-sucking dipterous insects are a big hazard and nuisance for marals.

Deep snow, predators and stray dogs are all negative factors affecting the existence of both marals and sika deer. The human influence on their habitat is also hazardous for wild marals and results in a decrease of their population. Effective measures are needed to improve the protection of the indigenous maral populations and thus to preserve the basic gene pool of this valuable species.

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13. DOMESTIC FOWL

I.A. Paronyan and O.P. Yurchenko

Modern poultry production in the USSR is developing on the basis of industrial technologies and two-way specialization, i.e. egg and meat production.

In the socialized sector the average annual egg yield of hens increased from 130 in 1964 to 226 in 1984. In the same period the total egg production grew from 29 to 73 thousand million. Numbers of breeding chickens were 230 912 000 in 1980 as against 174 758 000 in 1975 - an increase of 30%.

For egg production most chickens are three- or four-line crosses based on imported grandparental lines of the following: Shaver - 288, 292, 444, Evribreed -Highsex White, Highsex Brown and others. During the same time the numbers of egg-type Russian White chickens decreased - they were 6.8-fold less in 1980 compared with 1975.

For meat production the prevailing stocks are the four-line crosses Broiler-6 and Broiler-compact-8 which have been formed from Dutch lines of the Evribreed firm. The live weight of 7-week-old broilers is 1.7 kg, with 2.8 kg of feed being consumed per kilogram of gain.

Total fowl meat production was 2.2 million tonnes in 1984, i.e. three times as much as in 1965 (700 000 t). The Food Programme of the USSR envisages production of 3.4-3.6 m t of fowl meat in 1990. Special attention is being paid to the encouragement of fowl breeding on the private plots of collective farmers.

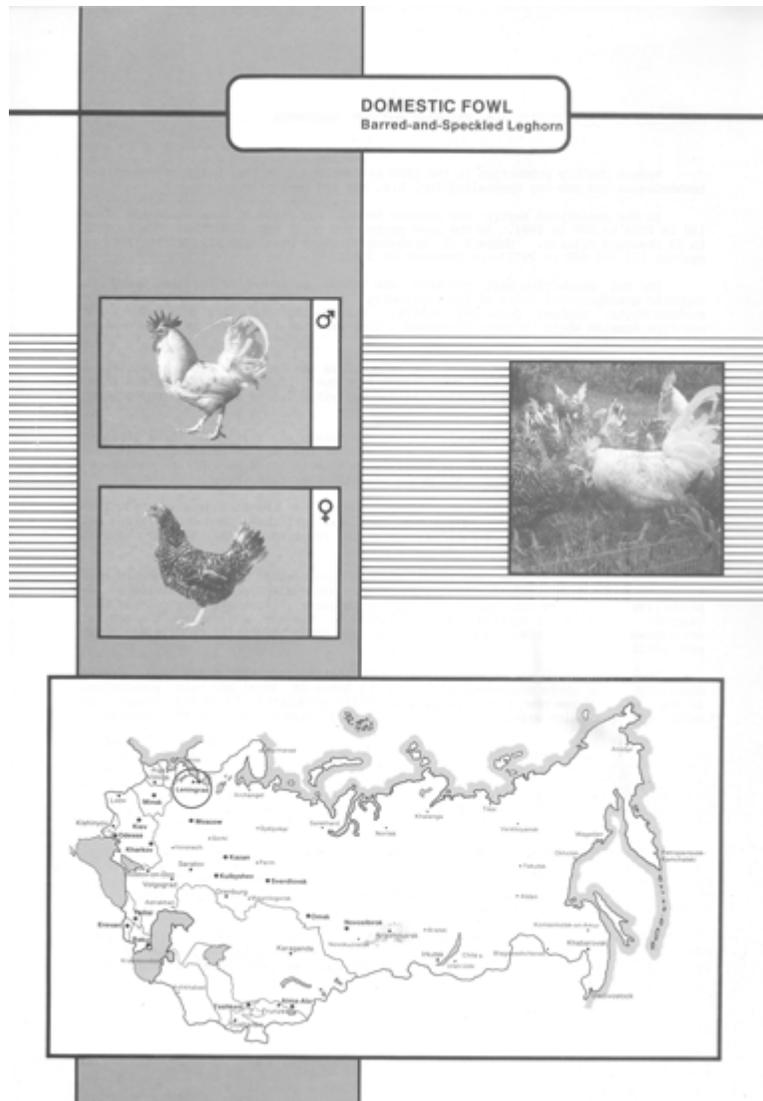
However, industrialization of poultry breeding has led to a drastic reduction in the number of breeds. The majority of them have lost their productive value and are maintained only as a genetic resource in research centres and by amateur breeders.

This chapter describes the local, old and new breeds and populations in the Soviet Union (see Table 13.1). The bulk of them are dual-purpose breeds with a low productivity which are not used by the poultry industry. However, they possess many valuable biological properties - resistance to disease and sharp changes of environmental temperature; high reproductive rate under industrial conditions; high meat palatability.

The lines which are widely used in the poultry industry badly need genetic diversity in the above characteristics. On the basis of local and rare populations in the Soviet Union new breed groups and highly productive lines and crosses are being developed which are adapted to the variety of climatic zones in the country.

Table 13.1 NATIVE CHICKEN BREEDS AND POPULATIONS IN THE USSR

Breeds and populations	Number (thousands)	
	1975	1980
<u>EGG BREEDS</u>		
Barred-and-Speckled Leghorn	-	0.2
Black Speckled Australorp	0.8	0.12
Russian White	29 730	4390
<u>EGG-MEAT BREEDS</u>		
Moscow	61	42
Moscow White	18	97
Poltava Clay	747	626
<u>MEAT-EGG BREEDS</u>		
Adler Silver	110	603
Kirgiz	132	122
Kuchino Jubilee	9	53
Pantsirev	278	22
Pervomai	2.1	2.5
Ukrainian Muffed		0.2
Yerevan	109	337
Yurlov	0.2	0.5
Zagorsk Salmon	0.2	0.4
<u>MEAT BREEDS</u>		
Uzbek Game		0.15
Total	31 197	6296



EGG BREEDS

BARRED-AND-SPECKLED LEGHORN (Polosato-pestraya leggorn)

This new synthetic population was produced during 1976-84 in the Ail-Union Research Institute of Farm Animal Breeding and Genetics by crossing White Leghorn males of the C line of cross Shaver 288 and hens from an experimental line of Black Speckled Australorps. The sex chromosome of Australorps was replaced by the chromosome of Leghorns. The genes responsible for the colour of Leghorn plumage - I, Sp, w - and their alleles in Australorps - i, sp, W - were used as markers to create genetic diversity in the new line.

The first specimens (n=30) of chickens homozygous for colour genes were produced in 1978 by inter se breeding of white hybrids (F₂) having 3/4 of Leghorn inheritance. They had a pronounced dose effect of gene B in the Leghorn sex chromosome. The male chickens (BB spsp) had white

plumage with traces of barring and the female chickens (B-spsp) were barred-and-mottled with white down.

In the first stage of breeding the stock of Barred-and-Speckled Leghorns numbered only 200-250 head. The bulk of them were heterozygotes (Ii Spsp and ii Spsp) (n=1 500) with annual egg production of 230 eggs weighing 56-57 g. This was followed by strict selection among females (50% intensity) for egg weight, conformation and maturity of males (selection intensity 10%) by means of crosses between up to 10 lines. Among male chickens the main selection criteria were conformation, weight and quality of eggs of their female parents, and to a much lesser extent the egg production of female parents.

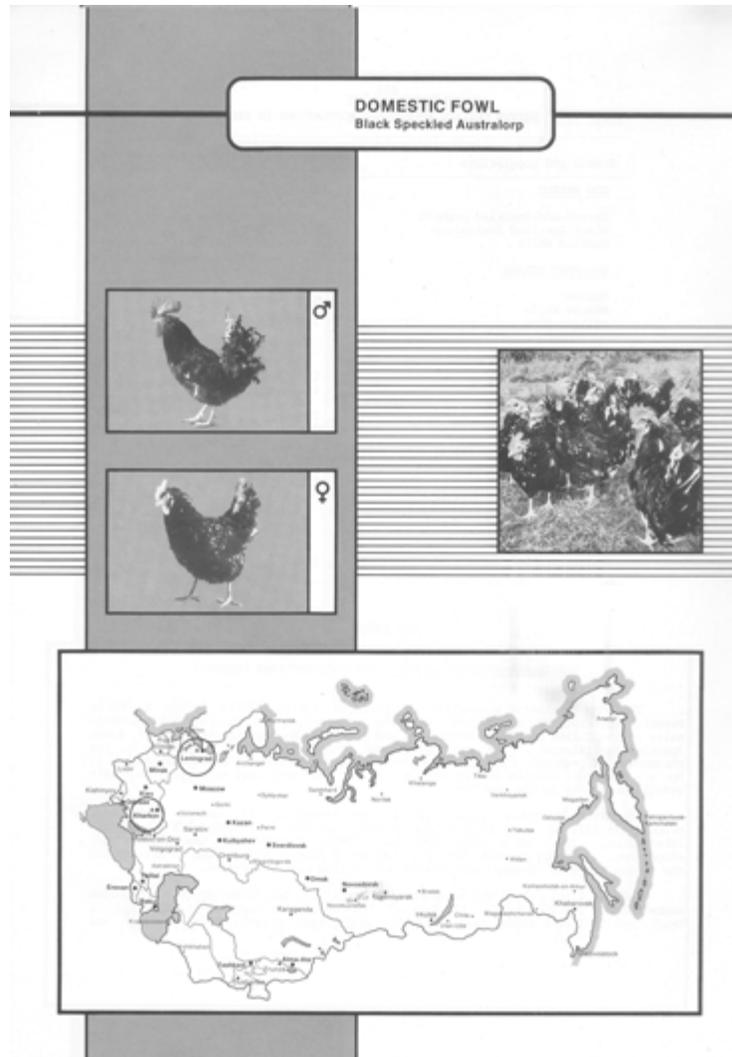
By 1984 the population of Barred-and-Speckled Leghorns reached 900. Of these 419 were kept in individual cages and from them were chosen 117 hens with a 4.5-month production of 111 eggs weighing 61 ± 0.2 g. The selection differential in egg production was 14 eggs and in egg weight 3 g. The population contains 7 lines and 27 sublines which differ in the frequency of the gene W (White skin).

The absence of pullorum-infected birds in sublines without yellow-legged offspring is worth mentioning. Probably, the male parents of these specimens were homozygous for the gene W. In 12 sublines out of 20, where male parents were heterozygous (Ww), hens with pullorum disease were identified. Selection in the population is being carried out against the recessive gene w (yellow skin).

The Barred-and-Speckled Leghorn is an egg-laying breed but it is a bit too heavy. The live weight of 150-day-old pullets is 1.74 and that of adult hens is 2.0-2.1 kg. The live weight of cocks is 2.5 kg. Age of maturity is 165 days. Annual production is 220 eggs averaging 58 g. Champion layers give 270-290 eggs per year. Egg shell is cream or white; selection is being conducted for cream colour. Fertility of eggs is 90-95% and hatchability 80%. Survival rate of the young up to 150 days of age is 95%; in adults it is 87%.

The characteristic feature of the new population is an excellent carcass appearance. In this trait they are superior to all known breeds of coloured chickens which carry the dominant gene E. Barred-and-Speckled hens, when mated with cocks of the C_1C_2 male parental form from the cross Hysex white, produce three-line hybrid layers, which are as good as four-way hybrids.

Barred-and-Speckled Leghorns are bred for increased egg production and for combining ability in the cross with male parental lines of White Leghorns.



BLACK SPECKLED AUSTRALORP (Cherno-pestraya avstralorp)

An experimental population was created at the All-Union Research Institute of Farm Animal Breeding and Genetics by breeding inter se descendants of Black Australorps which had been injected intramuscularly with blood from Barded Plymouth Rocks. The total volume of components injected during 11 months amounted to 330-380 ml per bird. The 1962 experiment resulted in 1093 offspring (F_1). Among them were birds in which the juvenile moult produced, instead of black, a partially or completely white plumage. The number of chickens (F_1) with depigmentation in groups which received injections of the whole alien blood, plasma, and blood elements was 4 (2.2%), 2 (1.9%) and 1 (0.9%). The control group had no specimens with white plumage.

Mendelian analysis showed that the white colour of the plumage in chickens obtained in this experiment was determined by the effect of the semi-dominant gene De with 40% penetrance in heterozygotes ($Dede$). The expression of depigmentation varied greatly in individual chickens.

Experimental chickens also showed a considerable variation in the down colour of the embryo. Together with black, which is typical for Australorps, nearly white was observed, with several transitions between the two. Two F5 female chickens produced 33 chicks 7 (21%) of which were white with a small black spot on the back. Assuming that this is a recessive character, the mating of heterozygotes should give 25% of cases. The deviation of the observed number (7) from the theoretically expected (8-9) appeared to be not statistically significant.

Birds with white embryo down were bred inter se and crossed with chickens having other down colour. In 1973-74, over 5000 such chicks were hatched. Their definitive plumage was black with a slight depigmentation. It was confirmed that white colour of the embryo down is inherited as a recessive character in relation to black and that it is controlled by the autosomal gene *sp* (spot). The gene *sp* inhibits melanin synthesis in homozygotes not only in various generations of the plumage, but also in the shanks. This improves significantly the appearance of Black Speckled Australorp carcasses (*dede spsp*), compared to the original breed - Black Australorps (*dede SpSp*). Further breeding was conducted with this group and raising of chickens carrying the *De* allele was discontinued. Birds with white definitive plumage (*DeDe SpSp*) had eyesight defects accompanied by symptoms of *exophthalmos* and *anexophthalmos*.

In breeding Black Speckled Australorps the chief attention was paid to mass selection for lower breeding age and higher egg weight. In 1975-76 their population reached 800-900 head. In 1976 they were joined by males of the C line of cross Shaver 288, in order to produce a new synthetic line. A small number of Black Mottled Australorps, 50 hens and 10 cocks, were transferred to the gene conservation flock, where they were randomly bred with one male to three females. In the breeding season of 1984 their number was 150 hens and 40 cocks.

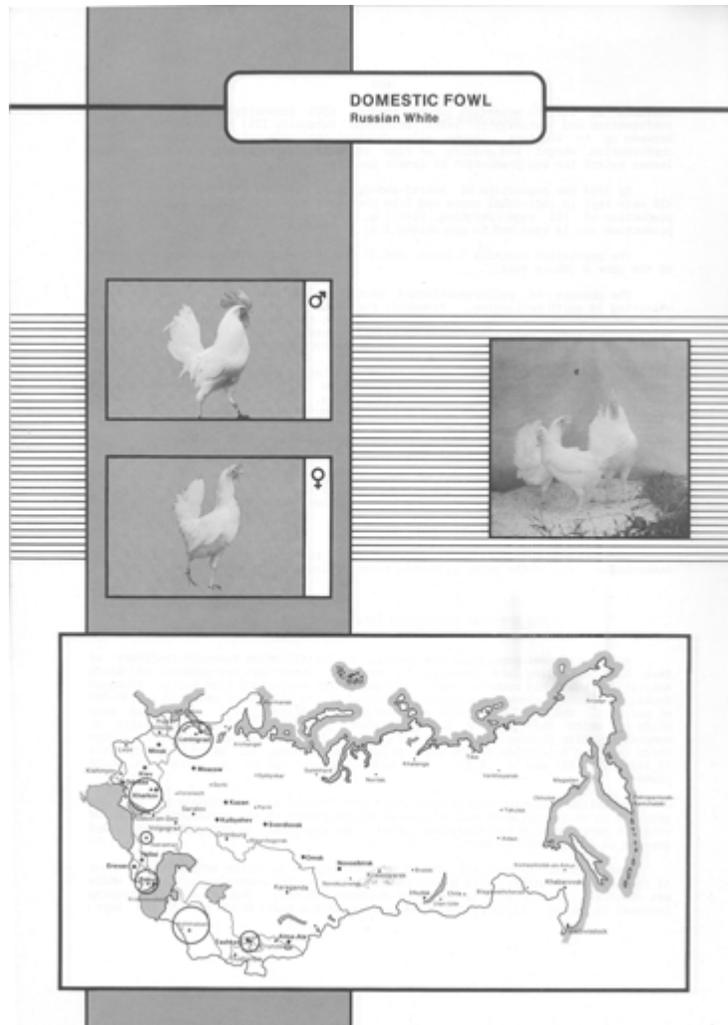
Black Speckled Australorps are bred for egg production. Plumage is black with small white spots; ear-lobes are red; comb is single. Down is light in colour; shanks are white, somewhat pigmented and not long.

The live weight of 56-day-old pullets is 0.73 and of cockerels 0.88 kg. The live weight of 150-day-old pullets is 1.82 and that of adult hens 2.2 kg. The live weight of cocks is 2.6 kg. Females reach sexual maturity at 162 days of age.

The average annual production of Black Speckled Australorps is 200 eggs weighing 55 g. Egg shells are cream-coloured. Fertility of eggs is 95%, hatchability 80-85%. Survival rate of the young up to 150 days is 95%; that of adults is 90%.

The birds are well adapted to battery keeping either individually or in groups. Another feature is a high resistance to pullorum disease. They are important as carriers of the recessive *sp* gene, which is responsible for the light colour of the plumage and a better appearance of carcasses.

Introduction of this gene into populations having the dominant *E* gene would contribute to their wide utilization by the poultry industry.



RUSSIAN WHITE (Russkaya belaya)

This breed was produced during 1929-53 by mating White Leghorn males with females from local populations, followed by inter se breeding of crosses with various grades of Leghorn inheritance. The crossbreeding involved Leghorns of different origin - Danish, English, American - each having its own production and exterior features. Selection had the aim of improving egg production, viability, growth rate and live weight.

Before 1965 Russian Whites were the principal egg-laying chickens in the USSR. The average annual production was 175-190 eggs per layer; egg weight was 57-60 g. In breeding state farms the egg production of Russian Whites was 220-230 per year. However, under commercial conditions Russian Whites could not compete with imported lines and crosses of White Leghorns. They fell behind by 40-50 eggs per year and by up to 2.5-3.0 g in egg weight.

For that reason the stock of Russian Whites, which in 1975 was 29.7 million, had decreased to 4.4 million by 1980. They are still found in considerable numbers in Turkmenia, Uzbekistan and Azerbaijan.

At present, breeding work with Russian White chickens is carried out in Yasnaya Polyana breeding farm in Stavropol territory. During the first phase (1967-69), breeding was based on selection and parents were evaluated by their daughters' production. In 1970 the breeding system was switched to creation of inbred lines ($n = 40$) and a control population. The main type of inbreeding was between paternal half-sibs, seldom between full sibs. The birds hatched in 1973 had an inbreeding coefficient (Wright) of nearly 37%. The average production of the six best inbred lines in 475 days was 200-205 eggs weighing 54-56 g. The crosses of these lines had a higher production — 211-236 eggs per year.

In 1983 the number of Russian Whites in Yasnaya Polyana breeding farm was 4500.

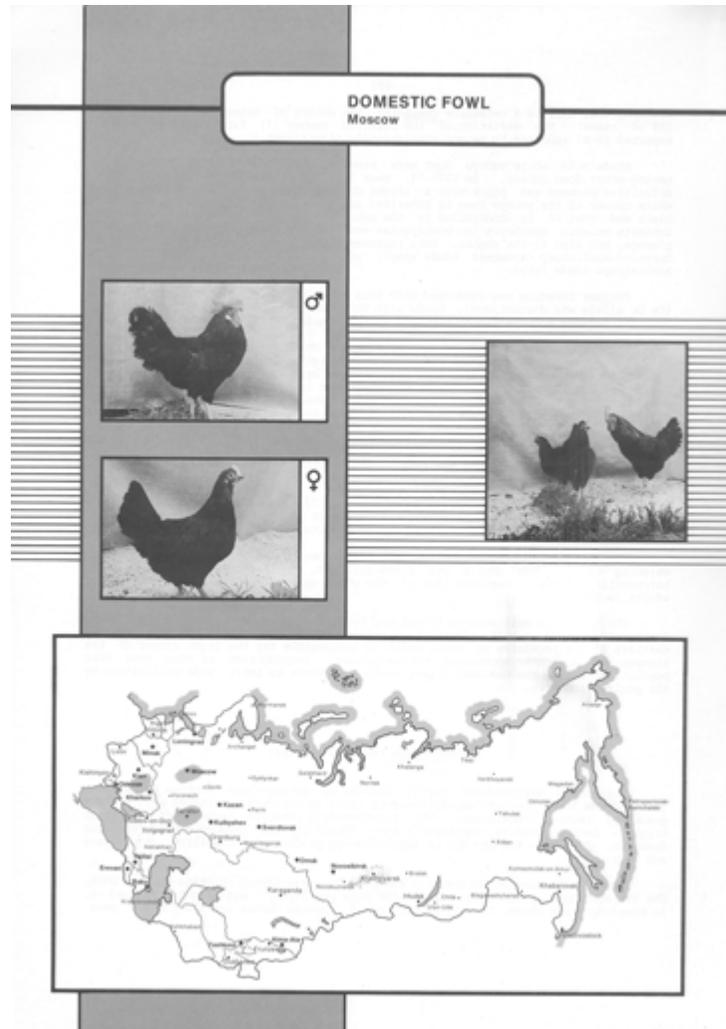
Chickens of this population are light in weight and produce small eggs. Their plumage is white; skin and shanks are yellow; they have a single comb.

The live weight of 8-week-old pullets is 0.55 kg; that of cockerels is 0.56 kg. Adult hens weigh 1.6 kg, cocks 2.0 kg. Fertility of eggs reaches 93%; hatchability is 82%; survival rate of young and adults is 95 and 92% respectively. Egg production for the initial and intermediate population during 70 weeks of life is 182 and 206 eggs of 55 g.

Of some interest is the population of Russian White chickens at the All-Union Research Institute of Farm Animal Breeding and Genetics. It was created by selection for resistance to subnormal temperatures in the first days of life and for high egg production. Chickens are free from leukosis and have a high resistance to Marek's disease and carcinomas of internal organs. Chicks are raised at temperatures which are 8-10 below normal. In 1984 this population numbered 500 head.

The live weight of 60-day-old chickens is 0.7 kg; that of adult hens is 1.8 kg and cocks weigh 2.2 kg. The average annual production is 240 eggs, weighing 56 g. Fertility of eggs is 92% and hatchability 80%. Survival rate of both young and adults is 95%.

Breeding work with the populations of Russian White chickens is directed to increasing live weight, egg weight and egg production.



EGG-MEAT BREEDS
MOSCOW (Moskovskaya)

This breed was created during 1946-67 by scientists of the Moscow Timiryazev Academy of Agriculture by mating the crossbred offspring of Brown Leghorn males and Yurlov females with New Hampshire males. The three-way cross chickens were bred inter se. Selection was carried out for egg production, viability and fleshing.

During the first stage of selection inbreeding was used. The average inbreeding coefficient in the lines was no more than 20% and the genetic similarity factor was 45%. The multiplication of lines was based on group mating of cocks with selected half-sibs or sibs.

By 1967 the breeding flock, which included the lines A, B, C and D, numbered more than 7 000 head. In the best pens the egg yield reached 220 and champion layers produced 260-280 eggs per year.

Since 1970 the breeding of Moscow chickens has been carried out in batteries and using artificial insemination. In the course of seven years, a promising new line has been created, M5, with an egg production of 228

eggs per year. It is used to produce hybrids in crosses with White Leghorns. The hybrids lay annually 230-250 eggs weighing 58-60 g. In selection for combining ability the productivity of hybrids was compared with that of paternal sibs of one line and of maternal sibs of the other (controls); at the same time the productivity of reciprocal hybrids was compared.

The characteristic feature of this breed is resistance to disease under commercial conditions.

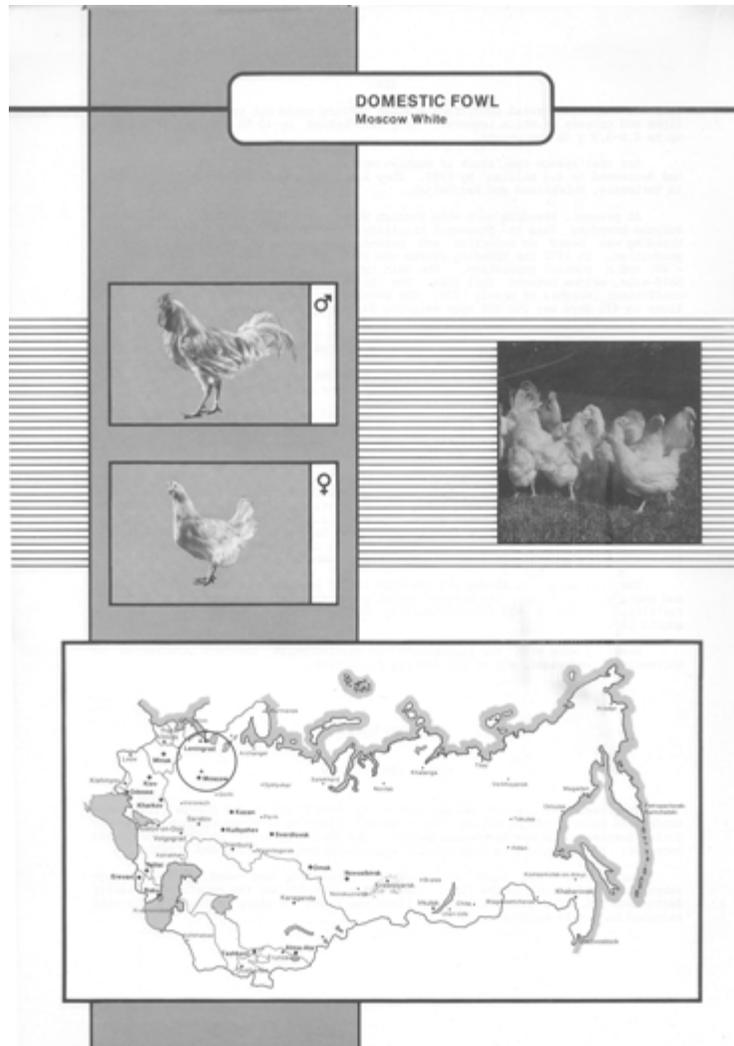
In the frequencies of ovalbumin genes (A - 0.989) this breed is close to meat-type breeds and in the allele frequencies of the G₃ locus (A - 0.750) it is close to Brown and White Leghorns.

The new breed can be found in Moscow and Saratov regions and in the Ukraine. However by 1980 its stock had declined to 42 000 compared with 61 000 in 1975.

Moscow chickens are bred for egg and meat production. They have a broad head, broad and bulging breast, long and broad back. The plumage is dense, black, with or without golden hackles. Cocks have golden feathers on shoulders and back. Ear-lobes are red. In hens shanks are black-and-yellow; in males shanks are paler, without pigmentation.

The live weight of 8-week-old pullets is 0.8 and that of cockerels is 0.9 kg; adult hens weigh 1.9-2.2 and cocks 2.6-2.8 kg. Chickens become sexually mature at 165-170 days of age. Egg-shell colour is light brown. Fertility of eggs reaches 92%; hatchability is 85%. Survival rate of the young and of adults is 95 and 90% respectively. Annual productivity averages 215-228 eggs weighing 56-58 g. Feed consumption per 10 eggs is 1.86-2.00 kg.

The breeding work with Moscow chickens is aimed at increasing combining ability in the cross with White Leghorns.

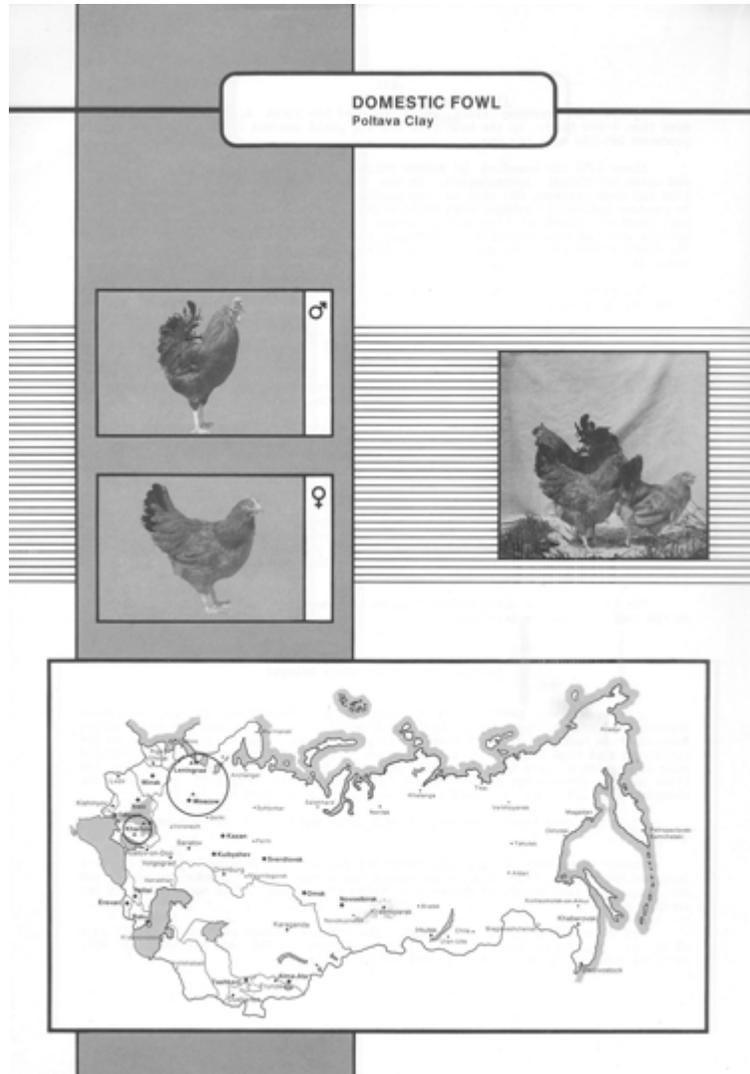


MOSCOW WHITE (Moskovskaya belaya)

This breed was produced during 1947-59 by researchers of the All-Union Institute of Poultry Breeding at the Zagorsk poultry farm in Moscow region by mating Russian White hens and Plymouth Rock and Pervomai cocks. Selection was based on the combination of high egg production with good fleshing. The nucleus stock included only birds with a rose comb. In 1948 the hens which met the standards of the new breed had an average egg production of 173 eggs with the weight of 60-62 g. The champion laid 219 eggs. The average live weight of adult hens was 2.7 kg. By 1975, this breed numbered 18 000 head and by 1980 it had increased to 97 000.

Moscow White chickens are used both for egg and meat production. They have a deep and broad body, red-and-white ear-lobes and a rose comb. Shanks are yellow and not long. The live weight of 8-week-old chicks is 0.8 kg; adult hens weigh 2.6 and cocks 3.6 kg.

Age at sexual maturity is 170 days. The average annual production is 180 eggs of 58 g; egg shell is white. Fertility of eggs is 95% and hatchability 90%. Survival rate of the young stock is 95% and of adults 90%. A characteristic feature of Moscow White chickens is their adaptability to rigorous climatic conditions. Their small rose comb never gets frost-bitten. Selection of this breed is directed to increasing egg production and egg weight.



POLTAVA CLAY (Poltavskaya glinistaya)

This is an indigenous chicken breed of the Ukrainian forest-steppe region. Its origin is unclear. It is believed that it was produced by crossing local hens with Buff Orpingtons. A great genetic similarity was found in the polymorphism of protein loci of eggs of Poltava Clay and Rhode Island Reds.

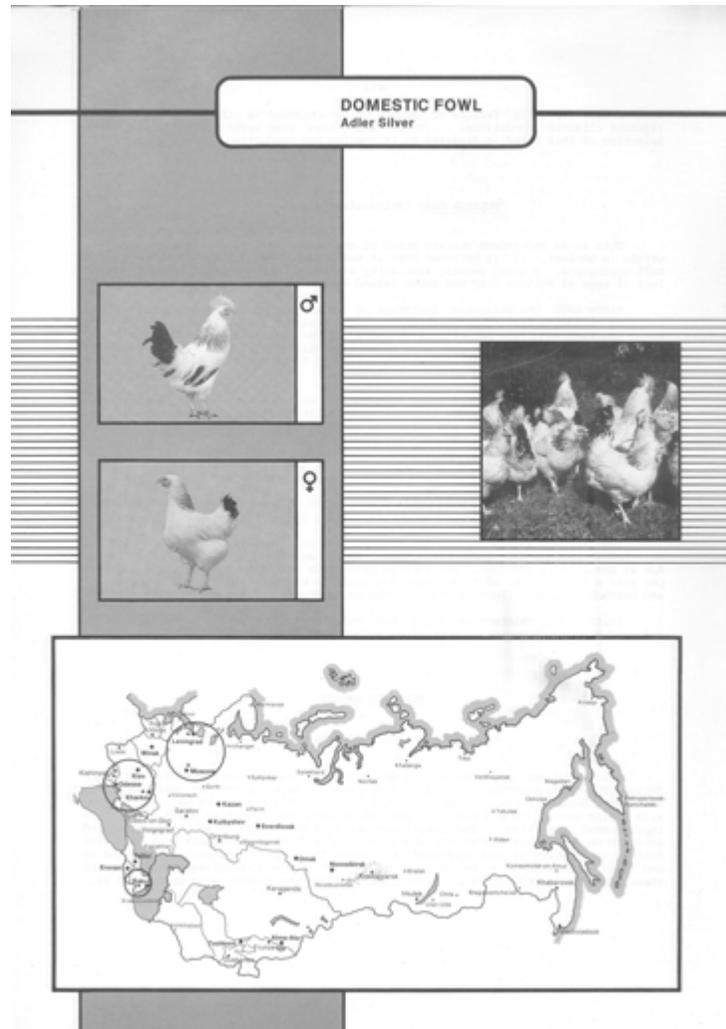
Since 1951 the Ukrainian Institute of Poultry Breeding has been engaged in breeding work with Poltava Clay chickens on the basis of mass selection to increase egg production and live weight. Five inbred lines specialized for egg production were started in 1966; they were bred by mating half sibs. The average production reached 190-209 eggs per year with an egg weight of 54-58 g. Production of champions reached 316 eggs per year. The combining ability of birds from these new lines was tested in the cross with White Leghorns. The production of two- or three-line interbreed hybrids was 236-240 eggs per year with an egg weight of 53-54 g.

Poltava Clay chickens are widely distributed in the Ukraine on farms not specializing in poultry and as private property of the rural population. In recent years their stock has decreased from 747 000 in 1974 to 626 000 in 1980.

Poltava Clay chickens have buff plumage with black tips to flight and tail feathers. Ear-lobes are red; the comb is pink and shanks are yellow.

The breed is raised for egg and meat production. The live weight of 8-week-old . pullets is 0.8 kg and of cockerels 0.9 kg; adult hens weigh 2.2 kg and cocks 2.6 kg. Age at maturity is 170 days. The average production of Poltava hens is 170-190 eggs per year with a weight of 56 g. The egg shell is brown. Fertility of eggs is 95% and hatchability 88%. Survival rate of the young stock is 92% and of adults 95%.

Poltava Clay chickens are being bred for higher egg production and egg weight and are used in autosexing crosses with birds having light Columbian plumage.



MEAT-EGG BREEDS

ADLER SILVER (Adlerskaya serebristaya)

This breed was produced in the Adler poultry complex in Krasnodar territory during 1951-65 by crossing chickens of five breeds. Males of the Pervomai breed were mated with Russian White females and the F₁ crosses were bred inter se. F₂ progeny with a high production and viability were mated with New Hampshire males in order to improve meat qualities. The three-breed crosses were bred inter se. Offspring selected on appearance and growth rate were mated with White Plymouth Rock cocks for further improvement of meat conformation. These four-way crosses were bred inter se and their offspring were selected according to "standard" requirements. Some of these hens were mated with Yurlov cocks and the five-way crosses were bred inter se.

In creating this breed the main breeding method was selection of the young stock on live weight at 60 days of age, rate of feathering, meat conformation. In each generation, when selecting birds for the nucleus

stock, preference was given to specimens with the Columbian plumage pattern.

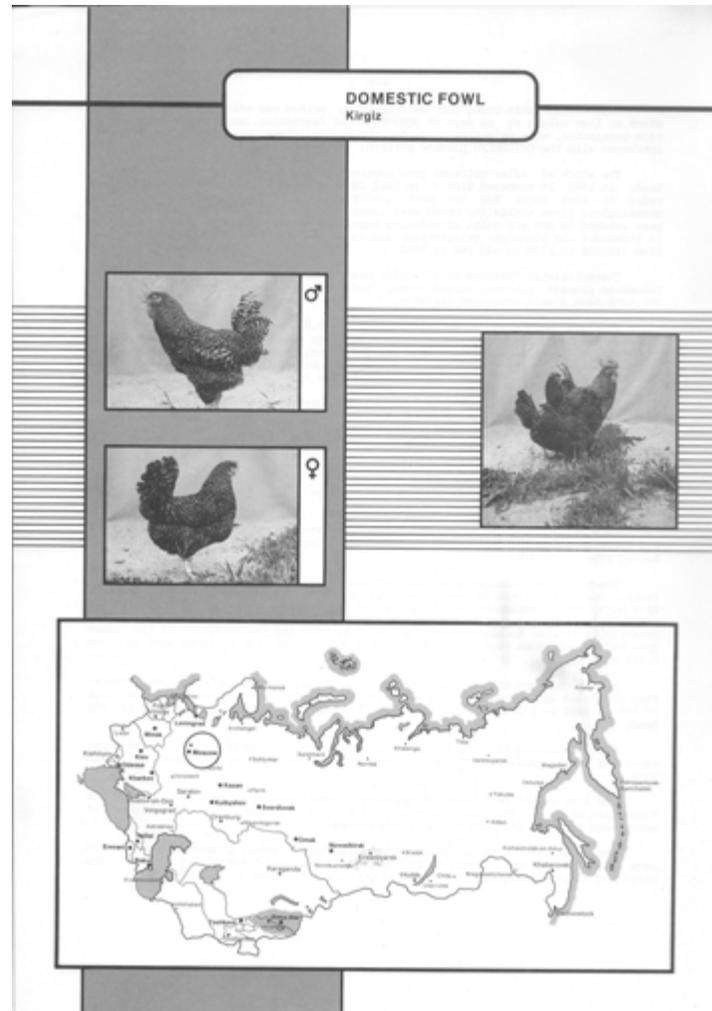
The stock of Adler chickens grew constantly and by 1961 it had reached 4600 head; in 1962 it numbered 8100. In 1962 20 pens of similar birds were formed in order to test cocks for the meat qualities of their offspring.

Promising genealogical lines within the breed were identified by 1965. The total stock in that year reached 46 000 and sales of hatching eggs rose to 500 000. The breed is raised in Krasnodar and Stavropol territories and in Azerbaijan. Its population increased from 110 000 in 1975 to 603 000 by 1980.

Characteristic features of the Adler breed are: both meat and egg production, Columbian plumage pattern, single comb, red ear-lobes and yellow shanks. These chickens have a well-developed skeleton.

The live weight of 49-day-old pullets is 0.83 kg and of cockerels 1.0 kg; adult hens weigh 2.7-2.8 and cocks 3.8-4.2 kg. Age at sexual maturity is 180 days. The average production is 160-180 eggs per year; egg weight is 60 g. The egg-shell colour is brown. Fertility of eggs is 90% and hatchability 75-80%. Survival rate of the young up to 56 days of age is 95% and of adults 83%.

At present, Adler Silver chickens are not used in broiler production because they cannot compete with White Plymouth Rocks. They can be used for creation of new synthetic lines as a female parent line in broiler crosses.



KIRGIZ (Kirgizskaya)

This breed was produced in the Kirgiz Research Institute of Animal Husbandry and Veterinary Science during 1948-68 by crossing Leghorns, New Hampshires, White and Barred Plymouth Rocks.

The main direction of breeding was family selection with progeny testing of cocks. During the first ten years emphasis on selection for egg production resulted in a high concentration of the A allele (0.905) in the egg white globulin locus. Later, selection was for growth rate. The population of Kirgiz chickens became genetically similar to meat-and-egg breeds. By 1979 the concentration of the above gene had decreased to 0.842 and that of the A allele at the G₃ locus went up from 0.092 to 0.126.

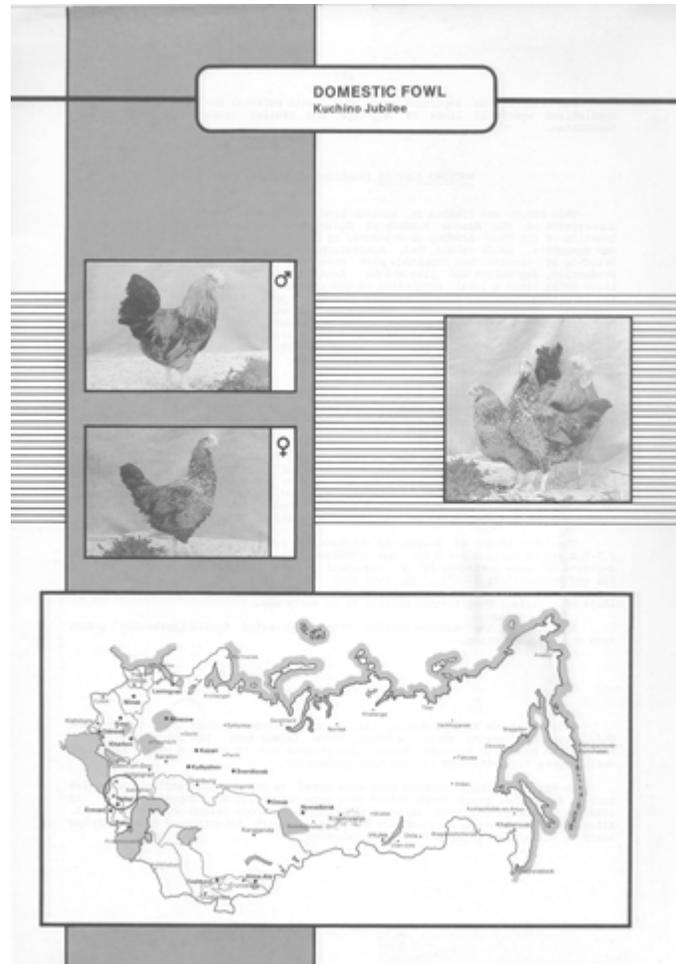
Kirgiz chickens are well adapted to the strongly continental, hot dry climate. They are found in non-specialized farms in Kazakhstan. Their stock increased from 17 000 in 1964 to 132 000 in 1975. In 1980 the number of Kirgiz chickens was 122 000 head.

Kirgiz meat-egg chickens have a cone-shaped body of medium size, pinkish-red ear-lobes and a small single comb. Plumage resembles that of the Barred Plymouth Rock.

The live weight of 9-week-old chickens in the breeding nucleus is 1.25 kg; the foundation males of the line weighed 1.4-1.6 kg at this age. The live weight of adult hens is 2.3-2.5 kg and of cocks 3.0-3.5 kg.

Hens reach sexual maturity at 180 days of age. Annual production is 160-170 eggs weighing 56-58 g. Fertility of eggs is 90-95% and hatchability 78-82%. The breed has a high viability: mortality of young is not above 3-5%, adults 5%.

The breed has an important value as a basic material for selection of highly specialized synthetic lines of egg-type and broiler crosses in Kirgizia and Kazakhstan.



KUCHINO JUBILEE (Kuchinskaya yubileinaya)

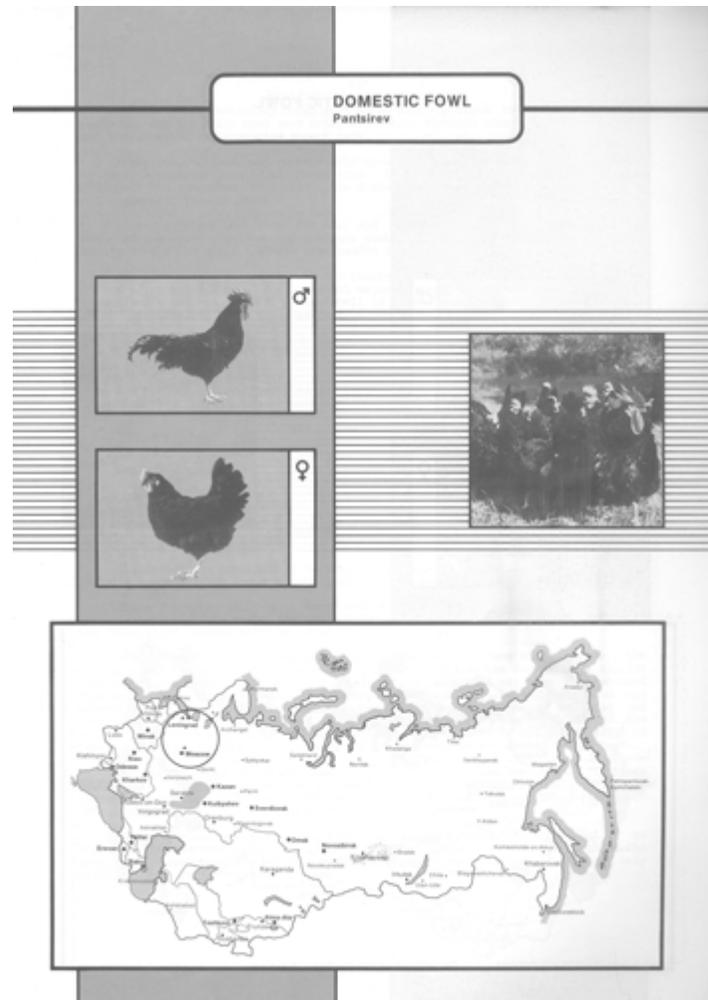
This breed was created at Kuchino breeding farm in Moscow region under the supervision of the Moscow Academy of Agriculture and the Institute of General Genetics of the USSR Academy of Sciences, by crossing five breeds - Russian White, New Hampshire, Rhode Island Red, Australorp and White Plymouth Rock. Inter se breeding of crosses was combined with selection for a number of traits - egg production, egg weight and live weight. Later, part of the stock was crossed with Livny cocks (from a local population of egg-and-meat chickens of the Orlov region); the resulting stock was divided into 16 individual pens, and was bred and selected as "standard" chickens. Since 1962 family selection was carried out with differentiation of lines by egg production, egg weight and growth rate. The most effective was selection for growth rate up to 60 days of age: live weight of cockerels increased from 624 to 1074 g, that of pullets from 557 to 928 g. When reared on high-protein rations (23.4% crude protein), average live weight of 90-day-old cockerels reached 2052 and that of hens 1545 g. The number of Kuchino Jubilee chickens increased from 9300 in 1974 to 53 000 in 1980. The breeding stock in Kuchino farm went up to 13 000, and sales of hatching eggs to 320 000. The breed is found in Moscow and

Voronezh regions, Krasnodar and Altai territories and in the Ukraine and Georgia.

Kuchino Jubilee chickens are of meat-and-egg type, very beautiful in plumage colour and conformation. Adult hens have dark buff plumage, with scattered black spots, and with "calico" hackles. The down is grey and quills are light in colour. Cocks have red plumage with golden hackles and saddle; tail and breast are black. On the wings there is a black bar with a green sheen. Ear-lobes are red; comb is single and small. Shanks are yellow. Brooding instinct is weak.

The live weight of 8-week-old chickens is 1.2 kg; that of adult hens is 2.7-3.0 and of cocks 3.5-4.0 kg. Age of maturity is 180 days. Annual egg production averages 200 eggs averaging 59 g. Egg shell is light brown. Fertility of eggs is 95% and hatchability 77-87%. Survival rate of chicks is 98.7% and of adults 95%. Kuchino Jubilee chickens have high meat quality: breast muscles of chicks contain 25.3% of protein. They feather quickly at an early age.

Selection of the Kuchino Jubilee breed is directed toward increasing growth rate and egg production.



PANTSIREV (Pantsirevskaya)

This breed was created during 1947-61 at Pantsirev breeding state farm in the Volga area by crossing White Leghorns, Rhode Island Reds, New Hampshires, Black Australorps and White Plymouth Rocks. The purpose was to create a native breed of dual-purpose type with high egg and meat production.

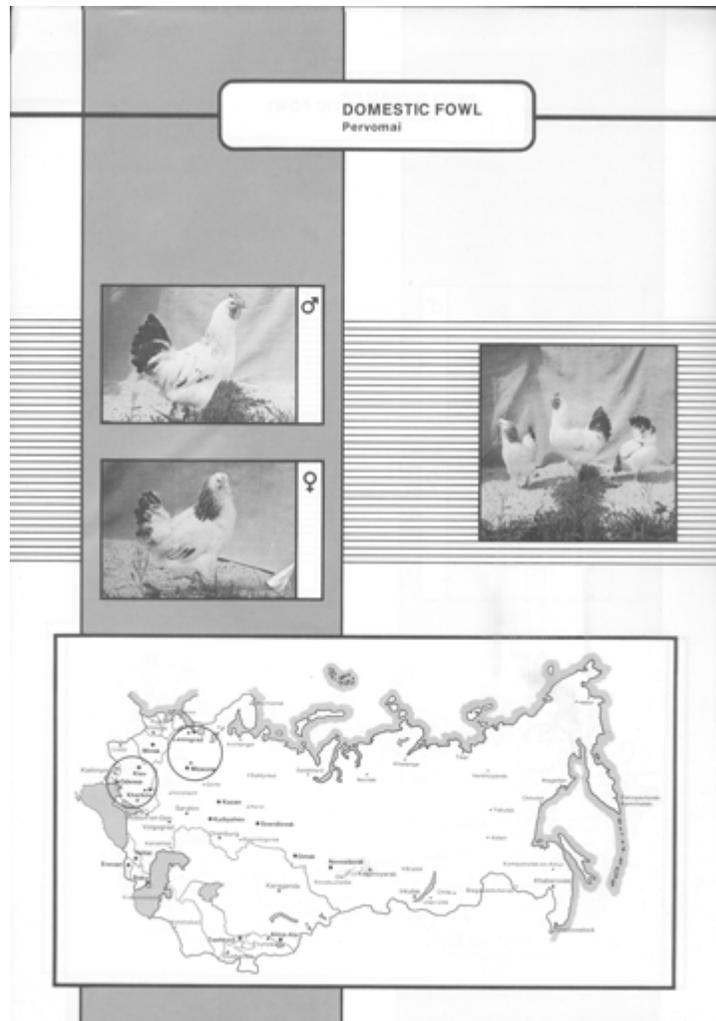
In the first phase Leghorn hens were mated to Rhode Island and New Hampshire cocks. In another group Rhode Island hens were mated with New Hampshire cocks. In 1948 the crossbred hens were mated to New Hampshire, Rhode Island or Leghorn cocks. After 1951 the three-way crosses were bred inter se with selection of hens which had black or white plumage and a high egg production.

In 1954 Black Australorp cocks were mated with the black hens in the crossbred population and the white hens were mated with White Plymouth Rocks. Further breeding work was directed to increasing growth rate. Pantsirev chickens used to be widely spread in the Volga area. They are famous for their adaptability to local conditions. In 1974 the stock numbered 278 000 but by 1980 it had gone down to 22 000. Low dual-purpose production appeared to be the main reason for this decrease.

Pantsirev black hens used for meat and egg production have a deep and broad body, red-and-white ear-lobes and a single comb. Shanks are black-and-white. Cocks usually have a few white feathers near saddle and tail. The live weight of the 8-week-old chickens is 0.91 kg; that of adult hens is 2.4 and of cocks 3.2 kg. Age at sexual maturity is 175 days. The average annual production is 180 eggs of 57 g. Egg shell is cream-coloured. Fertility of eggs is 95% and hatchability 85%. Survival rate of the young is 86%. The population of Pantsirev hens with white plumage is for egg and meat production. They have a small head with a single comb and compact body. Ear-lobes are red-and-white.

The live weight of 8-week-old chickens is 0.93 kg; that of adult hens 2.5 and of cocks 3.0 kg. Age at sexual maturity is 170 days. The average annual production is 190 eggs of 58 g. Egg shell is light cream. Fertility of eggs is 95% and hatchability is 80%. Survival rate of the young is 95% and of adults 96%.

Selection of Pantsirev chickens is aimed at improving egg production and egg weight.



PERVOMAI (Pervomaiskaya)

This breed was developed at Pervomai state farm in the Ukraine (1935-41) and at Pachelma state farm in Penza region (1942-63) from a three-breed cross.

White Wyandotte cocks were mated with Rhode Island hens and a crossbred cock was selected which was mated with Yurlov hens. Three lines were formed by breeding the three-breed crosses inter se using half-sib mating.

During World War II the population decreased to 48 hens and 6 cocks; the nucleus stock included only 10 hens and 4 cocks. In 1947 the Pervomai population increased to 180 and in 1948 to 670 birds. Line selection was then discontinued because of the adverse effect of inbreeding on viability, hatchability and egg production. The main breeding methods became large-scale crossing of lines and infusion of fresh blood of males from other farms. The year 1956 marked the resumption of line selection, breeding males being evaluated on the growth rate of their offspring. By 1962 the population of the Pervomai breed reached 56 000 head.

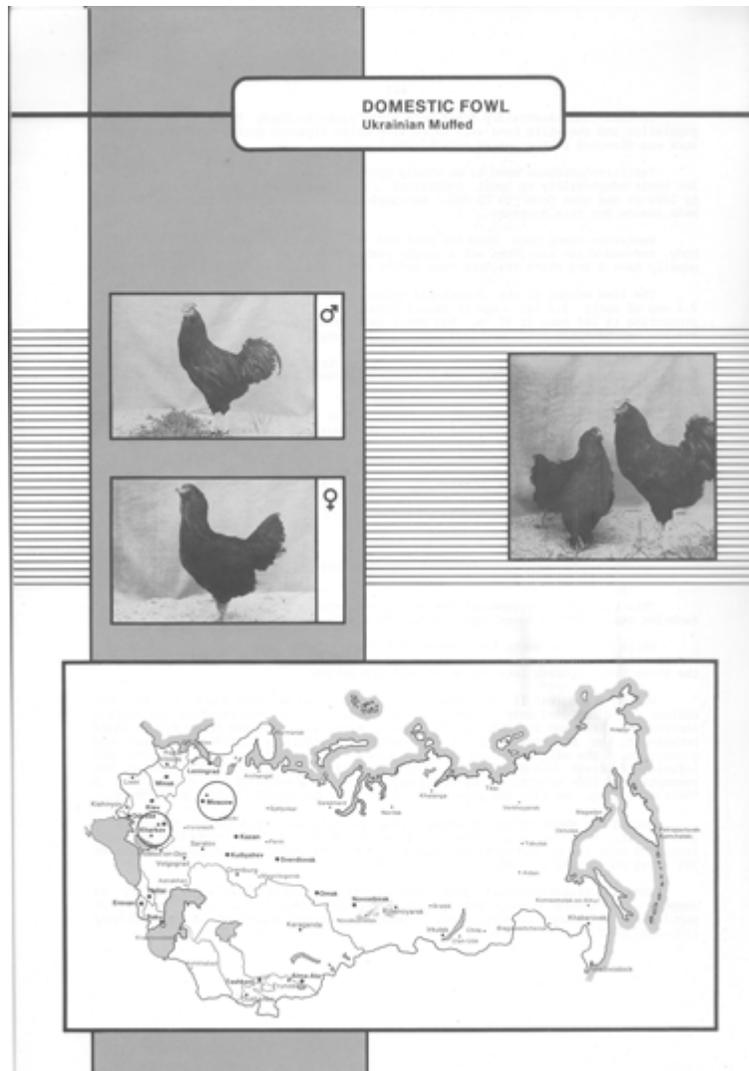
During the whole period of breed formation, selection was carried out for high growth rate, high egg production and early maturity. Annual production of hens increased from 135 to 195 eggs, weighing 56-57 g. Hatchability increased from 66 to 78%. Egg production of champions reached 256-270 eggs.

The main disadvantage of this breed is too low a production and inability to compete with modern highly specialized egg-meat lines. For that reason the population of Pervomai chickens began to drop sharply and in 1975-80 it numbered only 2100-2500 head.

Pervomai chickens are bred for egg and meat production. They have light Columbian plumage colour, yellow shanks, red ear-lobes and a rose comb. Their conformation is marked by short legs indicating compactness.

The live weight of 8-week-old pullets is 0.88, and that of cockerels is 0.98 kg. The live weight of hens is 2.5 and of cocks 3.5 kg. Age at sexual maturity is 170 days. The average annual production is 180-190 eggs weighing 55-56 g. Egg shell is brown. Fertility of eggs is 95% and hatchability 85%. Survival rate of the young up to 56 days of age is 98% and of adults it is 95%.

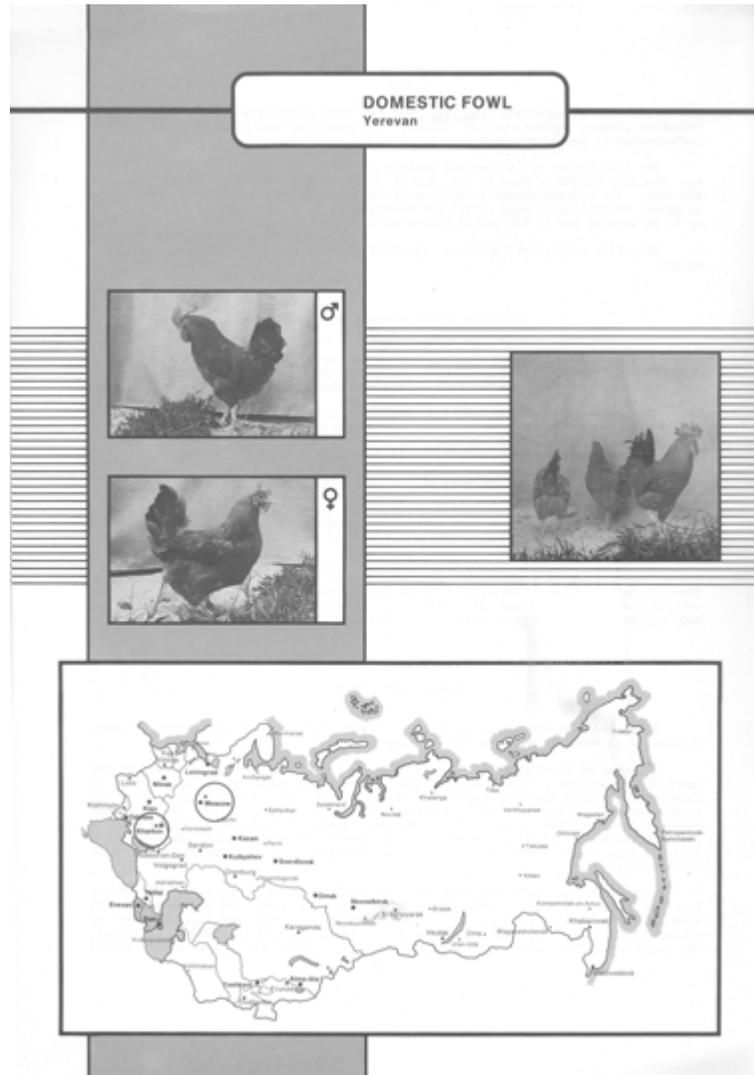
Selection of Pervomai chickens is aimed at increasing egg production and egg weight.



UKRAINIAN MUFFED (Ukrainskaya ushanka)

This is a local breed of the central and northern Ukraine; its origin is unclear. Its distinguishing feature is a short thick beard and thick muffs covering small ear-lobes. This character is dominant over absence of beard. The breed is raised by amateur breeders and in gene conservation flocks of research institutes. The stock is 200 head. The head is large and broad, with a rose or single comb and short strong beak. The body is compact, round, abundantly feathered. Muffed chickens are short and thickset with relatively short legs. The tail is well developed, with rounded feathers, and sloping somewhat backwards. The plumage is usually black, light grey or red-brown, but there are also white, spotted, silver and mottled varieties. Muffed chickens have a very strong brooding instinct. Chicks feather very early. The live weight of adult hens is 1.8-2.3 and of cocks 2.3-3.5 kg. Age at sexual maturity is 150-180 days. The average annual production is 150-160 eggs of 50-60 g. Egg shell is light brown. Production of champions reaches 200-214 eggs per year. Fertility of eggs is 93% and hatchability 75-

80%. Survival rate of the young is 94% and of adults 95%. Due to their thick plumage and compact body build, they have a good resistance to low temperatures.



YEREVAN (Erevanskaya)

The breed was developed in Armenia during 1949-74 from the cross of local chickens with Rhode Island Reds and New Hampshires.

Chickens of local populations were well adapted to the continental climate but had a low productivity - 100 eggs per year with an egg weight of 52 g. In 1949 a champion layer from the local population which laid 107 eggs in the third year of its production period, was mated with a Rhode Island cock of 1947 hatch. The cock was heavy (3.7 kg) and had a typical conformation. Among the crossbreds, a cock with a yearling weight of 3.0 kg was chosen. It was mated with another local champion which laid 191 eggs in the fifth and 123 in the seventh year of production and had a good hatchability. Backcrosses having 3/4 of local and 1/4 of Rhode Island inheritance, formed the breeding nucleus (n=11). Production of these birds was over

150 eggs and one hen with a live weight of 2.4 kg laid 213 eggs in a year. Later, one cock was used in mating both with the hen which originated the breed and with its female offspring. The third generation of chickens, possessing 7/8 of local and 1/8 of Rhode Island inheritance, was bred inter se after 1952, thereby preserving the characteristics of the local birds, and creating a one-type line in 4-5 years. Hens of this line had an average annual production of 153 eggs averaging 56 g. A champion layer gave 241 eggs. The average live weight of hens was 2.0-2.2 kg and that of cocks 3.0-3.7 kg.

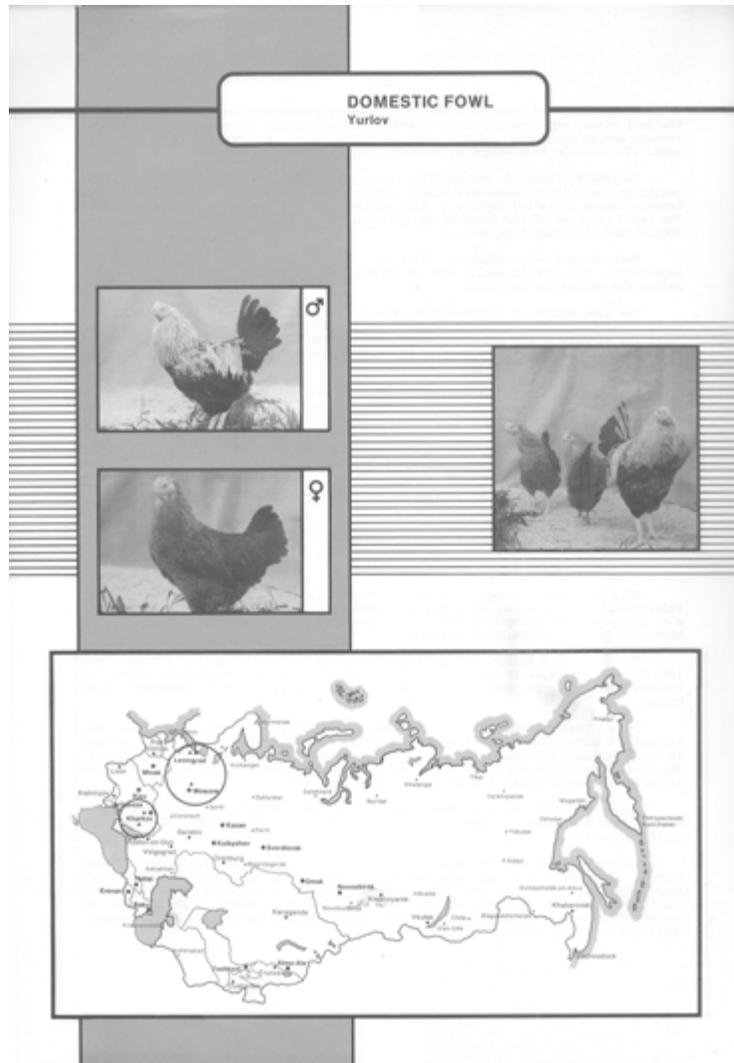
In 1964-65 hens of the new line were mated with New Hampshire cocks. The resulting red-buff chickens were widely distributed in Armenia and Azerbaijan. The breeding stock increased rapidly - 2500 in 1965, 109 000 in 1975, 337 000 in 1980. The rapid progress of the breed became possible by the creation of highly productive specialized lines and families.

Yerevan meat-egg chickens have a strong constitution and distinctive appearance. The comb is small, with uniform points; ear-lobes are pink; shanks are yellow and plumage is red-buff.

The live weight of 8-week-old chickens is 0.8 kg; adult hens weigh 2.2-2.5 and cocks 3.5-4.5 kg. Age of sexual maturity is 170 days. Egg shell is brown. Fertility of eggs is 95% and hatchability 80-85%. Mortality of the young is 5-7% and of adults 5%. The average production is 180-200 eggs per year; egg weight is 58-60 g. The production of champions is 270-290 eggs.

Crossbred progeny of Yerevan hens and White Leghorn cocks produce 230 eggs per year weighing 60 g. The live weight of adult layers is 1.8-2.0 kg. Specialized egg lines of Yerevan hens are used as female parents in crosses with male lines of White Leghorns.

Specialized dual-purpose (meat and egg) lines of Yerevan chickens are a valuable genetic resource for the creation of new synthetic meat-and-egg lines of broiler crosses.



YURLOV (Yurlovskaya)

This breed was created in the Central Black-Earth zone of the Russian Federation in Orlov, Kursk and Voronezh regions, by means of traditional selection. M.F. Ivanov was of the opinion that the Yurlov breed originated from crosses of local hens with fighting cocks and Brahma males. The breed was formed by prolonged selection of cocks having a strong and long-drawn-out crow. It was believed that selection on the beauty and length of crowing would help to develop a strong constitution with robust body and broad breast.

During 1941-45 the bulk of the Yurlov population was lost. In 1948, the All-Union Poultry Breeding Institute brought 27 specimens from Goryaninovka village in Kursk region. By 1951 the gene conservation population had increased to 200 head. The average performance in this flock was 124 eggs per year. Later it was possible to raise the performance up to 154 eggs of 71 g per year.

Yurlov chickens are the ancestors of some new home-bred breeds: Pervomai, Adler Silver and Zagorsk Salmon chickens still have in their genotype 1/2 to 3/8 of Yurlov inheritance.

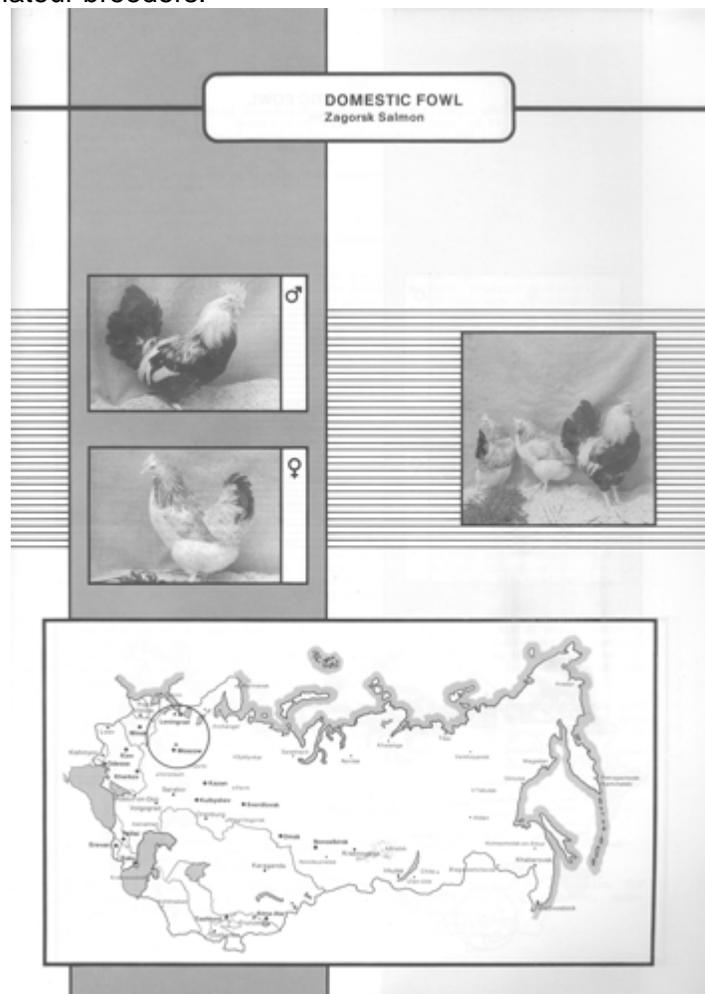
Yurlov chickens have the well-manifested characters of meat-type Asian and game breeds. Their body is broad, deep and long. The head is small, with broad frontal bone, large orbital arches and red ear-lobes. They have a single, rose or walnut comb. The legs are long and strong, yellow or black in colour. The plumage is rather fluffy and of various colours; dark silver, salmon and red are the commonest. Chicks feather very slowly.

The live weight of 8-week-old chickens is 0.9-1.2 kg; adult hens weigh 2.6-3.0 and cocks 3.5-4.0 kg. Annual production is 160-180 eggs of 60-80 g.

Egg shell is pink-brown. Fertility of eggs is 91% and hatchability 80%.

Survival rate of the young is 90% and of adults 88-93%.

The Yurlov breed is kept in gene conservation flocks at research institutes and by amateur breeders.



ZAGORSK SALMON (Zagorskaya lososevaya)

This breed group is used for meat and egg production. It was created during 1950-59 by breeders from the Ail-Union Poultry Breeding Research Institute in the Moscow region starting with a four-way cross. In 1950 they made

reciprocal crosses of Russian Whites with the New Hampshire, Rhode Island Red and Yurlov breeds. The F₁ crosses were backcrossed to Rhode Island Red and Yurlov cocks.

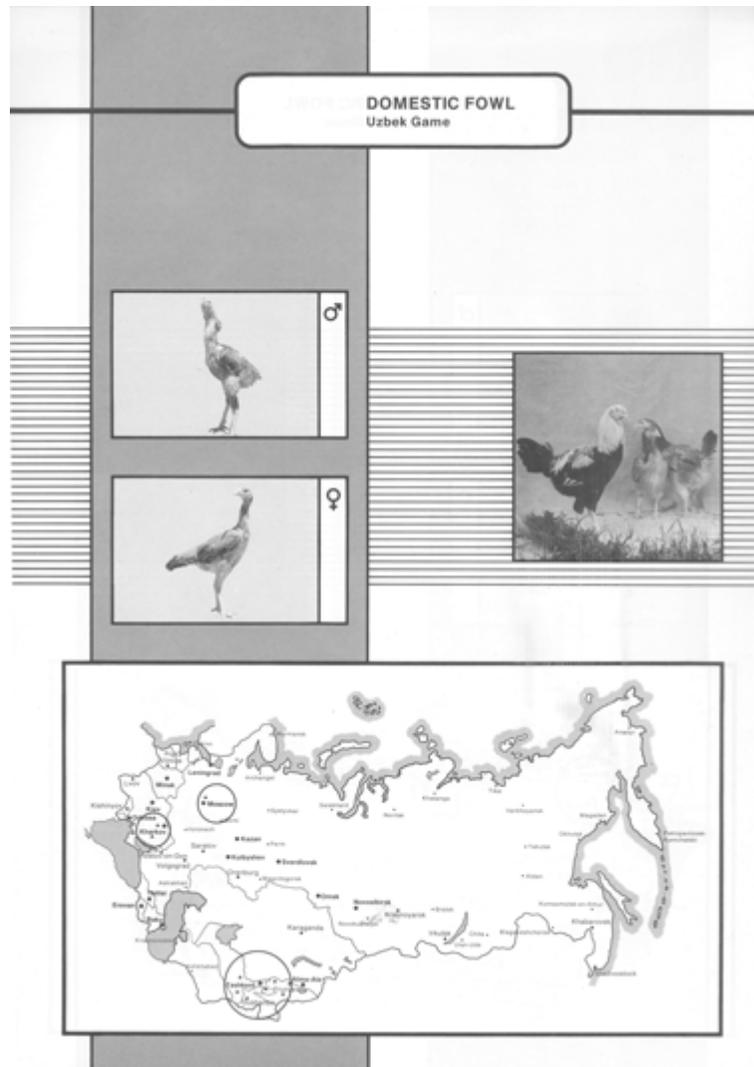
The foundation birds had a high production and viability. For example, Rhode Island Red cocks had female parents which laid not less than 180 eggs per year and Yurlov cocks descended from a hen which laid 185 eggs. In 1953 the number of Salmon chickens having 3/8 of Yurlov blood was 227. They were bred in a closed population where family selection was used to combine high laying rate, viability, egg weight and good fleshing. The live weight of the 90-day-old Zagorsk Salmon cockerels was 1.7 kg; 90.6% of carcasses were rated as first grade.

The Zagorsk Salmon breed used to be numerous in Krasnodar and Stavropol territories and in Moscow and Tambov regions. During the last five years they have been bred only in two populations in research institutes; the total stock is 600 head.

The Zagorsk breed is raised for meat and egg production. They have a deep and broad body. The head is of medium size, with a single comb and red ear-lobes. The neck is also of medium size with silvery hackles in cocks. Flight and tail feathers are light brown in hens and almost black in roosters. Shanks are short and yellow. Feathering of the young is slow and the brooding instinct is weak.

The live weight of 7-week-old pullets is 0.85 and that of cockerels is 1.00 kg; the live weight of adult hens is 2.7 and cocks weigh 3.7 kg. Age at sexual maturity is 180 days. The average annual production is 170 eggs of 60-62 g; for champions the corresponding figure is 211-216 eggs. The egg shell is thick and brown in colour. Fertility of eggs is 91% and hatchability 75-80%. Survival rate of the young is 93% and of adults 92%.

A characteristic feature of Zagorsk Salmon chickens is polymorphism in the down colour of day-old chicks. This colour varies from absolutely white, or white with dark spots, to light brown with longitudinal stripes. Selection is aimed at autosexing day-old chicks by the down colour.



MEAT BREEDS

UZBEK GAME (Uzbekskaya boitsovaya)

This breed was formed in ancient times in Central Asia by selection for aggressiveness of cocks, massive body, strong constitution and skeleton, under conditions of scarce feeding and adverse management.

The breed has a wide distribution in Bukhara and Samarkand regions under the name "kulang" and in Fergana valley and Kirgizia as "dakan". It is said that in the past "kulangs" were used for breeding some English commercial breeds.

Long selection for sporting purposes (cock fights) led to the formation of chickens with unique exterior and constitution. They are large, with a massive vertically-set body. The head is small, slightly flattened from side to side; the comb is small, pea-shaped, often reduced. Eyes are round, gleaming, vivid. Legs are long. Plumage is thick, tight to the body; its colour is variable. The temperament is lively and aggressive.

The live weight of 9-week-old pullets is 0.97 and that of cockerels is 1.29 kg; adult hens weigh 3.2-3.8 and cocks 4.0-7.0 kg. Age at sexual maturity is 215 days.

Annual production is 105-120 eggs of 55-60 g. The egg shell is light brown. Fertility of eggs is 70% and hatchability 80-85% Survival rate of the young up to 9 weeks of age is 98% and of adults 97%.

Uzbek Game birds are well adapted to local conditions. The breed can be used in the creation of new lines for the broiler industry of Central Asia.

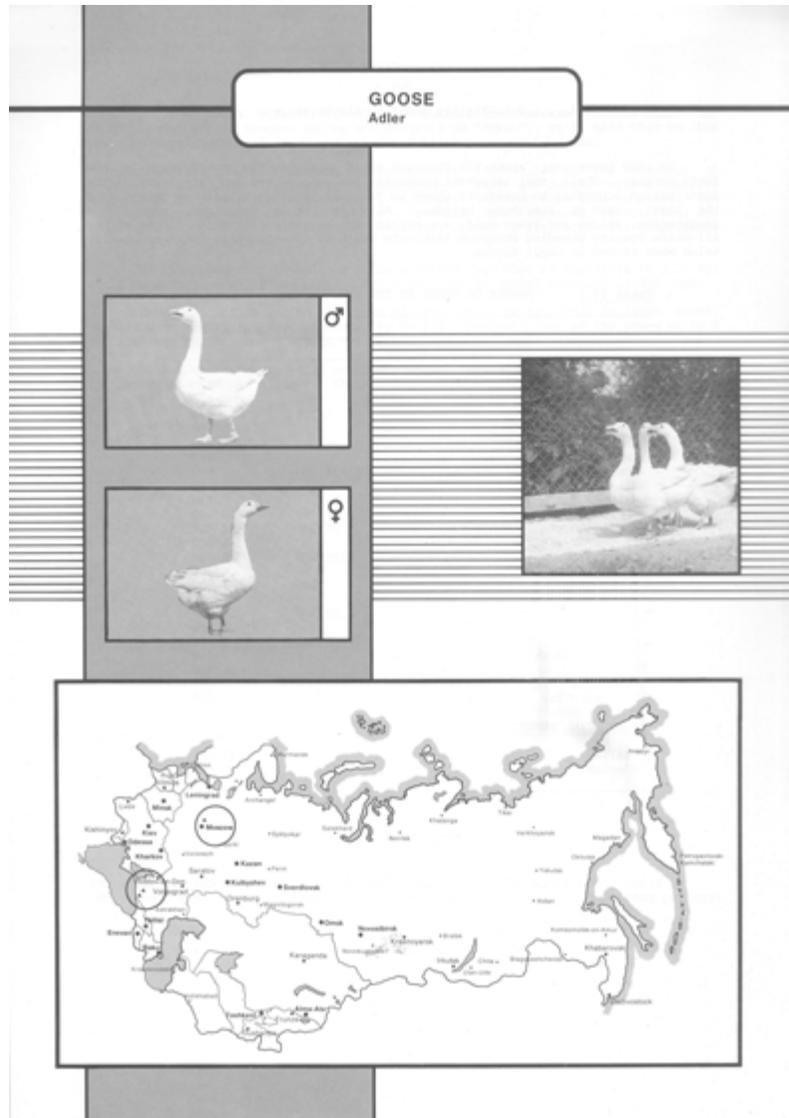
14. GEESE

V.I. Fisinin and K.V. Zlochevskaya

In 1980 there were about 824 thousand adult geese in the Soviet Union in the State sector. Their most important products are meat, down and fat liver. The distribution according to breeds is shown in Table 14.1. This article describes only the local, rare or vanishing breeds. All the breeds described, except the Javakhetian, Kaluga and Pskov Bald, are maintained in gene conservation flocks at the Ail-Union Poultry Breeding Research Institute which is investigating their commercial value when raised in small flocks.

Table 14.1 BREEDS OF GEESE IN THE SOVIET UNION

	Number (adults)	
	1974	1980
<u>LOCAL, RARE OR DECLINING BREEDS</u>		
Adler		few
Arzamas	3 700	few
Benkov		5 300
Chinese		239 000
Embden		919
Gorki	34 000	42 600
Javakhetian		few
Kaluga		few
Kholmogory	19 680	18 500
Kuban	20 500	82 300
Landes		6 000
Large Grey	196 000	314 200
Obroshino		4 300
Pereyaslav	2 100	1 500
Pskov Bald		few
Romny	38 500	24 500
Sebastopol		few
Shadrin	6 600	1 600
Solnechnogorsk		few
Toulouse		11 400
Vishtines		few
Vladimir Clay		230
<u>COMMERCIAL BREEDS</u>		
Italian		34 600
Rhenish		36 682



ADLER (Adlerskaya)

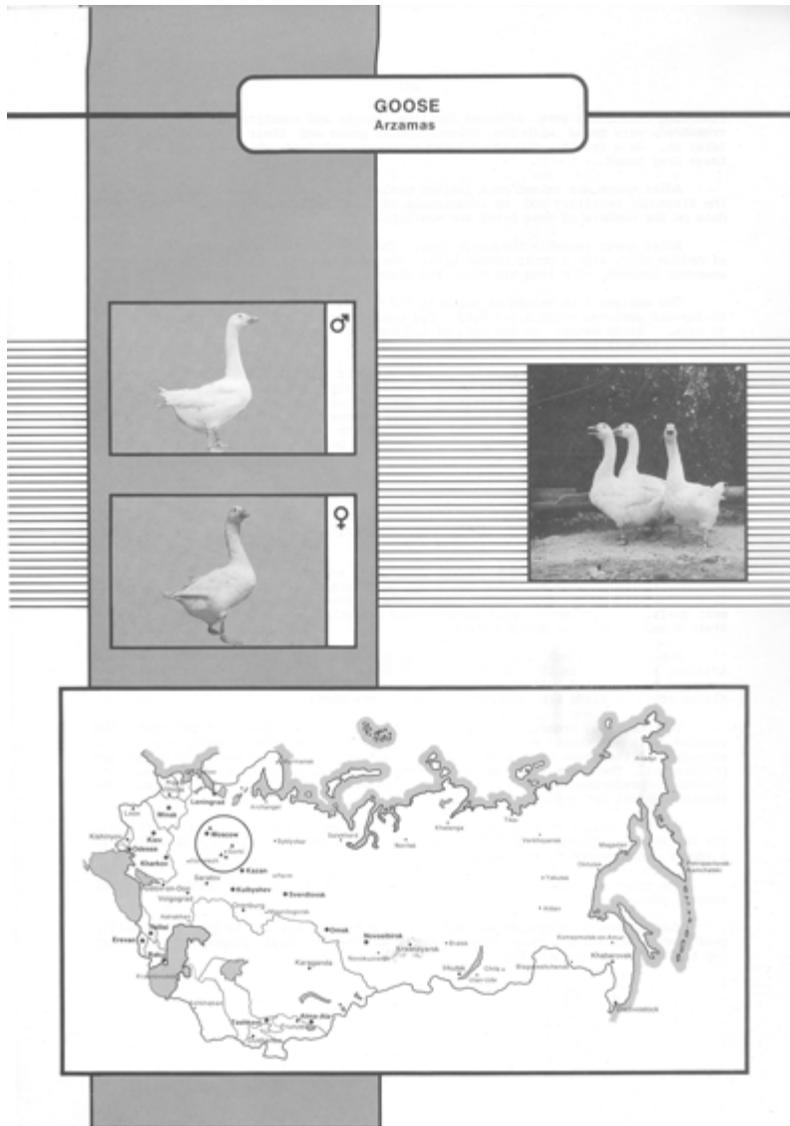
A breed group developed at the Adler poultry plant in Krasnodar territory by crossing small local geese with a high egg production with the Large Grey breed. The resulting crossbreeds were selected for live weight and constitution. In 1965 the crossbreeds were mated with the Solnechnogorsk geese and their offspring were bred inter se. As a result, the Adler breed group was obtained, which is similar to the Large Grey breed.

Adler geese are raised on a limited scale, mainly on the Adler poultry plant in the Krasnodar territory and by inhabitants of this and adjacent areas. No precise data on the numbers of this breed are available.

Adler geese resemble the Large Grey. The body is large and broad. The head is of medium size, with a short orange bill; the neck is short and the breast is broad, somewhat rounded. The legs are short and strong. The plumage is white.

The average live weight of males is 7-9 kg and that of females is 5-7 kg. The 60-day-old goslings weigh 3.9-4.0 kg. Egg production is 25-30 eggs; some geese lay 40 eggs. Birds mature at the age of 9.5 months. Egg weight is 160-170 g. The hatching rate is 40-50%.

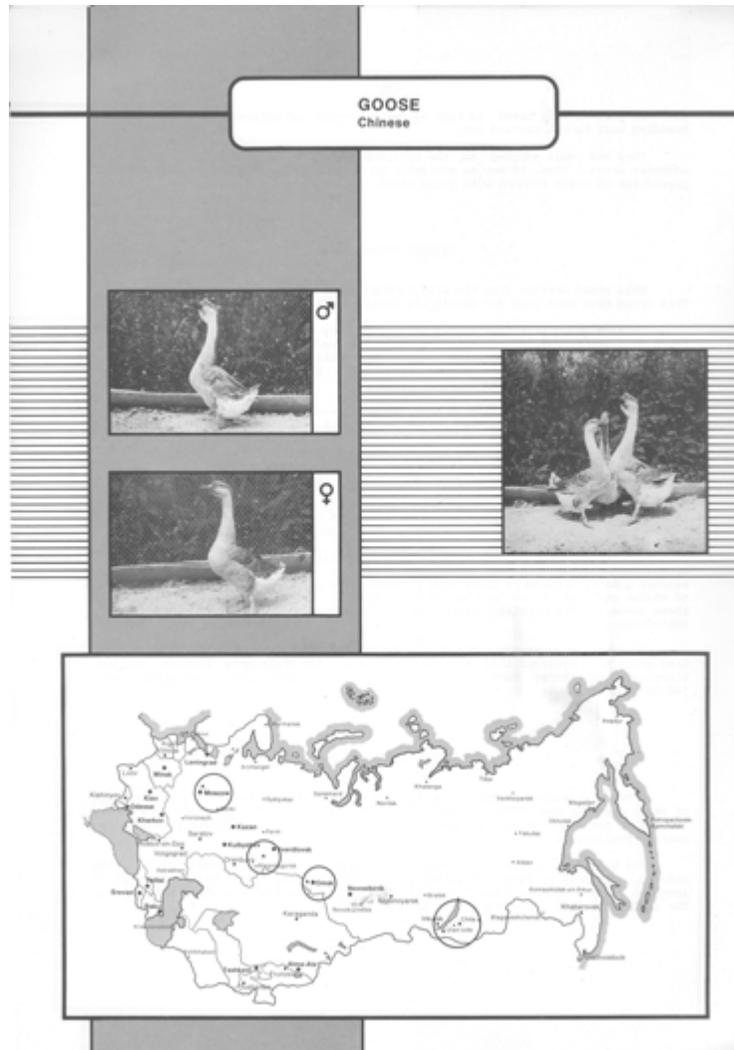
Adler geese have good meat qualities but their fertility and hatching rate are not high enough - only 60-77 and 55-60% respectively. The breed is well adapted to the hot climate of Krasnodar territory. The survival rate of adults is 90-100% and that of the young is 75-85% depending on the management conditions. This explains both the limited distribution of Adler geese and the greater popularity of Large Grey geese which are raised on a large scale. Pedigree breeding of Adler geese is carried out on a small scale at Adler poultry plant.



ARZAMAS (Arzamasskaya)

This breed has been developed by prolonged selection of local geese in Gorki region. Initially, the selection was aimed at obtaining a fighting bird, with a high live weight and a strong constitution. Later, efforts were directed at improving meat qualities. For some years breeding and selection have been carried out at the State Breeding Farm for Arzamas geese. The breed was not popular. It was predominantly raised in the Gorki and adjacent regions. In 1974 there were 3700 birds. In 1980 no Arzamas geese were recorded on state and collective farms or other commercial plants. At present small flocks of these birds are raised mainly on private plots. The body is broad and deep, horizontally placed. The head is small and rounded, with a short straight bill. There are populations which are named, according to the shape of the bill, hook- and flat-billed. The breast is broad and protuberant. The legs are long and strong; the wings are well

developed. The plumage is predominantly white, although there are grey and pied individuals. The shanks and feet are yellow or orange. The live weight of adult birds is 6.0 kg for males and 5.0-5.5 kg for females. The 60-day-old goslings weigh 3.7-4.0 kg. The egg production is low - 18-20 eggs in 4 months. Egg weight is 165-180 g. The geese are good brooders. The viability of the breed is high - survival rate of young is 96%. The limited distribution and reduction in numbers are due to low reproductive performance including a relatively low egg production. A high proportion of females (up to 70-80%) brood their eggs. At present this breed is kept in Gorki region and adjacent areas. Extensive breeding work is not carried out. They are well adapted to the environmental conditions of Gorki region and adjacent areas. Thus, it may be advisable to extend their breeding by providing the population of these regions with young stock.



CHINESE (Kitaiskaya)

This breed derives from the wild knobbed geese (*Anser cygnoides*). The geese of this breed have been used for developing local breeds and breed groups in the USSR.

Chinese geese were once raised in this country on a very large scale. In 1980 there were about 239 000 Chinese Grey and Chinese White geese. At present their numbers have declined by more than 70%. Most poultry farms do not raise purebred Chinese geese but their crossbreds with other breeds which have higher meat qualities.

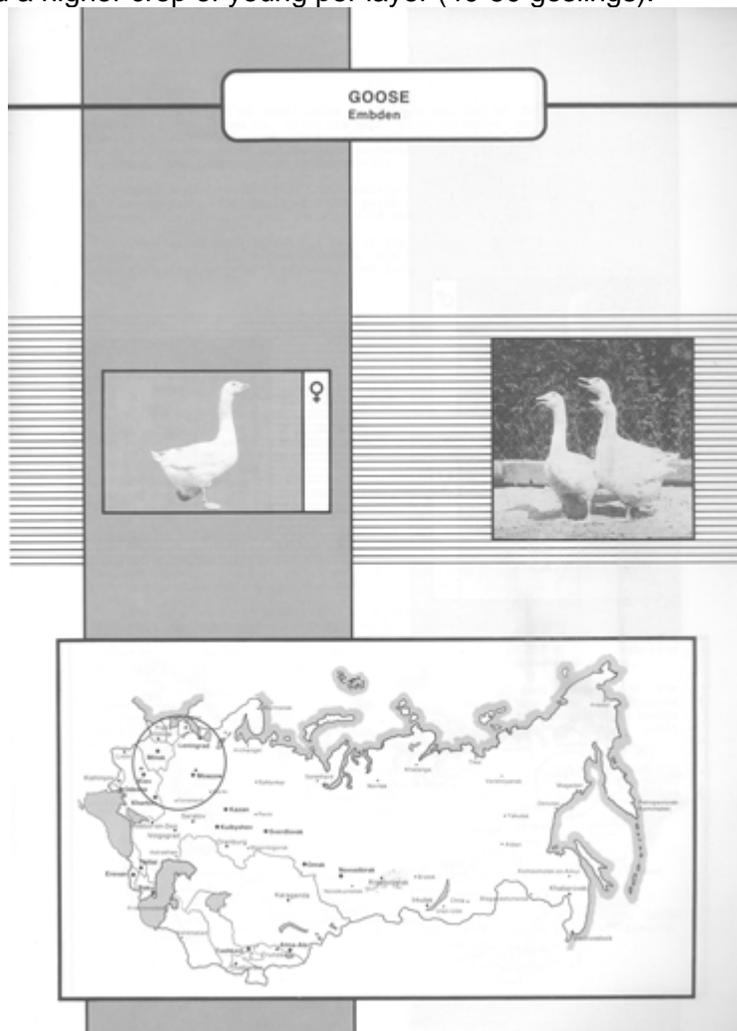
The head is large, with a knob on the forehead. The egg-shaped body is slightly raised; the breast is broad, and the neck is swan-like. The legs are of moderate length. In the Chinese Grey the back, wings and back of the neck are dark grey (greyish-brown) while breast and abdomen are pale. There is also a population of Chinese White geese, with white plumage. The shanks and feet are orange.

Egg production is 45-70 eggs per year with a maximum of 90-100 eggs. Egg weight is low - 140-150 g. Birds mature at the age of 9 months. The

hatching rate is sufficiently high - 70-75%. The live weight of adult birds is low; males weigh 50-55 kg and females 4.0-4.5 kg. The 60-day-old goslings weigh 3.0-3.2 kg.

The reproductive performance is good: fertility and hatchability are 90-95 and 80-85% respectively. Chinese Grey geese have slow weight gains when young and low carcass quality because of their grey plumage. The dressing percentage and the yield of edible parts are 56-60 and 56-57% respectively. For these reasons the number of these geese is now drastically reduced and new, more productive, breeds have been introduced.

Studies are currently under way to determine the efficiency of crossing Chinese Grey geese as a maternal line with heavier breeds: the Kholmogory, Rhenish, Italian, Vishtines, and others. Such crossing has produced a higher crop of young per layer (40-50 goslings).



EMBDEN (Emdenskaya)

A breed developed in Germany in the vicinity of Emden. There is a small number of these geese in the USSR. In 1980 there were 919 in Estonia and

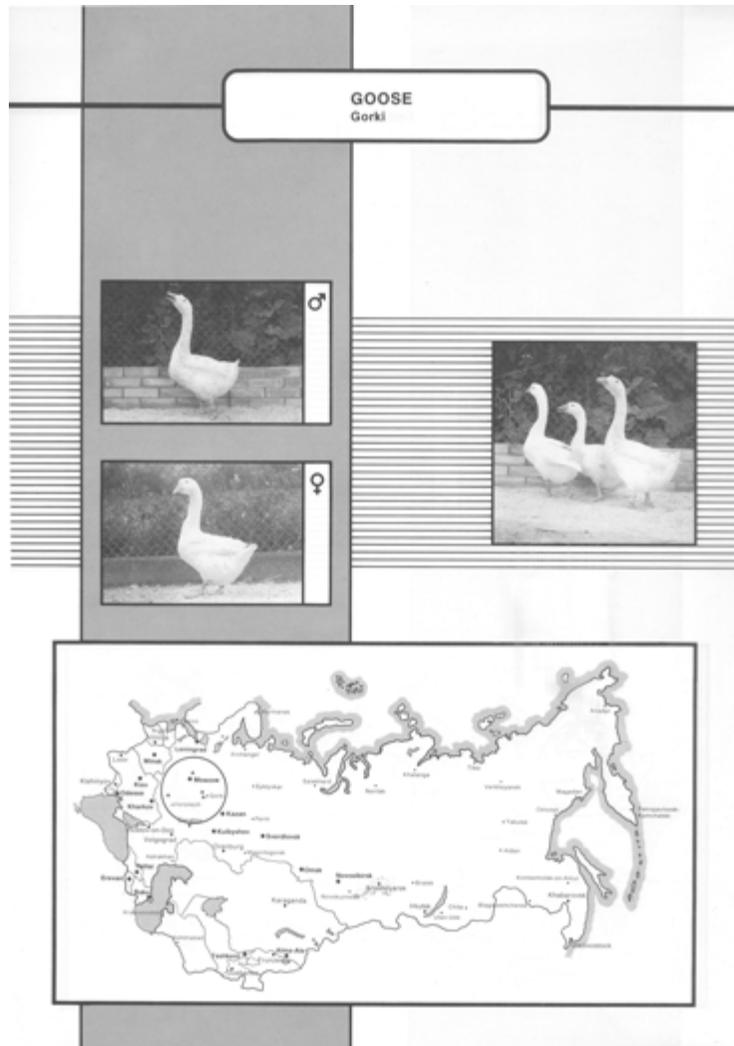
also very small numbers in the other Baltic republics and the Ukraine, kept on private plots and by amateur poultrymen.

The birds are large. The body is long and broad, with a small fold on the abdomen. The head is large and broad, with a short, broad, orange bill. The neck is long and curved, with a "purse" beneath the bill. The legs are short and strong. The shanks and feet are orange. The plumage is white.

The live weight of adult males is 9-10 kg and that of females is 8 kg. The figures are lower when the birds are kept under extensive conditions: 6.5-7 and 5.0-5.5 kg respectively. The 60-day-old goslings weigh 3.6-3.8 kg. The geese begin to lay at the age of 10 months; egg production is only 25-30 eggs; egg weight is 160-170 g. The hatching rate is only 40-45%.

It is a good meat breed; the quality of meat and fat is high and the birds gain weight fast. The yield of edible parts amounts to 68.8%. The geese are good brooders; the latter account for 45-47% of the female flock.

The limited distribution and use of the breed are due to its low reproductive performance: fertility and hatchability are 60-65 and 55-60% respectively. Embden geese are raised on private plots and used for crossing to obtain parental lines.



GORKI (Gorkovskaya)

A breed group obtained by crossing local geese of Gorki region with the Chinese breed. The crossbreds were mated with Solnechnogorsk geese and the three-way crosses were bred inter se. Local Gorki and Solnechnogorsk geese have good meat qualities, while the Chinese have better reproductive performance. This work has resulted in a breed group which considerably surpasses local Gorki geese in commercial value. Gorki geese are raised on a large scale in Gorki and many other regions of the Russian Federation.

In 1974 these geese numbered more than 34 000 birds and they reached 42 600 in 1980. At present numbers are smaller due to the introduction of more productive breeds, the Rhenish and Italian.

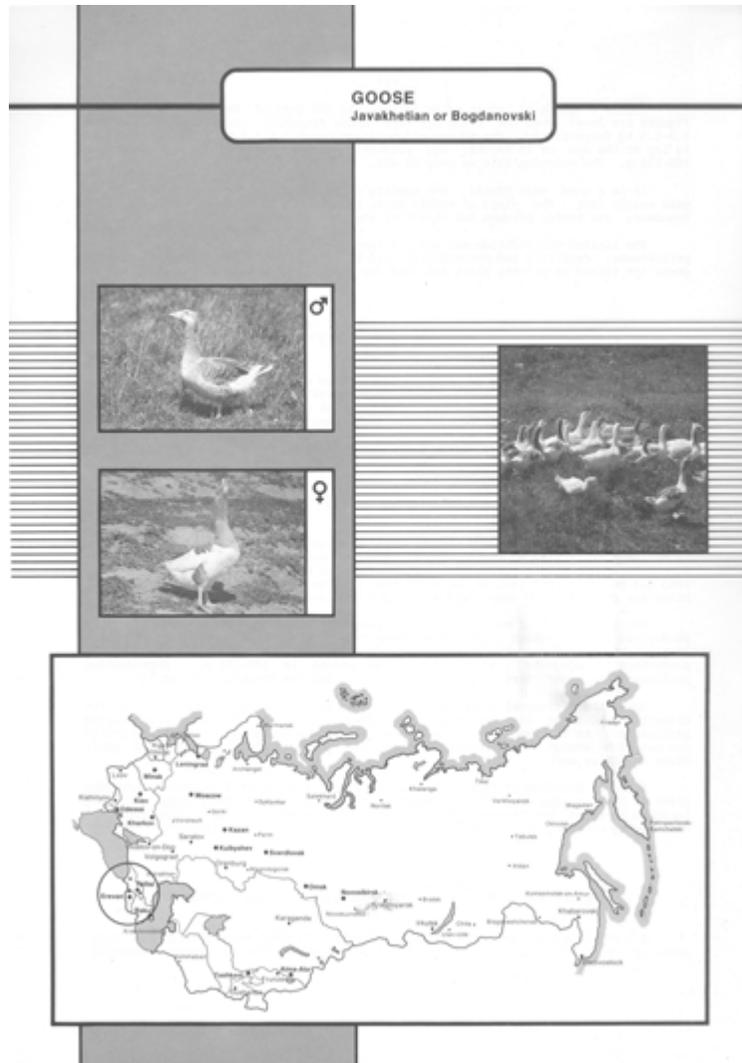
In constitution, size and colour Gorki geese resemble the Kholmogory. The head is medium-sized, with a small knob on the forehead. The body is long, broad, somewhat raised in front. The breast is protuberant but not very broad. The neck is long and curved; the tail is raised. The plumage is grey,

white or pied. Most birds are predominantly grey. The shanks and feet are orange.

The live weight of males is 7-7.5 kg and that of females is 5.5-6.0 kg. The 60-day-old goslings weigh 3.2-3.5 kg. There is a group of Gorki geese that reach the live weight of 3.8 kg at this age. Birds mature at the age of 240 days. Egg production is adequate - 50-60 eggs. Egg weight is 140-150 g. Reproductive performance is high: fertility of eggs is 80-90% and the hatching rate is 70%.

Among the biological properties one should single out good adaptation to the climatic conditions of the Gorki and adjacent regions and high reproductive performance. At the same time the weight gains of the young in the first two months are not high enough. The survival rate of the young is 80-85% and that of adult birds is 90% or more.

Pedigree breeding of this breed group is carried out at Burevestnik breeding plant in Gorki region and at Lindovskaya poultry plant. The breed group is being improved in order to obtain a maternal line. Crossbreds with high production are obtained by crossing Gorki geese with local breeds of low productivity.



JAVAKHETIAN or BOGDANOVSKI (Dzhavakhetskaya or Bogdanovskaya)

A local breed of geese in Georgia. Previously, they were raised on a large scale in Bogdanovski and other districts of Georgia and adjacent areas of Armenia.

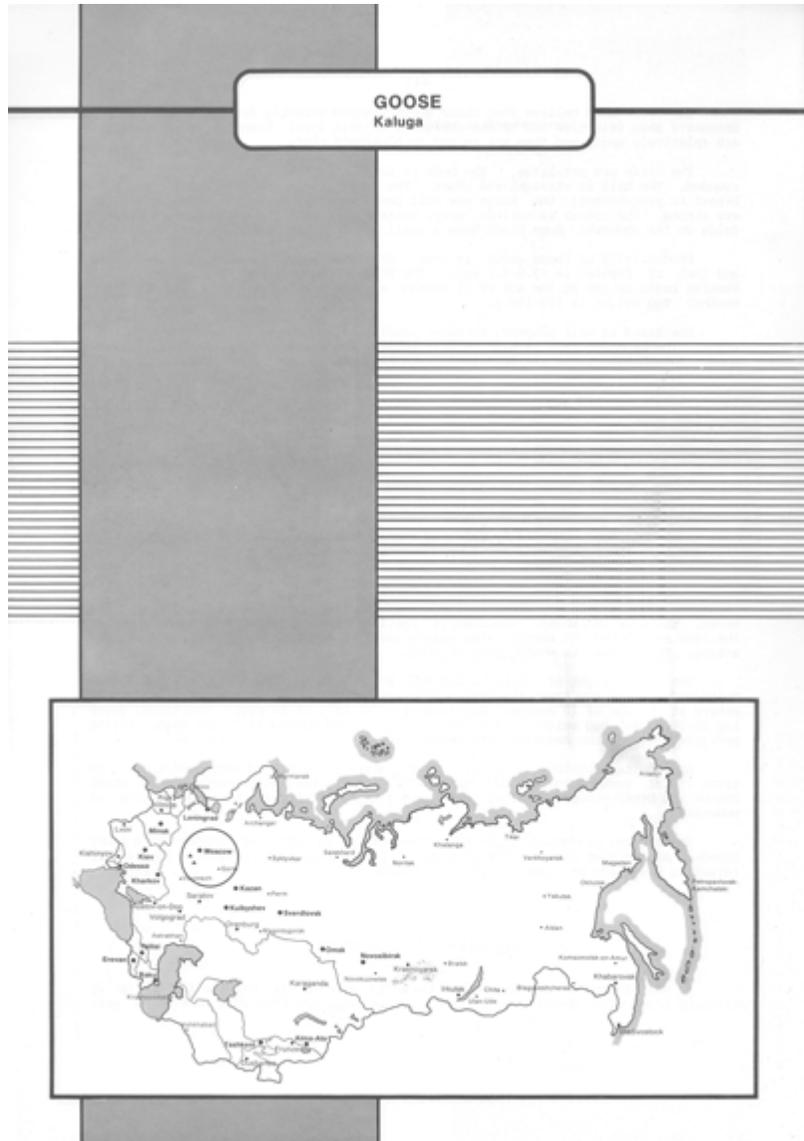
There are reasons to believe that these geese descend directly from local wild birds. Extensive mass selection led to the emergence of this local breed group. The flocks are relatively small and they are raised on household plots.

The birds are not large. The body is long and broad. The head is small and rounded. The bill is straight and short. The neck is also straight and short. The breast is protuberant; the wings are well developed, close to the body. The legs are strong. The colour is varied: grey, white, or pied. There are one or two skin folds on the abdomen. Some birds have a small crest on the head.

Productivity of these geese is poor. The live weight of males is 4.5-5.0 kg and that of females is 3.8-4.0 kg. The 60-day-old goslings weigh 2.9-3.0 kg. Females begin to lay at the age of 11 months and the egg-laying period lasts 3.0-3.5 months. Egg weight is 140-150 g.

The breed is well adapted to local conditions in Georgia, i.e. to mountainous areas. The brooding rate is high, almost 100%. The survival rate of adult birds is good. Javakhetian geese are less productive than other breeds and therefore are not very popular.

These geese are useful as a genetic resource for producing new, more productive populations well adapted to local conditions in Georgia.



KALUGA (Kaluzhskaya)

A breed group obtained by crossing local geese with local Tula birds of the fighting type which have well-developed muscles and a compact conformation. Kaluga geese have long been raised on private plots in the Kaluga region and in some districts of the Tula region. Currently numbers are insignificant.

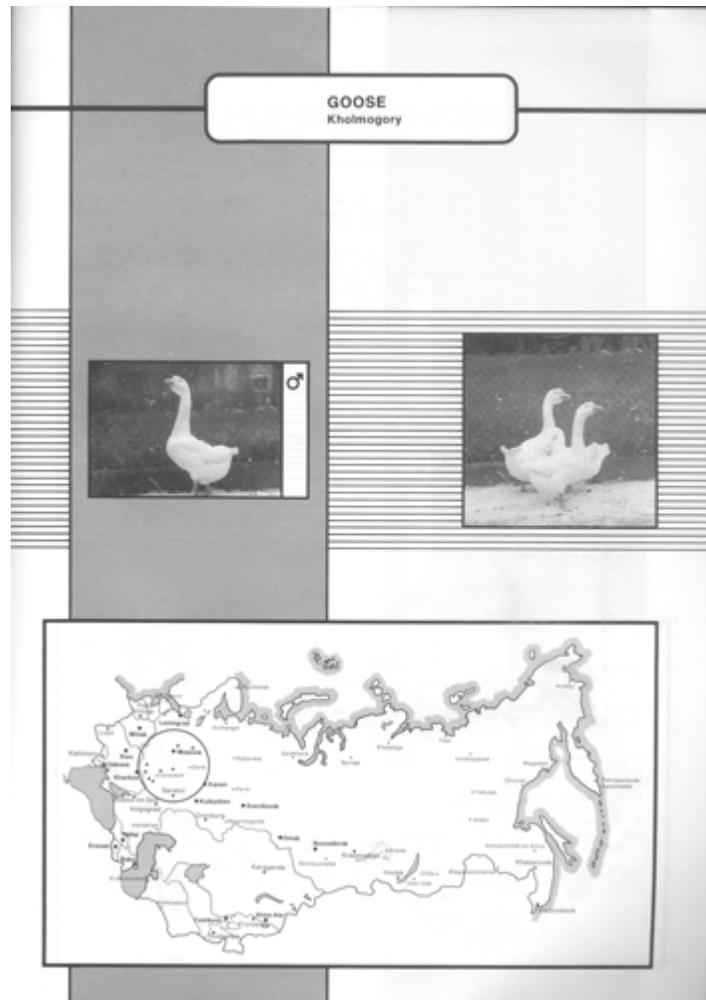
The body is compact, with the wings close to the body. The back and breast are broad. The neck is short; the head is small and the bill is straight and orange. The legs are strong and short; the shanks and feet are orange. The birds are very active. The plumage is white, grey or pied.

The live weight of males is 6.0-6.5 kg and that of females is 5.5-5.8 kg. Males and females may reach the higher live weight of 8 and 7 kg respectively. Birds mature at the age of 10 months. Egg production is only 15-18 eggs. Individual geese lay 25-30 eggs. Egg weight is 160-180.

Fertility and hatchability are high. During pedigree breeding the hatching rate reached 90%.

An important biological feature of the breed is its good meat qualities. In terms of fat content in the dry meat matter (58.2%) the geese surpass many other breeds and breed groups. Kaluga geese have a high viability; the brooding rate is moderate.

The low egg production of Kaluga geese has led to their replacement with other breeds. At the same time this breed group is a useful genetic resource. They can be raised as purebreds or crossed with other breeds.



KHOLMOGORY (Kholmogorskaya)

It was formed in the Central Black-Earth zone of the Russian Federation by crossing local white geese with Chinese; it is suggested that Tula Game geese were used in the crossing. Long-term pure breeding, improved feeding and management have resulted in the national breed. The breeding work is carried out by the Ail-Union Poultry Breeding Research Institute. The breed was widely spread over Kursk, Belgorod, Voronezh, Moscow, Vladimir, Arkhangel and other regions.

In 1974 there were 19 680 geese of this breed. Their number decreased slightly, to 18 500, by 1980. At present the population is still declining slowly. They are generally used on non-specialized poultry farms and private plots.

The Kholmogory goose's body is massive (long, deep and broad) and horizontal. The head is elongated with a knob on the forehead; the breast is broad and bulging; the beak is straight, long and orange-red in colour; the neck is long, slightly curved and with a purse. The knob on the forehead appears at the age of 6 or 7 months. There is a fold on the abdomen. The wings are strong, well developed, close to the body. The legs are of medium

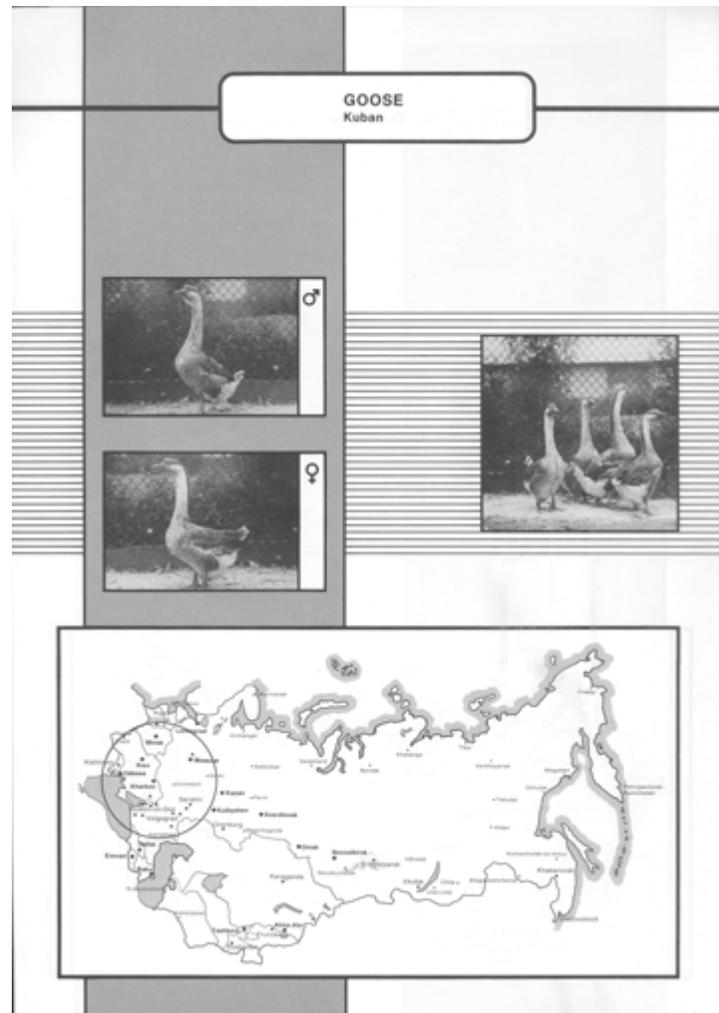
length and strong; the shanks and feet are red or orange. The plumage is grey, white or pied.

The live weight of adult males is high, 7-8 kg, and that of females is 5.5-6.0 kg. Under optimal conditions the live weight of males reaches 9-10 kg and that of females 7 kg. By 60 days of age goslings reach the rather high live weight of 3.0-3.5 kg, the feed consumption being 3.8-4.0 kg per kg of gain. Egg production is 25-30 eggs weighing 170-180 g each. Fertility and hatchability are 80 and 50% respectively.

Kholmogory geese are very hardy and have a calm disposition; they quickly acclimatize to local conditions. Meat qualities are good. The crossbred progeny of Kholmogory males and Chinese White females produced 69% of edible parts. It is feasible to raise Kholmogory geese on private plots.

The reduction in numbers of these geese and their removal from commercial farms are due to the introduction of more productive breeds.

Kholmogory geese have a low egg production and hatchability; the resulting crop is only 12-13 goslings per layer.



KUBAN (Kubanskaya)

A breed developed at the poultry breeding department of the Kuban Agricultural Institute by backcrossing Gorki geese with the Chinese. Another population of Kuban geese, with white plumage, was obtained by crossing white Gorki geese with the Large Grey, the Embden, and the Vishtines.

The first population of Kuban geese is widely distributed, predominantly in the southern regions of the Russian Federation. They are also kept in the central regions, in the Volga area and in Ukraine, Moldavia and Kirgizia. In 1974 these geese numbered 20 500 birds; in 1980 their numbers reached 82 300 but at present they have declined somewhat.

The body is of medium length, raised in front. The head is large with a knob on the forehead at the base of the bill. The breast is rounded and the legs are of medium length. The back and wings of the Kuban Grey are light greyish-brown with a dark brown stripe on the head and neck; the feet are dark. The Kuban White has white plumage and pale feet and bill.

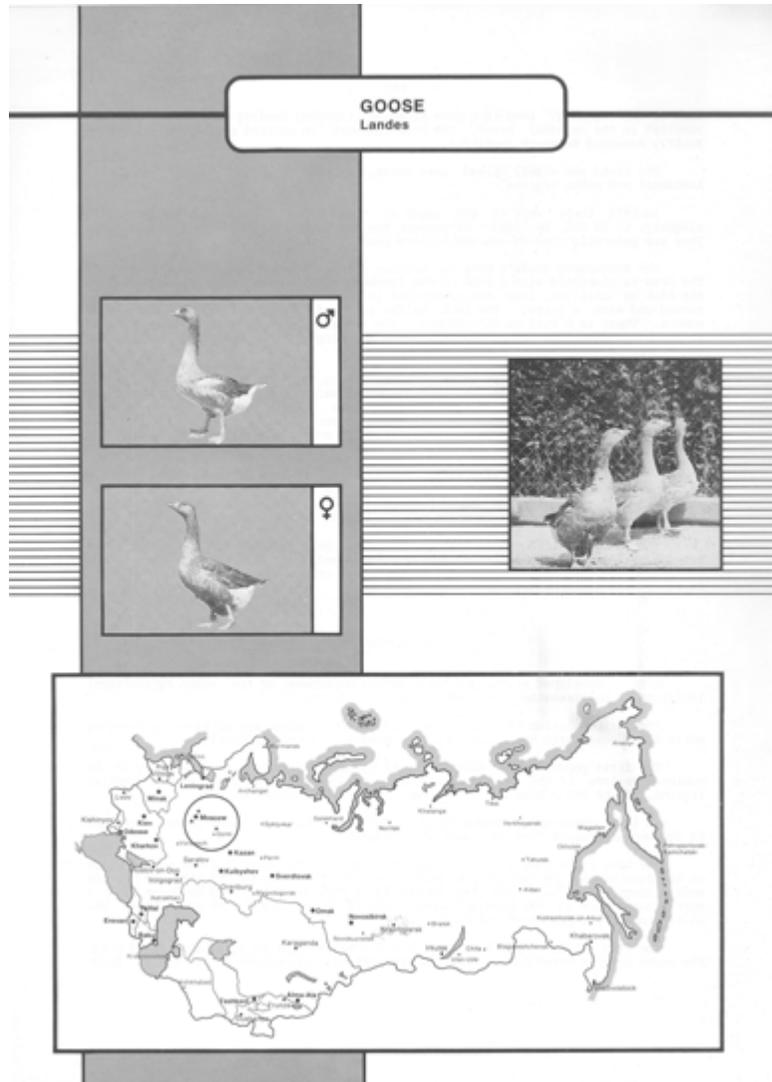
The live weight of adult males is 5.0-5.5 kg and that of females is 4.5-5.0 kg. The geese of this breed have a high egg production; egg weight is 140-160

g. Birds mature at the age of 240-250 days. The egg-laying period lasts 7 months. The hatching rate is high - 75-85%. The survival rate of young is good - 85%. The 60-day-old goslings weigh 3.4-3.6 kg.

The breed is known for its high reproductive performance (egg production may reach 100 eggs per layer, fertility and hatchability are up to 90%, survival rate of young is up to 95%) and good adaptation to the climatic conditions of Krasnodar territory and adjacent regions.

The weak points of the breed are the slow weight gain of the young and low carcass quality because of the colour of the plumage and skin.

Pedigree breeding of Kuban geese is carried out at the poultry breeding department of the Kuban Agricultural Institute which is working on the development of new highly-productive strains. The research work is aimed at producing a maternal line for broiler production by crossing with breeds of good meat qualities.



LANDES (Landshskaya)

Landes is a breed imported from Hungary. At present, there are small flocks of these geese in Gorki and Moscow regions, their total number being some 6000 birds.

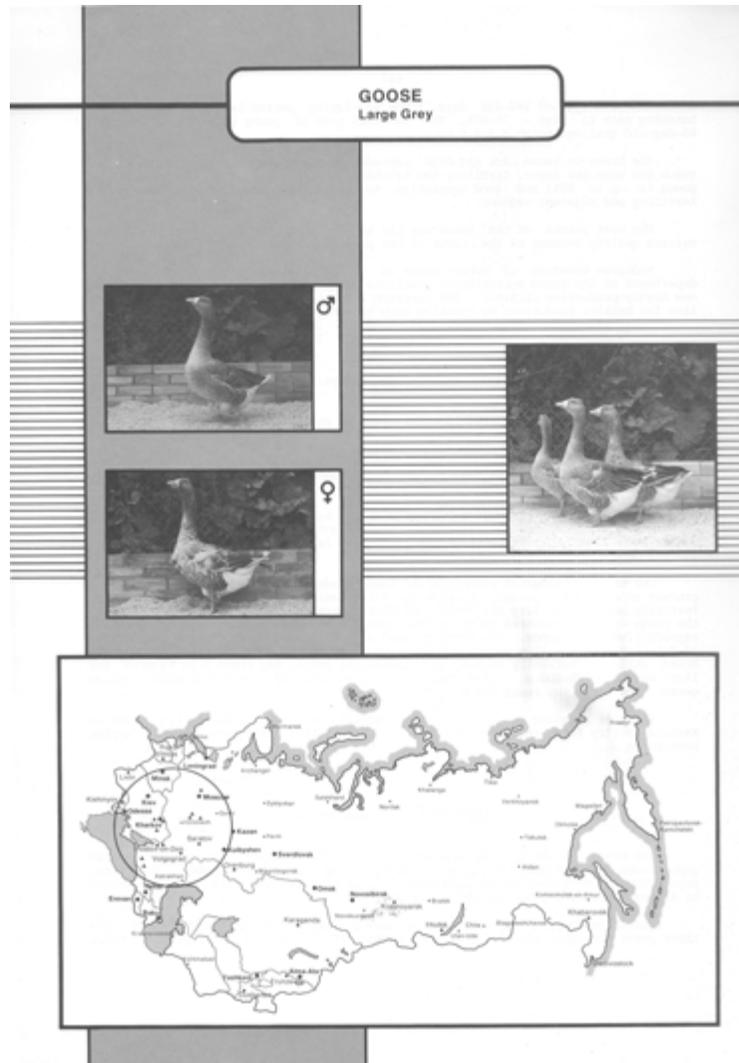
In constitution, size and colour Landes geese resemble the Toulouse but with a lighter plumage. The body is massive, the head broad, the neck thick and short, the breast broad and deep. The legs are of medium length.

The live weight of adult males is nearly 6 kg and that of females is 5 kg. When fattened to produce fat livers, the live weight reaches 8 kg. The 60-day-old goslings weigh 3.5 kg. The average egg production is 25-30 eggs; egg weight is 170 g. The hatching rate is 45-50%.

One of the biological properties of these birds is that they can be fattened to produce enlarged fat livers. Young with a live weight of 8 kg have 700 g livers. Fertility and hatchability are 75-80 and 60-65% respectively. The survival rate of the young is 80%. Purebred birds of this breed are not popular because of their low reproductive performance. The breed is used

as a paternal strain in crosses for the of fat livers. The live weight of goslings obtained by crossing with the Rhenish breed, which are currently raised on a commercial scale, may reach 9-10 kg with the liver weighing 700-800 g. Good results are also obtained by crossing with Italian geese. The liver may reach 520 g or more.

Pedigree breeding is carried out at Lindovsk enterprise in Gorki region and on Kashira poultry farm in Moscow region. Flocks of this breed are kept at Complex enterprise.



LARGE GREY (Krupnaya seraya)

The breed exists in two populations, the Ukrainian and the Tambov. Both populations were obtained by crossing Romny geese with the Toulouse. The first population was developed by the Ukrainian Poultry Breeding Institute, and the second at Arzhenka breeding plant in Tambov region. The Large Grey is the most popular among local breeds in the USSR. In 1974 these geese numbered 196 000 and they reached 314 200 in 1980. At present their numbers have declined somewhat due to the large-scale commercial introduction of the Rhenish and Italian breeds.

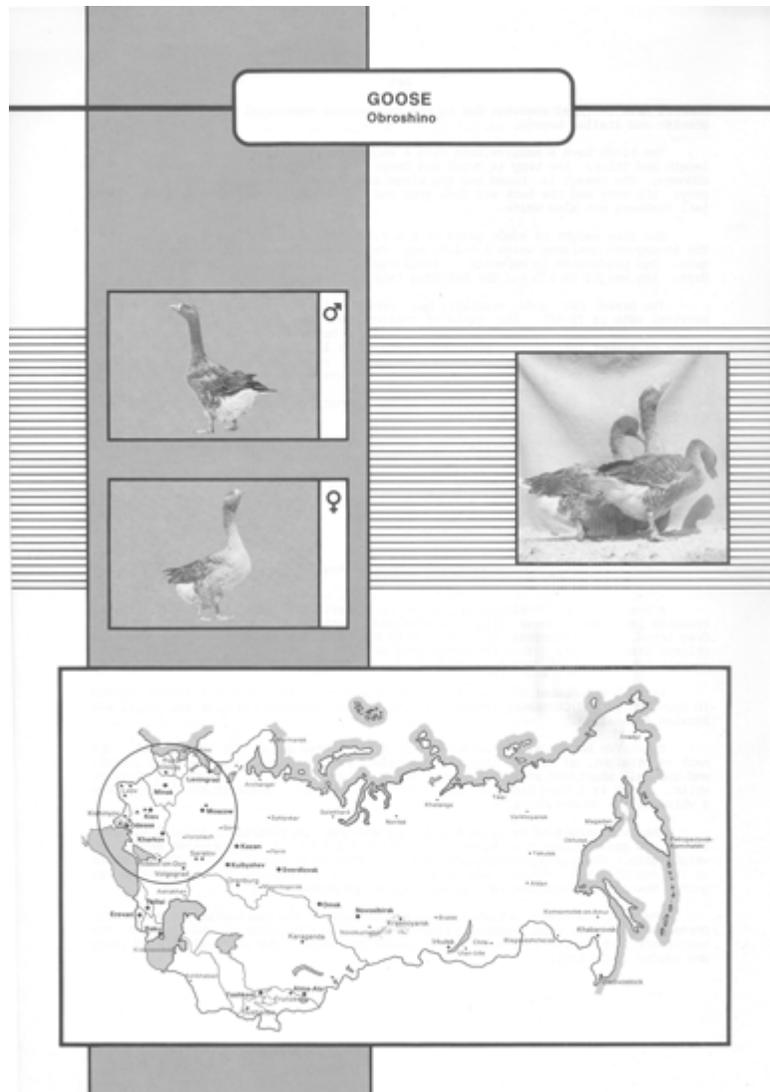
The birds have a massive head with a short orange bill. The neck is of medium length and thick; the body is broad and deep; some birds have two skin folds on the abdomen. The breast is broad and the wings are close to the body. The plumage is grey; the neck and the back are dark grey and the abdomen is white. The tips of the tail feathers are also white.

The live weight of adult males is 6.5-7.0 kg and that of females is 5.8-6.0 kg. The 60-day-old goslings weigh 3.5-4.0 kg; feed consumption is 3.1-3.2 kg

per kg of gain. Egg production is moderate - 35-40 eggs. Birds mature at the age of 250-260 days. Egg weight is 175 g. The hatching rate is 55-58%. The breed has good viability but reproductive performance is poor. The survival rate is 78-80%. The yield of goslings per layer is also low - 18-20 head. Large Grey geese are bred pure and also used as the paternal line in crossing with breeds of higher reproductive performance and lower live weight. They are also used as paternal or maternal grandparental lines which are crossed to form the maternal line which is then crossed with the highly productive Rhenish geese.

Large Grey geese are widespread in the central and southern regions of the Russian Federation and in the Ukraine.

Pedigree breeding is carried out at the Ukrainian Poultry Breeding Institute which has a selection programme aimed at producing new strains. Breeding is also carried on at Arzhenka breeding plant in Tambov region. Large Grey geese constitute good genetic material for producing crossbreds with fast weight gains up to the age of 8 weeks and a live weight of 4.2-4.5 kg.



OBROSHINO (Obroshinskaya)

A breed group developed on Obroshino Experimental Farm in the Ukraine by crossing local white geese with good down and feathers with ganders of the Chinese Grey breed. The crossbreds were mated with the offspring of Large Grey ganders and Chinese Grey females. Then the crossbreds were bred inter se. There are two types in this breed group (C_1 and C_2), which differ in plumage and productivity.

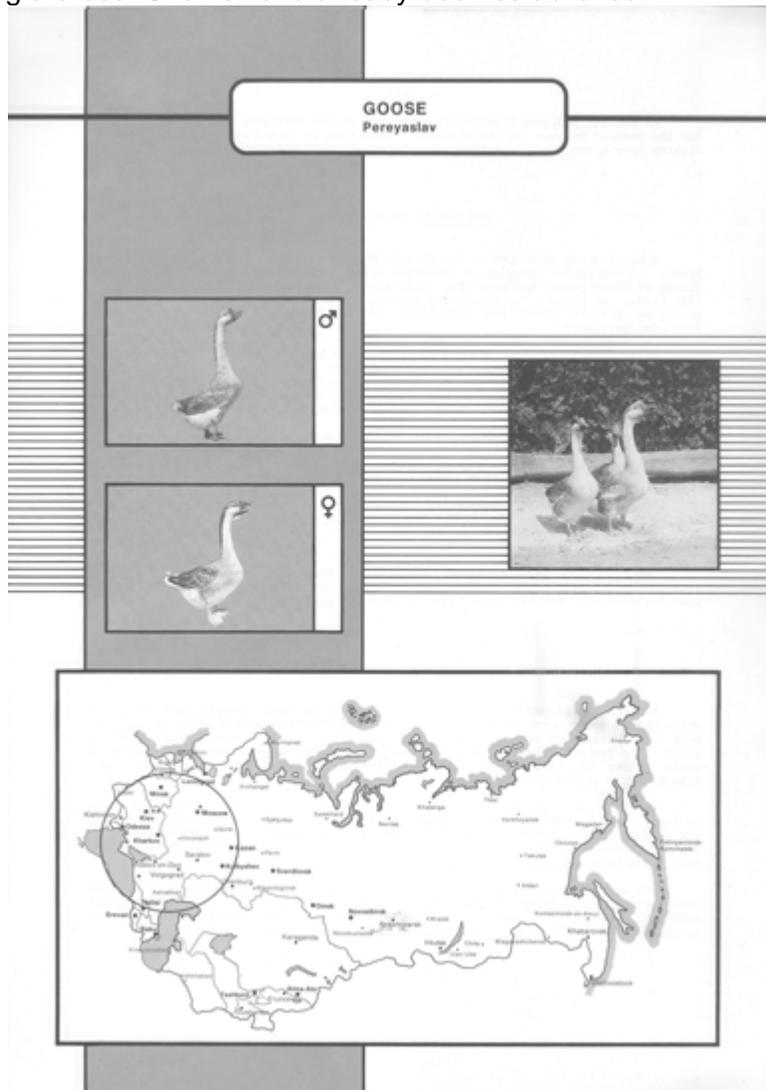
In 1980 the number of Obroshino geese exceeded 4 000. They are mainly raised in Lvov, Volyn and Cherkassy regions, as well as in Moldavia and some regions of the Russian Federation.

The birds have a strong constitution, a small head and bright orange bill. The neck is straight, of medium length. The breast is broad and deep, the back erect, and the tail short and straight. The plumage is grey except for the abdomen which is white. There is a dark brown stripe on the head and neck. Geese of the C_2 type have a white stripe on the breast.

The live weight of males is 6.8-7.2 kg and that of females is 6.3-6.8 kg. The 60-day-old goslings weigh 4 kg or more with 2.9-3.3 kg of feed required per kg of weight gain. The egg production in the first cycle is 40 eggs or more. Birds mature at the age of 9-9.5 months. Egg weight is 155-160 g. Reproductive performance is good. The average hatching rate is 65-70% but can reach 80-82%.

The meat qualities are good, and the fertility and hatchability are 80-89%. Obroshino geese are good grazers and well adapted to the climatic conditions of the southeastern Ukraine. They have fine down and feathers. The survival rate of young and adults is 90-100%.

At present pedigree breeding is under way at the Institute of Animal Husbandry for the Western Regions of the Ukraine. Selection is aimed at obtaining a breed. Strains have already been established.



PEREYASLAV (Pereyaslavskaya)

A breed group developed in the Ukraine by crossing local geese with the Chinese breed. It was rather popular in Chernigov region and adjacent

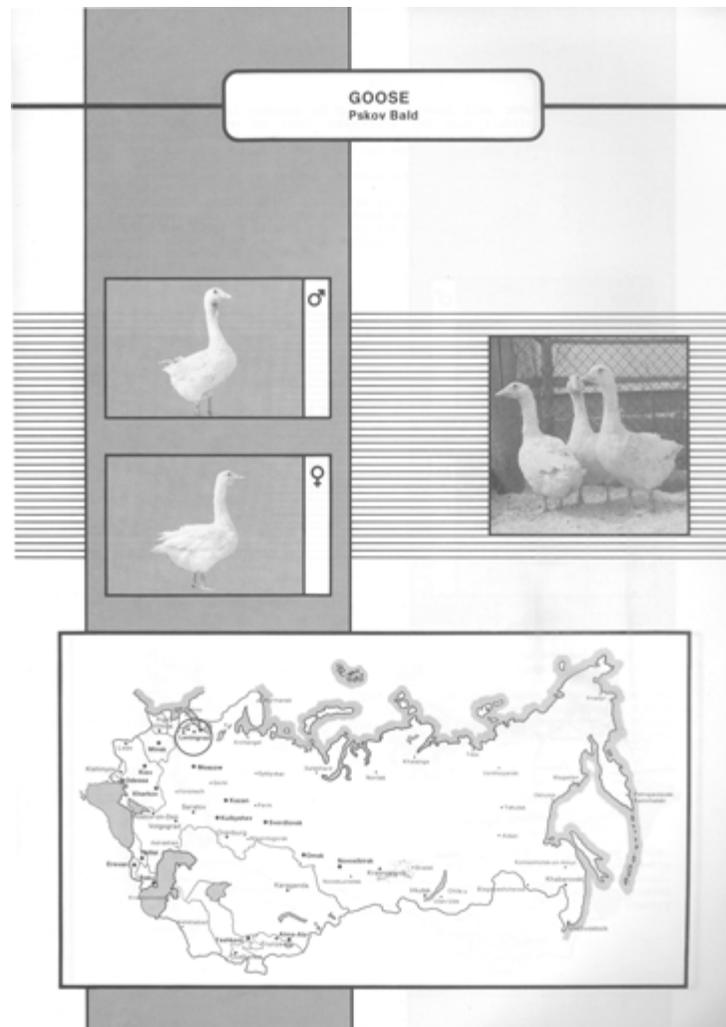
areas. In 1974 the flocks of these geese had more than 2100 birds; in 1980 their number declined to 1500 birds. At present the population is even smaller. Pereyaslav geese are raised mainly on private plots and individual poultry farms in Chernigov region and Krasnodar territory.

In conformation, size and colour Pereyaslav geese resemble the Chinese Grey breed. The body is medium-sized, raised in front; the neck is long. The head is large with a knob on the forehead. There is a "purse" under the bill and a fold on the abdomen. The plumage is dense. Back and wings are dark grey, with a dark greyish-brown stripe down the back of the neck. The bill is dark and the tarsi are rose-coloured.

The live weight of adult birds is relatively low; males weigh 4.5-5.0 kg and females 3.8-4.0 kg. The 60-day-old goslings weigh 3.0 kg. Egg production is high -50-60 eggs. Egg weight is 140 g. Meat qualities are poor.

Among the biological properties of these geese one should point out their reproductive performance. The fertility of eggs is 80-90% and the hatching rate is 70%. The breed is well adapted to local conditions. The survival rate of young and adults is 85-95%.

The reduction in the former numbers of Pereyaslav geese is due to the introduction of new breeds with better meat qualities. However these geese can be used for obtaining material with high reproductive performance.



PSKOV BALD (Pskovskaya lysaya)

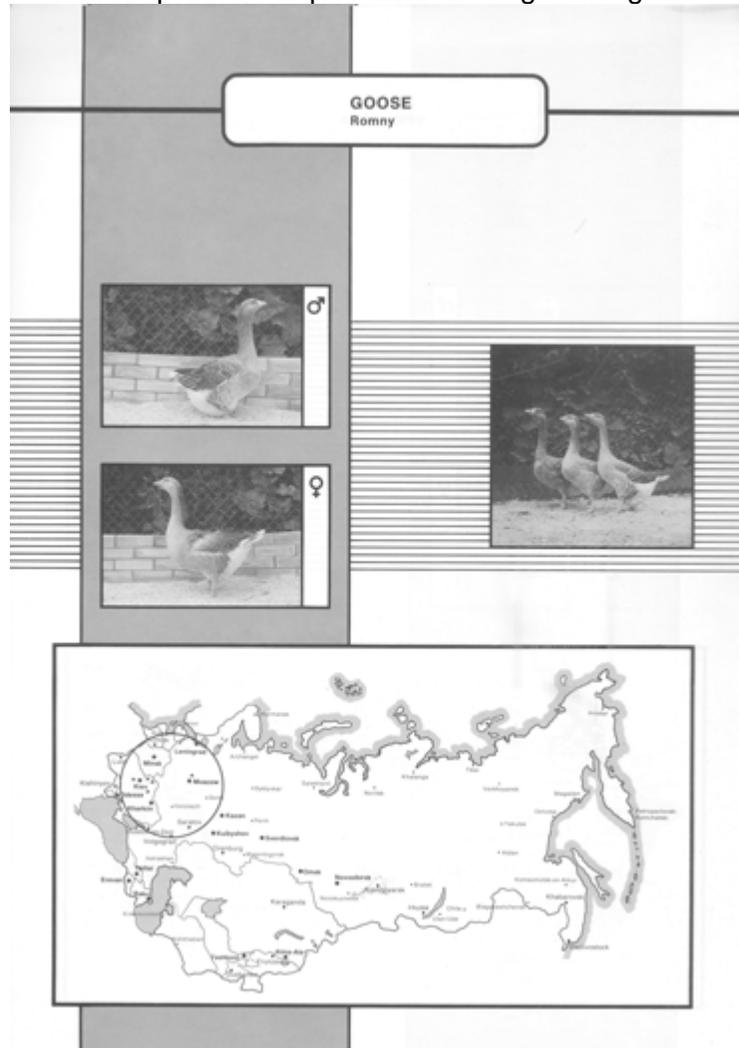
A breed developed in Pskov region by crossing local breeds with the wild white-headed geese which used to live there. Crossbreds were bred inter se and the best individuals were selected. During the war (1941-45) the breed almost ceased to exist. The few individuals remaining were used to restore the breed. At present a small number of birds exist in the Pskov and adjacent regions. They are predominantly raised on private plots.

The body is horizontal, broad and deep. The head is large, with a white spot on the forehead; the bill and the neck are short. The legs are short and the shanks are orange. The plumage of back and wings is steel-grey; breast and abdomen are lighter. Some birds are light grey, with a dark stripe down the back of the neck. Most birds have a fold on the abdomen.

The average live weight of males is 6.0 kg and that of females is 5.0 kg. The 60-day-old goslings weigh 3.5 kg. Egg production is only 15-20 eggs. The females mature at the age of 10 months. In optimal conditions of keeping and feeding egg production reaches 30 eggs. The average egg weight is 180 g.

Major biological features of Pskov Bald geese, like other local breeds, are their good adaptation to local conditions and high viability under extensive conditions. They have good weight gains. Under optimal conditions of feeding and management the live weight of the young can reach 3.8-4.0 kg by the age of 60 days.

The reduction in the numbers of these geese is due to their low productivity. Pskov Bald geese are of some value as a genetic resource and will be included in the conservation flock of the All-Union Institute of Poultry Breeding. To this end, Pskov and adjacent regions are being searched for the most typical specimens in terms of colour, size and constitution. Their economic value and productive qualities are being investigated.



ROMNY (Romenskaya)

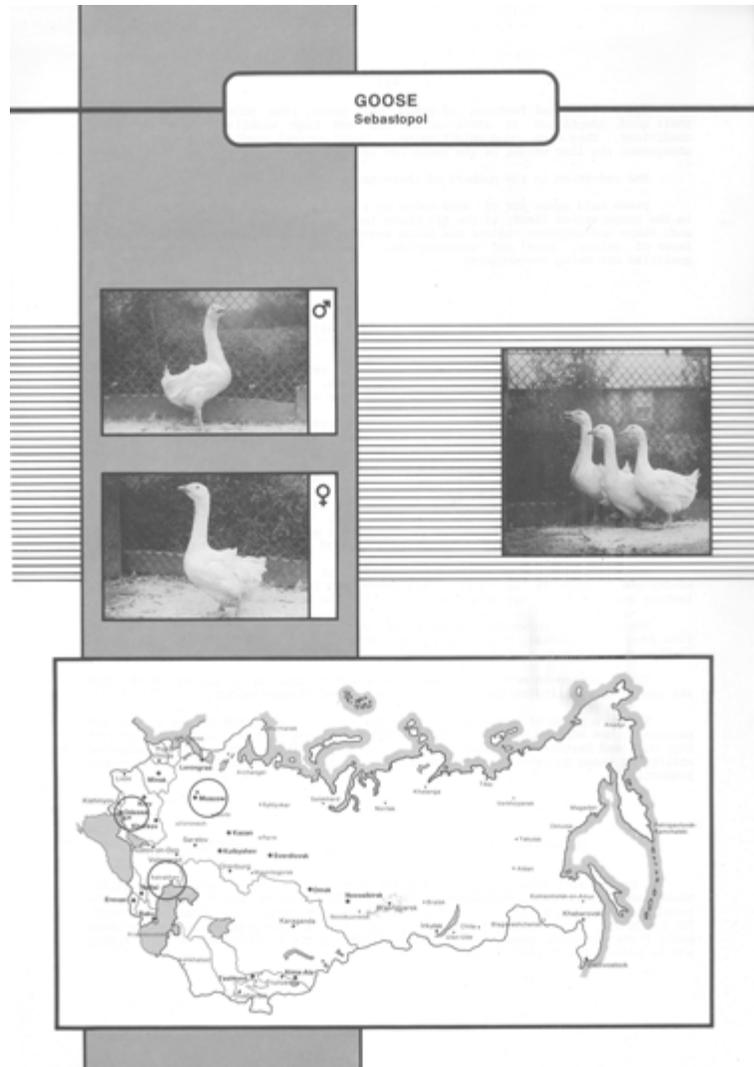
A breed obtained from local geese of Poltava region by means of mass selection aimed at improving their productive characteristics. Romny geese were widely spread in Chernigov, Sumy, Poltava, Kiev and other regions of the Ukraine.

In 1974 there were 38 500 birds of this breed; by 1980 their numbers had declined to 24 500. At present there are even fewer. They are mainly raised on general farms and on private plots.

The body is deep and broad. The head is small and rounded, with a short, straight bill of orange colour. The breast is broad and deep. The wings are well developed; the tail is small, slightly raised. Adult geese have one or two skin (fat) folds on the abdomen. The plumage is grey, white or pied. Most birds are grey; the neck and back are dark grey, the breast grey and the abdomen light grey. The legs are short and strong with orange shanks and feet.

Adult males weigh 6 kg or more and females 5.5 kg. The live weight of 60-day-old goslings is 3.4-3.5 kg. Egg production is 15-20 eggs in the first cycle lasting 4-4.5 months. Egg weight is 160-170 g. The hatching rate is 60-65%. The breed is known for its efficient weight gains, tender and fat meat, and fine down and feathers. The fertility and hatchability are sufficiently high, 80 and 75-80%, respectively.

The reduction in numbers is due to slow weight gain up to the age of 60 days and low market quality of the carcass because of the plumage colour. The germ plasm of Romny geese is useful for the development of new breeds and parental lines adapted to the climatic conditions of the Ukraine, and of groups with high down and feather qualities. Studies are under way to determine the combining ability of these geese with other breeds in order to obtain a maternal line of higher productivity.



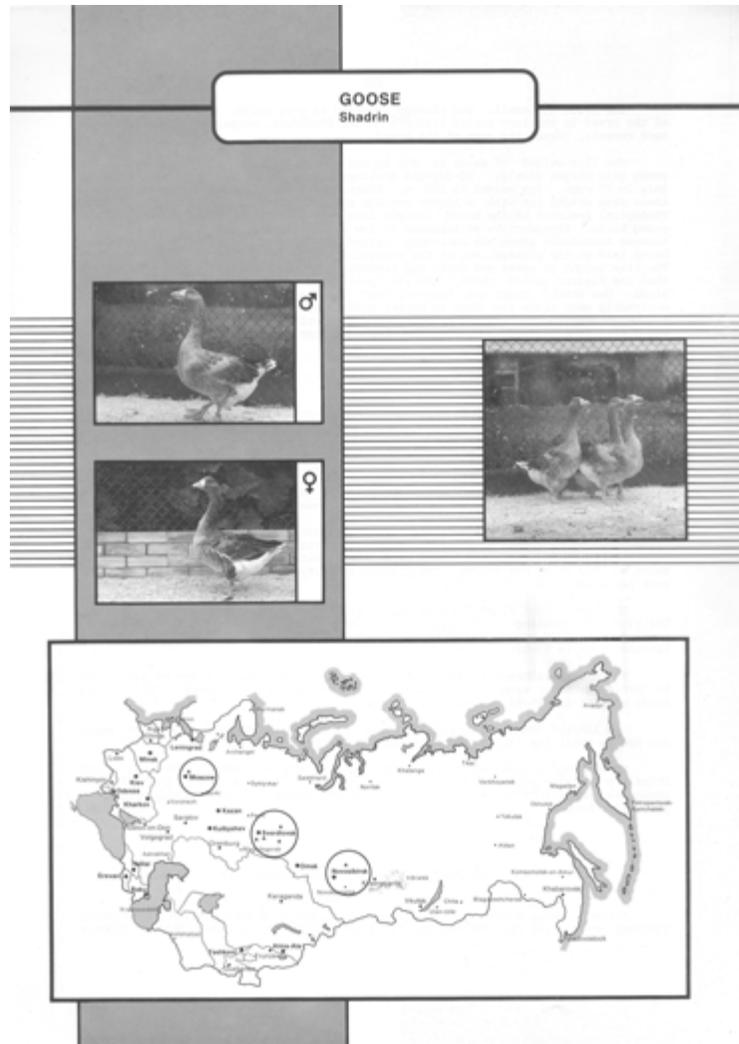
SEBASTOPOL (Curly or ribbon = Kurchavaya or Lentochnaya)

A breed also known as Silk, Astrakhan, Turkish or Sevastopol Ribbon geese. These names indicate the localities of their origin and distribution. Previously the breed was raised on a rather wide scale and it used to number more than 50 000 head. The birds also had a higher productivity than the existing population. At present small flocks of these geese are raised on private plots in the south of the country and by amateur poultrymen.

The birds are small. The plumage is white or grey white. The peculiar feature the breed is the long curled feathers on the shoulders, wings, tail, and among the pack coverts. Hence the name of the breed.

The live weight of males is 5-6 kg and that of females is 4.5-4.7 kg. The young gain weight slowly: 60-day-old goslings weigh 3.2-3.5 kg. Egg production is only 20-25 eggs. Egg weight is 160 g. There is a group of Sebastopol geese with a flower live weight but with a higher average egg production of 30-35 eggs per layer. -Biological features of the breed include

slow feathering and low growth rate of the young birds. Reproductive performance is low with fertility only 60-65%. For these reasons Sebastopol geese are currently raised on a limited scale, the main emphasis being laid on the plumage, not on the commercial value and productivity of the birds. The live weight of geese and their egg production in these populations are much lower than the figures quoted above. Amateur poultrymen raise these geese as ornamental birds. One should point out, however, that the productivity of the breed improves noticeably when birds are kept in better conditions. According to the data of the Ail-Union Institute of Poultry Breeding, the live weight of the 60-day-old young does not differ from that of many other small populations, and the hatching rate reaches 70-75%.



SHADRIN or URAL (Shadrinskaya or Uralskaya)

This is an old local breed obtained by long selection for adaptation to the severe climatic conditions of Siberia and the Urals.

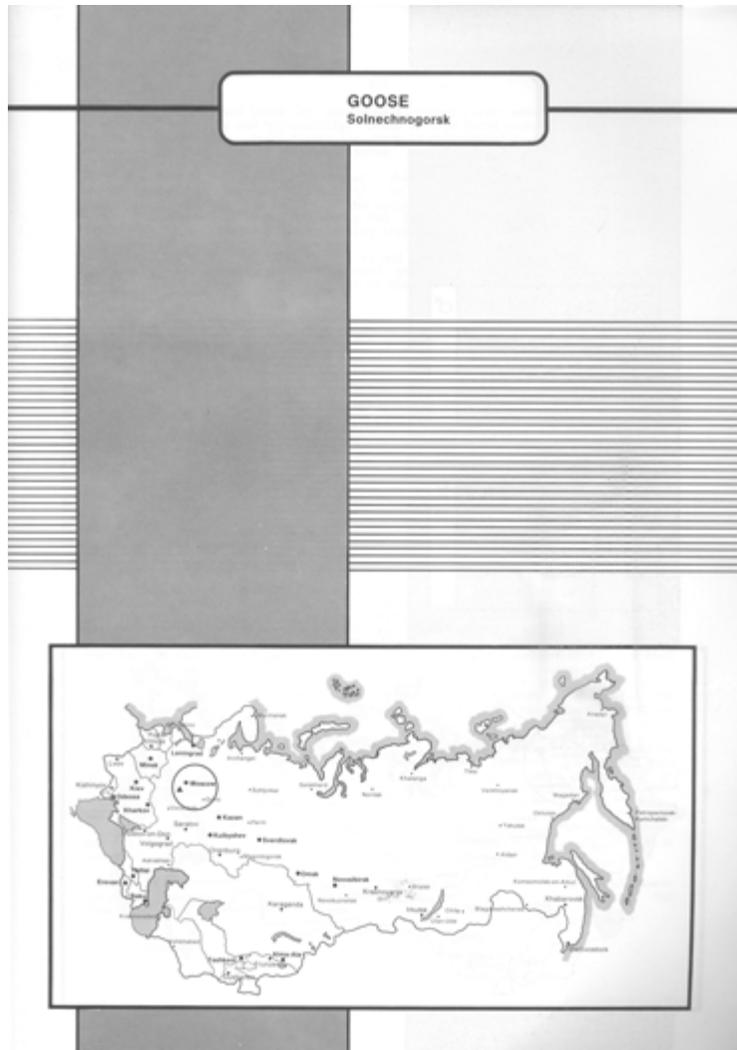
The breed was not raised on a large scale. In 1974 there were 6600 birds; by 1980 numbers had declined to 1600 and at present remain at this level.

The head is small, the neck short, the bill short and straight. Shadrin geese differ from other breeds in having only 16 neck vertebrae instead of the usual 17 or 18. The body is compact and there is a small fold on the abdomen. The legs are short and the wings are strong. The plumage is grey, white or pied. The shanks and feet are orange-red.

The live weight of adult males is 5.5-6.5 kg and that of females is 4.5-5.0 kg. The 60-day-old goslings weigh 3.2-3.6 kg. Egg production is low and ranges from 20 to 25 eggs in four months; some birds lay 35-40 eggs. Egg weight is 150-160 g. The hatching rate is 50-55%.

Birds of this breed are well adapted to severe conditions and are characterized by hardiness under extensive conditions. The geese are good brooders and broody birds account for 45-55% of females:

The limited distribution and reduction of the former numbers of Shadrin geese are due to their low commercial value and reproductive performance. No meaningful breeding is currently under way with this breed. They are raised chiefly on private plots in regions adjacent to the Urals. On general farms Shadrin geese are usually raised on a limited scale and are used for crossing with more productive breeds.



SOLNECHNOGORSK (Solnechnogorskaya)

A breed group produced on Beriozki state farm in Moscow region by crossing Toulouse geese with the Kholmogory breed and mating the crossbreds with Chinese geese. Selection was aimed at obtaining a higher live weight and better egg production, fertility and hatchability. Geese of this breed group are raised chiefly in the Moscow region. Small flocks are kept in Solnechnogorsk and other districts mainly on private plots and individual farms.

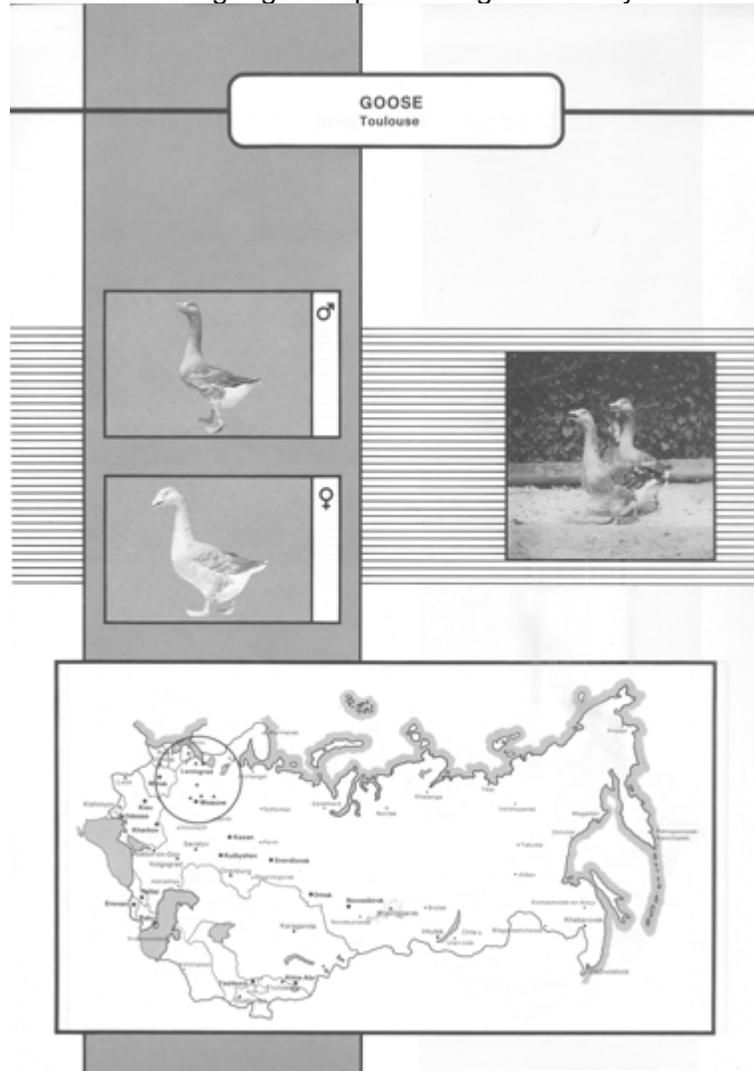
The body is massive, broad and deep. The head is elongated, with a small knob on the forehead at the base of the bill; in some birds the knob is missing. The breast is broad, deep and rounded. The wings are well developed and close to the body. The legs are short and the shanks and feet are orange. The plumage is white, sometimes with a tinge of grey on the wing tips.

The live weight of males is 7-8 kg and that of females averages 6 kg. The young gain weight fast. The 60-day-old goslings weigh 3.8-4.0 kg. The egg

production is 35-40 eggs. Birds mature at the age of 9-9.5 months. Egg weight is 170-180 g.

Solnechnogorsk geese are well adapted to the climatic conditions of Moscow region. Their reproductive qualities are good. The hatching rate is 65-70%. Both young and adult birds gain weight fast. The yield of first-grade carcasses is 80-85%.

The limited distribution and reduction in numbers are due to the introduction of breeds with faster weight gains up to the age of 60 days.



TOULOUSE (Tuluzskaya)

This breed was developed in France and is very popular in European countries. Geese of this breed were imported to the USSR a long time ago. Acclimatization and breeding have somewhat changed the breed.

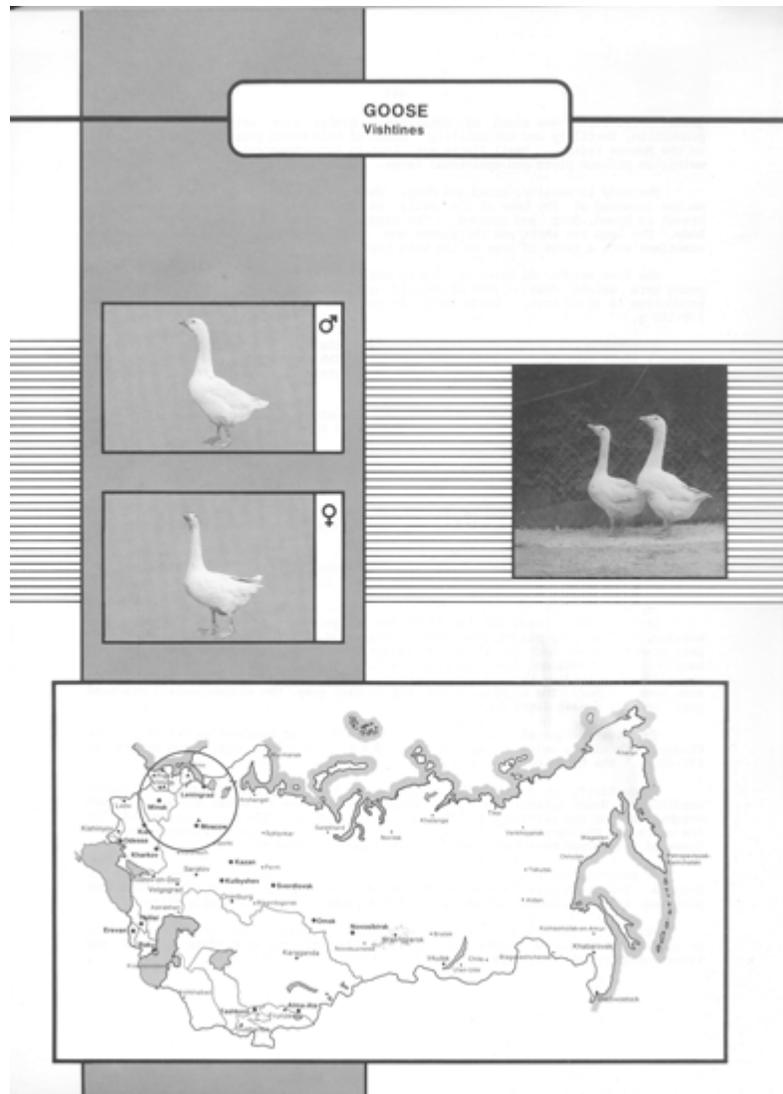
Toulouse geese were raised on a large scale in Kalinin, Vladimir, Moscow, Leningrad and other regions. In 1980 there were 11 400 birds of this breed; at present their numbers are smaller.

It is a meat breed and the birds are large. The body is broad, deep and massive, horizontally placed. The head is broad and short; the bill is straight and pale orange. The neck is of medium length and thick. The legs are short and massive; the shanks and feet are orange-red. There is a "purse" on the neck under the bill and a fold on the abdomen. Some birds have only a "purse" or only a fold; some have neither. The plumage on the back is dark grey, the abdomen white, the head grey, and the breast light grey. The live weight of males is 7-10 kg and that of females is 6-8 kg. The 60-day-old goslings weigh 3.8-4.0 kg. Egg production is 25-35 eggs; egg weight is 170-200 g. The hatching rate is 50-55%.

Productivity is drastically reduced when birds are raised under extensive conditions. Under optimal conditions Toulouse geese have high meat qualities, gain weight fast and produce a lot of fat. The yield of edible parts is some 68% of the carcass. The hatching rate is 70-75%. The survival rate of the young is 90-95%. Geese of this breed have been used for developing new breed groups.

At present Toulouse geese are raised in Kalinin and Moscow regions and in Estonia. Selection work is currently under way in order to maintain the standards achieved, to obtain faster weight gains of the young and improve meat qualities.

Studies at the Ail-Union Institute of Poultry Breeding show that the breed can be used for crossing to obtain young suitable for fattening to produce enlarged fat livers weighing 400 g or more.



VISHTINES (Vishtines)

A breed group developed in Lithuania by selection of local geese with high productivity. Later, these geese were crossed with East Prussian, Embden and Pomeranian geese.

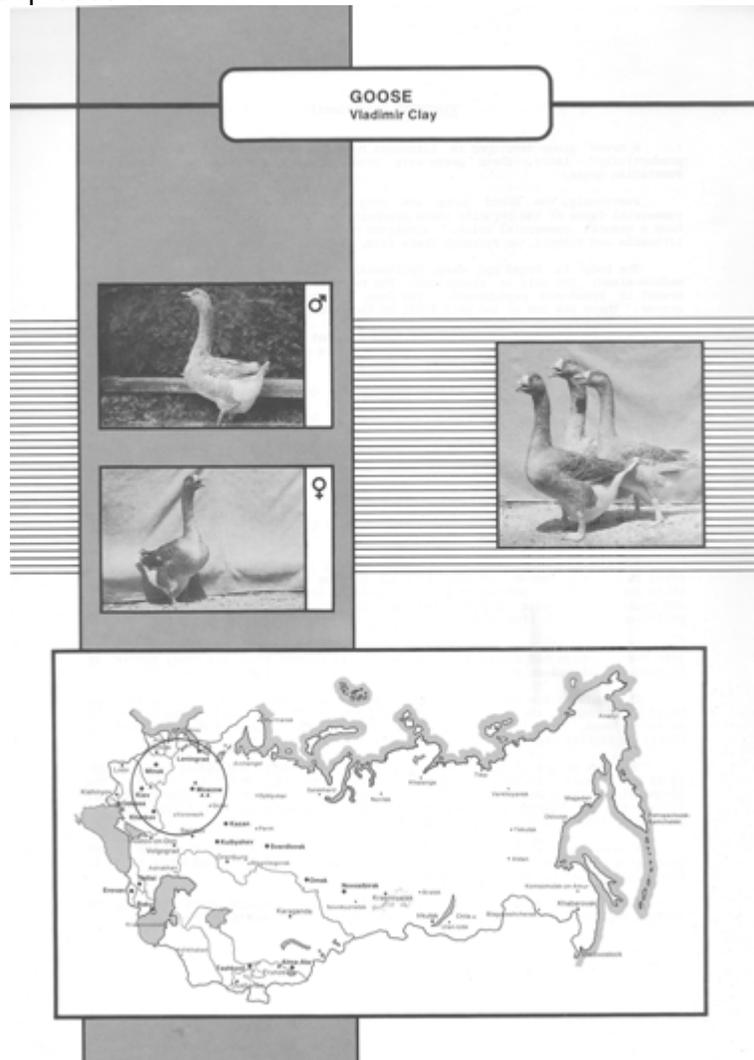
Previously, the breed group was very popular in Lithuania. At present commercial farms of the republic raise predominantly Rhenish and Italian geese which have a greater commercial value. Vishtines geese are raised on private plots in Lithuania and Estonia, on Pydrangu State farm, and on other farms in Estonia.

The body is broad and deep, horizontally placed. The head is round and medium-sized; the bill is orange-red. The neck is curved, of medium length. The breast is broad and protuberant. The legs are short; the shanks and feet are orange. There are one or two skin folds on the abdomen. The plumage is white.

The live weight of males is 6.0-6.5 kg and that of females is 5.5-6.0 kg. The 60-day-old goslings weigh 3.8-4.0 kg. Birds mature at the age of 9.5

months. Egg production is 30-40 eggs. Egg weight is 160-170 g. The hatching rate is 60-65%.

The meat qualities of the breed are rather good. Edible parts account for 68-70%; fat content is 13-14%. The survival rate of the young is 75% and that of adults is 90-95%. For these reasons, as well as because of the plumage colour on which the quality of carcass depends, and satisfactory reproductive performance (fertility and hatchability are 80-82% and 70-75% respectively), the breed is raised either as a purebred or as a parental form for broiler production.



VLADIMIR CLAY (Vladimirskaya glinistaya)

A breed group developed at Pioneer breeding plant in Vladimir region. The breed is based on geese with clay-coloured plumage obtained by crossing Kholmogory White geese with the Toulouse Grey. The resulting crossbreeds were then bred inter se and typical individuals were selected according to the plumage, good reproductive performance and high live weight.

Previously these geese were very popular in Vladimir and adjacent regions. By 1980 their numbers had declined to 230 birds. At present there are small flocks at Pioneer breeding plant and on private plots of local inhabitants.

The conformation is compact. The head is small and rounded. The breast is broad and rounded; the neck is of moderate length. There are one or two skin folds on the abdomen. The legs are of moderate length. The plumage is clay-coloured of darker or lighter shade.

The live weight of adult males is high - 7.0-7.5 kg; individual birds reach 10-12 kg. Females also have a high live weight ranging from 6.0 to 6.5 kg. The 60-day-old goslings weigh 3.6-3.8 kg. Egg production is 35-40 eggs. Egg weight is 170-180 g. In reproductive performance, Vladimir Clay geese are similar to the Kholmogory breed and in meat qualities they resemble the Toulouse.

A major biological feature of this breed is high egg production in the first productive year, reaching 55 eggs. The survival rate of the young and adult birds is also high, 80-100 and 95-100% respectively.

Vladimir Clay geese represent a valuable genetic resource which is useful to produce new populations. They are raised on general farms and household plots.

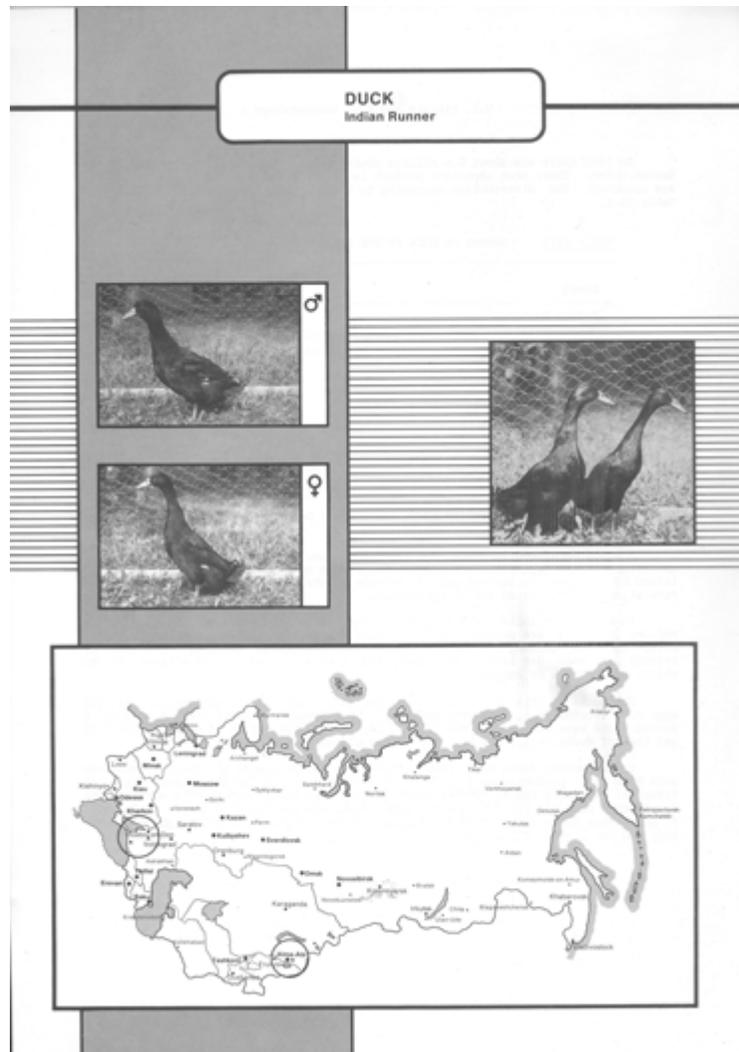
15. DUCKS

V.I. Fisinin and K.V. Zlochevskaya

In 1980 there are about 6.6 million adult ducks in the socialized sector in the Soviet Union. Their most important product is meat but to a small extent fat livers are produced. The distribution according to breeds and their numbers are shown in Table 15.1

Table 15.1 BREEDS OF DUCK IN THE SOVIET UNION

Breed	Number of adult birds	
	1974	1980
Indian Runner		few
Moscow White		few
Muscovy		few
Pekin		4 358 000
Russian Decoy		few
Speculum	400	few
Ukrainian Clay		360
Ukrainian Grey	17 700	2200
Ukrainian White	26 700	6800
White-breasted Black	218	190
Commercial ducks		
	2 202 000	



INDIAN RUNNER (Indiiskii begun)

A breed developed in India for egg production. It was imported from Britain, and selected intensively in the USSR. At present small flocks of these birds are raised by amateur poultrymen and on private plots in the south of the Russian Federation, in Uzbekistan and in Kazakhstan.

In appearance Indian Runners differ considerably from other ducks. The body is narrow; the legs are penguin-like; the head is small, with a large, wedge-shaped bill; the neck is long and thin; the wings are close to the body; the tail is raised; the legs are long; the shanks and feet are orange. The plumage can be white, pied, black or ash-red.

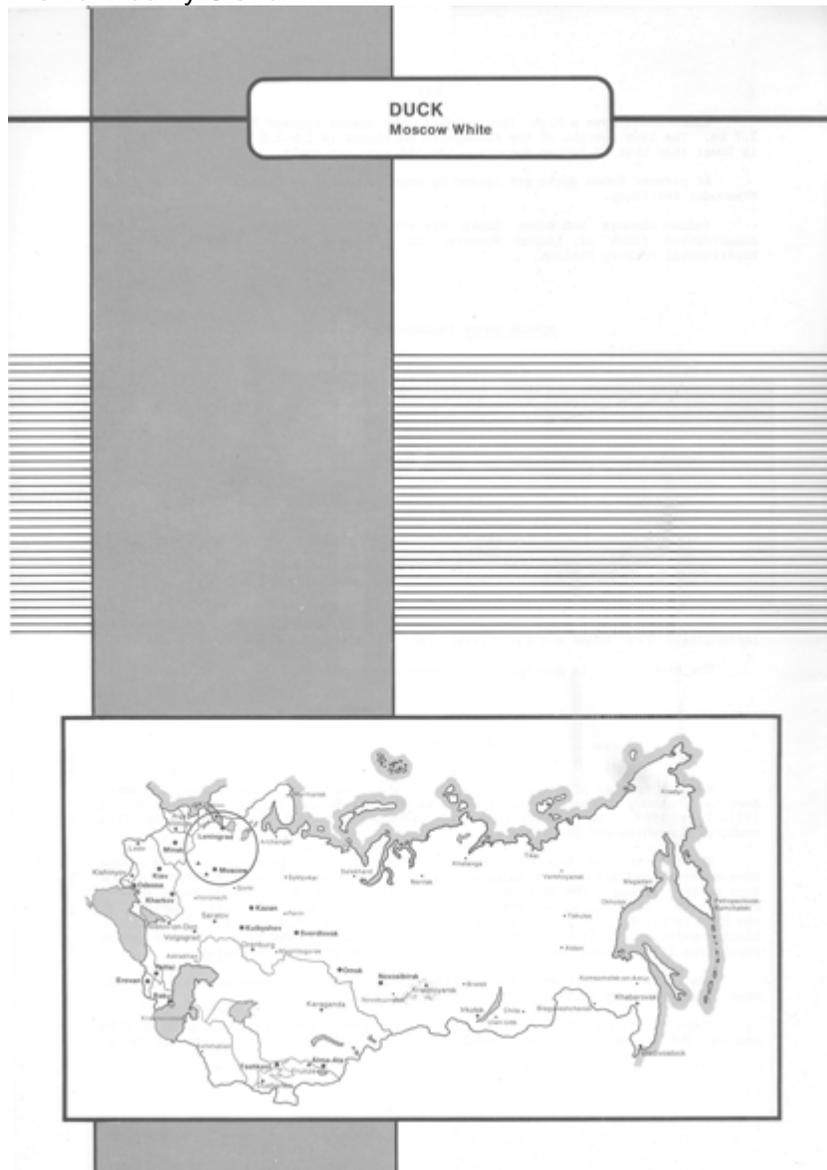
The ducks of this breed are noted for their high egg production, of some 200 eggs with records up to 365 eggs per year. Egg laying begins at the age of 5 or 6 months. The eggs are white and weigh 70-80 g. The live weight of drakes is 2.0 kg and that of ducks is 1.7-1.8 kg. The 60-day-old ducklings average 1.5 kg.

Indian Runner ducks have been crossed with other breeds to obtain crossbreds with high egg production and good meat qualities. On Lebyazhi

state farm in Krasnodar territory Indian Runners were crossed with Pekin ducks. The work on the development of a new population named Kuban ducks was continued on Dinski state farm. In appearance Kuban ducks resemble Indian Runners, particularly in the shape of the body and the length of the legs.

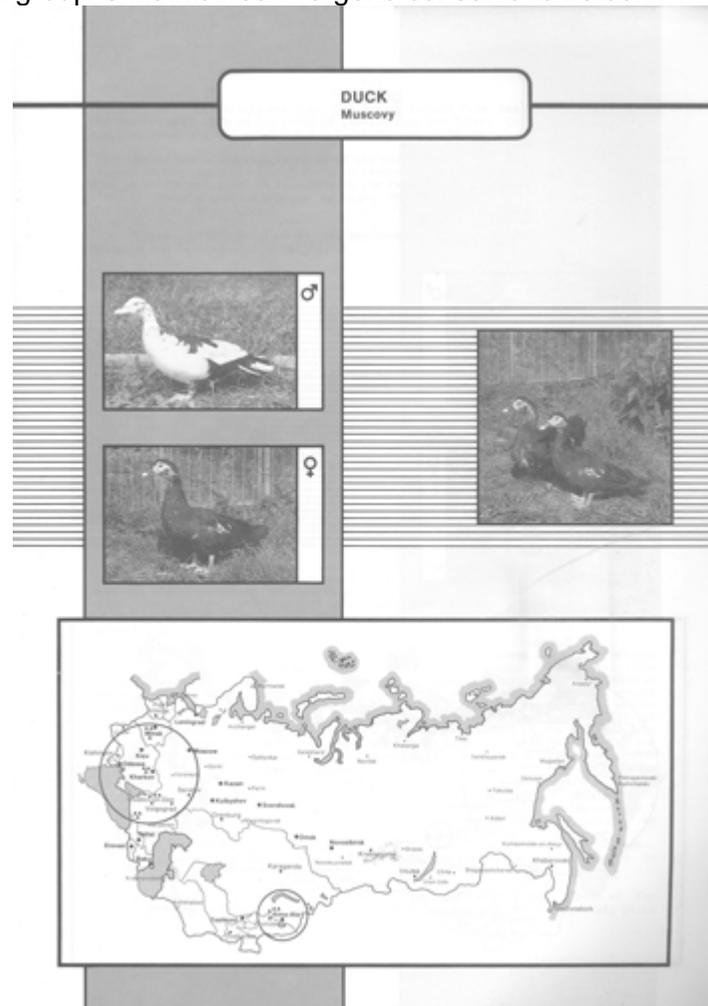
Kuban ducks have a high live weight; the drakes average 3.0 kg and the ducks 2.7 kg. The live weight of the 60-day-old ducklings is 1.8-2.0 kg. Egg production is lower than that of Indian Runners - 130-150 eggs per cycle. At present Kuban ducks are raised by amateur poultrymen and on private plots in Krasnodar territory.

Indian Runners and Kuban ducks are viewed as a genetic resource. A gene conservation flock of Indian Runners is maintained at the Kazakh Regional Experimental Poultry Station.



MOSCOW WHITE (Moskovskaya belaya)

A breed group developed on Ptichnoe poultry state farm in Moscow region by crossing Pekin ducks with Khaki Campbell drakes to obtain ducks with good egg production. Moscow White ducks used to be raised on a large scale in Moscow region, on state and collective farms in the Baltic republics, and in many regions of the central area. At present, small flocks are kept in central regions of the Russian Federation and in the Baltic republics, mainly on private plots and small poultry farms. Individual poultry farms raise crossbreeds obtained by crossing Moscow White ducks with Pekin ducks. In conformation Moscow White ducks are similar to Pekin ducks. The body is broad and raised, the breast rounded, the head small, the legs short and wide-set. The plumage is white. The bill, shanks and feet are pale. The live weight of drakes is 3.9-4.2 kg and that of ducks is 3.0-3.5 kg. Individual birds have a higher live weight. Egg production is 120-130 eggs in the first production cycle. Egg weight is 90 g. Moscow White ducks have good meat qualities, thin bones and white skin. The reproductive performance and the survival rate are high, 75 and 90% respectively. The breed group is maintained in a gene conservation stock.



MUSCOVY DUCKS (Muskusnye)

Another species of duck (*Cairina moschata*), which was domesticated in South America. Muscovy ducks were imported from western Europe in small numbers during 1960-70 and 1983. At present there are two populations of Muscovy ducks in this country, the white and the black. The body is long, broad and deep; the head has a bulging forehead; the drakes have a large head and ducks a medium-sized one. There are featherless patches on the face of the drake; the skin in these spots is red, with folds and knobs at the bill's base. The bill is of medium length, skin-coloured or dark pink; the tip of the bill is black. The breast and the back are broad and the legs are long. In the black population the plumage, shanks and feet are black. The plumage of the white population is white and the skin, the shanks and feet are pale in colour.

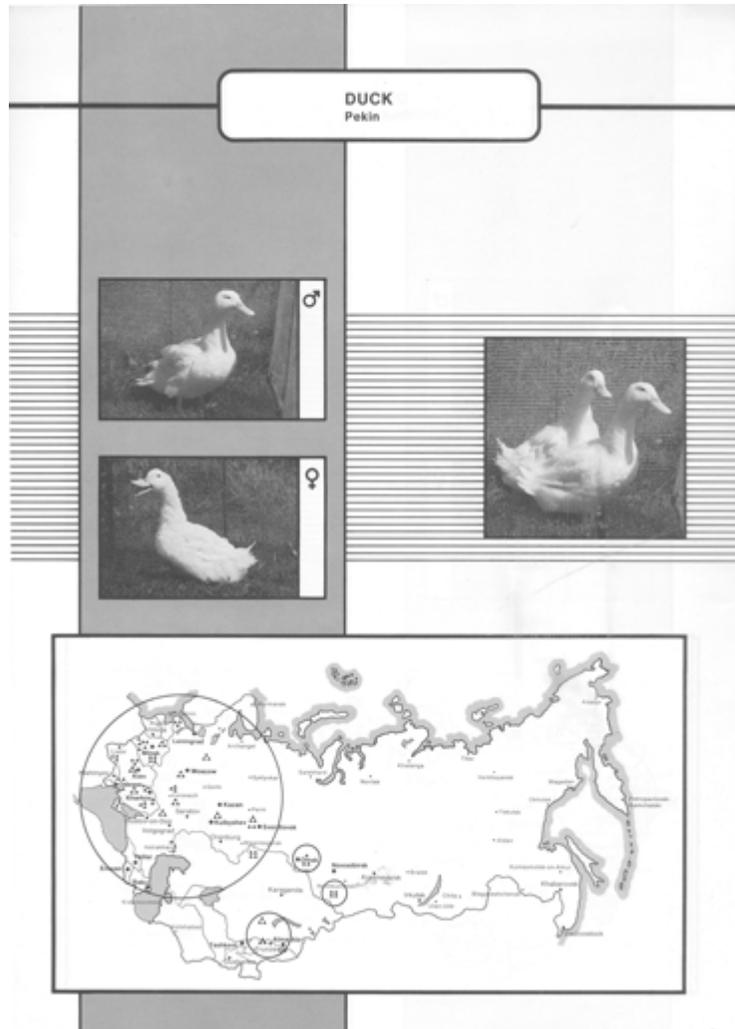
The ducks of this breed have a peculiar gait, moving the head back and forward. When frightened they raise a feathered crest on the head.

There is strong sexual dimorphism in live weight. The drakes weigh up to 6 kg and the ducks some 3 kg. Egg production is 80-120 eggs. Egg weight is 70 g.

Fertility and hatchability are low. The French Grimaud firm has selected strains of the Muscovy duck with an egg yield of 140—150 eggs per layer. Crossbred obtained by crossing these strains weigh 3,8—4.0 kg at the age of 80 days.

One of the biological features of the Muscovy duck is a low fat content in the carcass of the young (22-26%), For this reason studies have begun using the Muscovy duck as a paternal line in crosses with the Pekin duck. These parents produce few offspring but carcass quality is high. The fat content is 10-15% less than in the carcass of pekin ducks.

Muscovy ducks are raised at the Byelorussian and Kazakh Regional Stations, in in Moldavia and in Krasnodar territory.



PEKIN (Pekinskaya)

A breed developed in China. In the USSR the introduction of the breed on a large scale began in 1920 and 1930s. At present broiler production is based mainly on crossbred from special strains of the Pekin duck. In addition, several populations have been developed on the basis of this breed which differ from it in their commercial characteristics.

The body is broad, long and somewhat raised. The breast is broad and rounded. The head is large, the eyes are dark blue; the forehead is bulging; the bill is small and orange-coloured. The back is broad; the wings are small, close to the body; the legs are short and thick. The plumage is white with a yellowish-cream tinge.

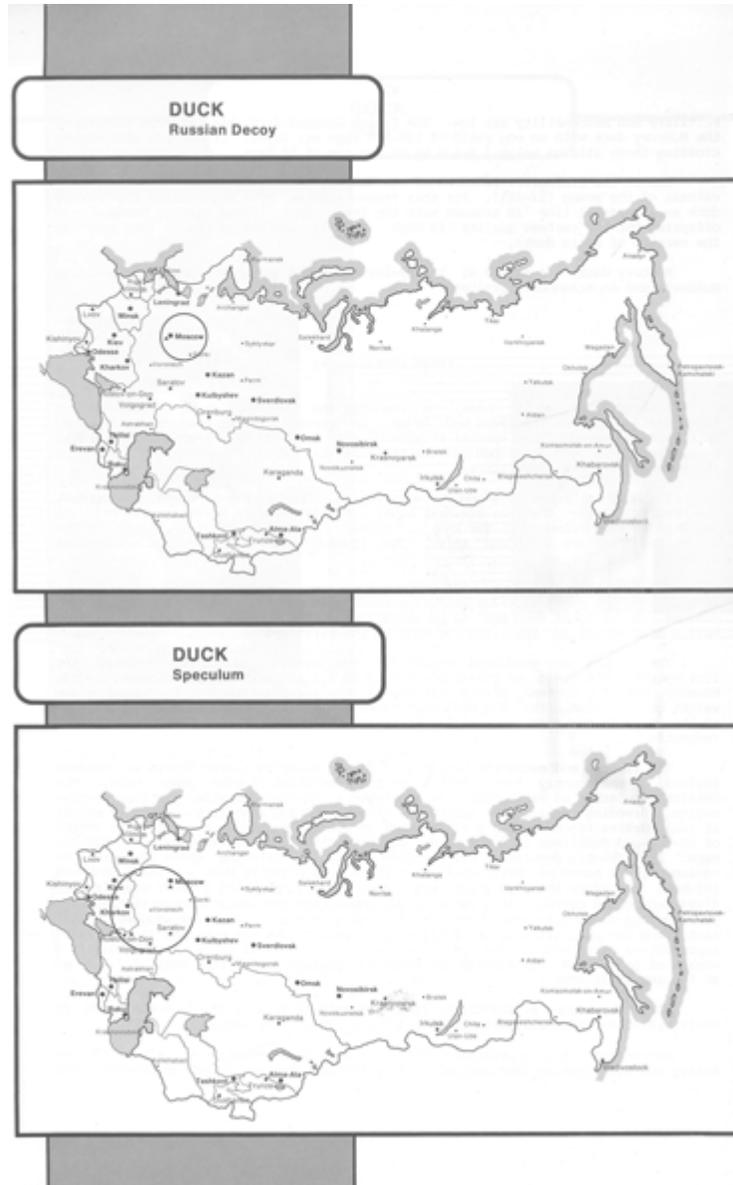
The live weight of ducks of the special strains is high. The drakes weigh 4 kg or more and the ducks 3.5-3.7 kg. The 60-day-old ducklings weigh 2.8-3.2 kg and consume 2.9-3.3 kg of feed per kg of weight gain. The lines of the maternal strain have a high egg production — 170-180 eggs in the first cycle. These ducks have good meat qualities. The carcass accounts for 65-70% of the live weight. The yield of breast muscles is 10-11% and that of all muscles 41-43%. However, the fat content of the carcass of the strains

selected for rapid early weight gain is high. The skin with subcutaneous and visceral fat accounts for 31-36% of the carcass or even more. Fertility and hatchability are 85—93% and 80—90% respectively.

The raising and extended breeding of Pekin ducks in closed flocks in various regions of the country have resulted in the isolation of some populations. The Chkalov population of Pekin ducks was developed at Chkalov breeding plant in Donetsk region. Breeding was aimed at increasing live weight and viability. The live weight of adult drakes reaches 3.8-4.0 kg and that of ducks is 3.4-3.6 kg. The live weight of 55-day-old ducklings is 2.4-2.5 kg. Egg production in the first cycle is 120-125 eggs. The Zhlobin population was selected on Zhlobin breeding state farm in Gomel region. It is based on Pekin ducks into which some blood of Moscow White ducks was infused; therefore the population has a high production - 160 or more eggs in the first production cycle. The Yagotinskaya population was selected on Yagotinskaya poultry farm in Kiev region. Within this population there are three groups. Within each group the paternal line has a higher live weight and the maternal line a better reproductive performance. The egg production of the maternal lines is 130 eggs in 5 months of production. Crossbreds obtained by crossing these lines weigh 2.4-2.5 kg at the age of 55 days.

These three populations differ from the special strains of the Pekin breed in their higher reproductive performance and lower carcass fat content.

At present these populations exist in the gene conservation flocks of the Kazakh and Byelorussian Experimental Poultry Stations and are raised on private plots in the Ukraine and the Russian Federation. Plans envisage the preservation of these populations as genetic material for producing new maternal lines with better reproductive qualities.



RUSSIAN DECOY (Russkaya podsadnaya)

A breed developed by domesticating wild mallards followed by selection.

They are used by hunters for enticing wild ducks.

In appearance Decoy ducks do not differ from mallards but there is greater variety in the plumage colour. The drakes have a head and a neck of greenish colour and an olive-green bill with a black tip. There is an enclosed white ring on the neck. The breast is dark brown and the back and wings are dark grey. There is a blue and green speculum on each wing. The lower part of the body is greyish white. The shanks and feet are orange. The ducks' plumage is very much like that of wild ducks.

The live weight of adult drakes is 1.4-1.5 kg and that of ducks is 1.3-1.4 kg. Egg production is low - 30-40 eggs; egg weight is also low - 50 g.

Russian Decoy ducks have a good stamina and high viability; they are good foragers and flyers. At present small flocks of these ducks are kept on specialized game farms and by amateur poultrymen.

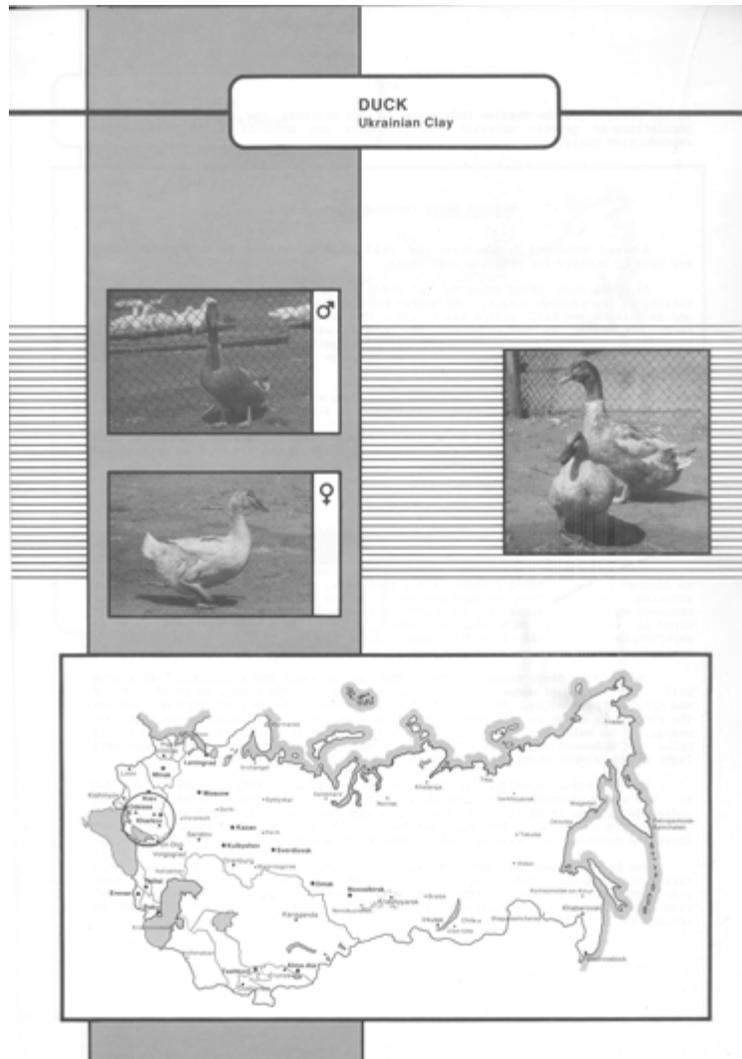
SPECULUM (Zerkalnaya)

A breed group of ducks obtained by complex crossing at Kuchinski breeding plant in Moscow region. Local breeds, Khaki Campbells, and Pekin ducks were used for crossing. The population of Speculum ducks at the Moscow Agricultural Academy was obtained by breeding inter se crossbreds of local ducks and Khaki Campbells. This breed is raised only on a limited scale. In 1974 there were some 400 birds on experimental farms. At present, small flocks are kept on private plots and by amateur poultrymen.

The body is deep, broad and long. The head is small and elongated, with a dark bill. The neck is of moderate length, slightly curved. The breast is broad, rounded and slightly protruding. The back is broad and erect. The tail is short and narrow. The wings are close to the body. The legs are short; the shanks and feet are orange. The male has a dark head and neck, shot with blue and green and a red collar; the breast is reddish brown and the body is light grey. The ducks have very light brown, almost white plumage. Both drakes and ducks have wing specula.

The average live weight of drakes is 3.3-3.5 kg and that of ducks is 2.8-3.0 kg. The egg production of Speculum ducks used to be higher than that of Pekins. In individual flocks it varied from 130 to 200 eggs per duck. The eggs are white and average 80 g in weight. The hatching rate is 70% or more. The production period lasts 8-9 months. The survival rate of both young and adult birds is high - 98-99%.

The breed group was developed under extensive conditions; the young were raised at low temperatures to obtain a population with a high viability. At the same time highly-productive birds were selected; therefore Speculum ducks have a high viability and good meat qualities. The dressing percentage is 89% and the yield of edible parts is 64% of the carcass. Speculum ducks constitute germ plasm for developing maternal forms with a high egg production.



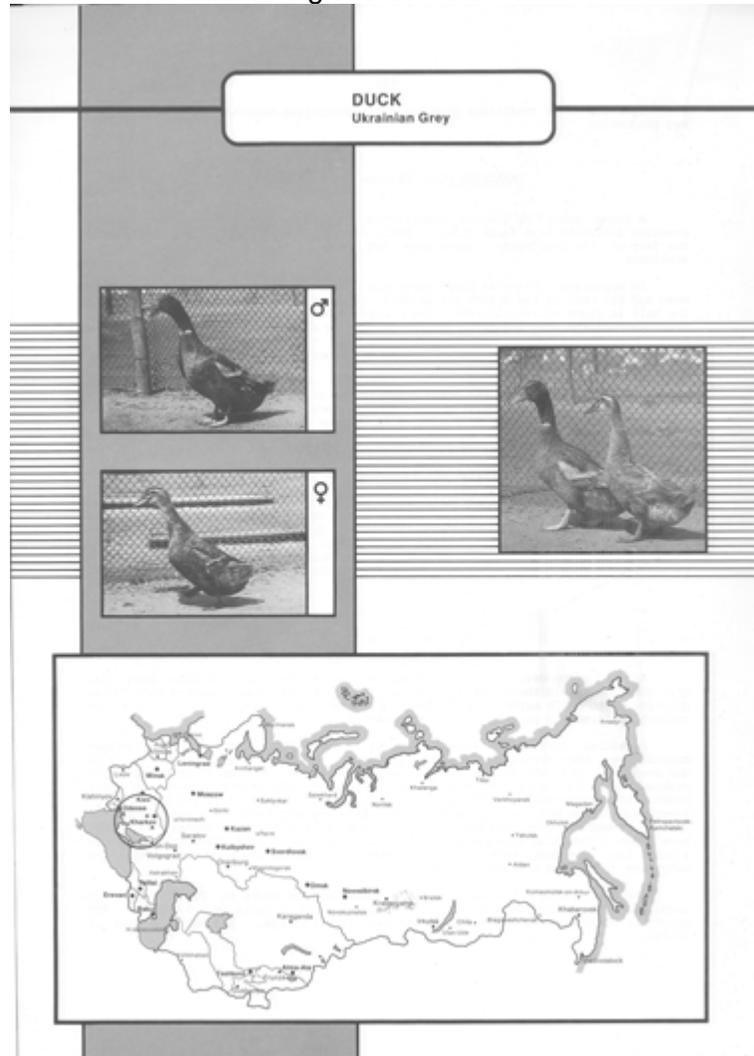
UKRAINIAN CLAY (Ukrainskaya glinistaya)

A breed group of limited distribution developed at the Ukrainian Poultry Breeding Institute from local ducks. Small flocks are kept on private plots and at the farm of the Institute. There were 360 birds in 1980; current data are not available.

In appearance Ukrainian Clay ducks are similar to Ukrainian Grey ducks. The head and the neck of the drakes are of dark chestnut-brown colour, shot with bronze; the bill is light olive-coloured; the breast and the body are brown, light on the lower part of the body and darker on the back. The shanks are orange-red. The ducks have a chestnut-brown head with two dark stripes; the bill is dark olive-coloured; the neck and body are light brown, yellow in summer. The shanks are of the same colour as in the male.

The economic value of the breed group is similar to that of the Ukrainian White but egg production and the live weight of the young are lower. Egg production is 120-125 eggs per cycle. The birds mature at the age of 6 months. The live weight of 5-month-old drakes is 3.0 kg and that of ducks is

2.8 kg. The 50-day-old ducklings weigh almost 2.0 kg. Egg weight is 78-80 g and the hatching rate is 65-70%. Fertility and hatchability are 88-90 and 68-72% respectively. The survival rate of the ducklings is 94% and that of adult birds is 96%. Ukrainian Clay ducks have good adaptability to local conditions and a low carcass fat content'. The breed group is maintained in a gene conservation flock. The reduction in numbers is due to the introduction of the more productive Pekin ducks which are raised both on commercial poultry farms and on small private plots. At present Ukrainian Clay ducks are raised on Borki Experimental Farm of the Ukrainian Poultry Breeding Institute and by farmers in Kharkov and other regions of the Ukraine.



UKRAINIAN GREY (Ukrainskaya seraya)

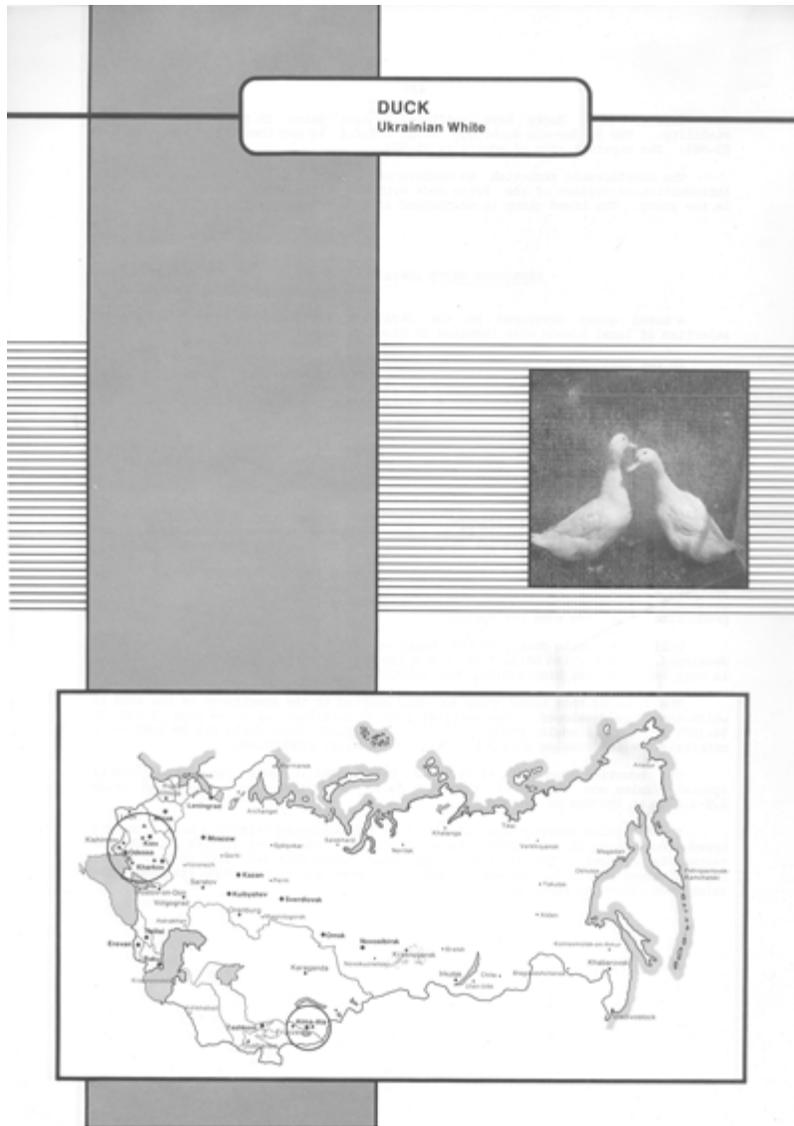
A breed group developed at the Ukrainian Poultry Breeding Institute from local grey ducks. In 1974 these ducks numbered 17 700; by 1980 their numbers had fallen drastically to 2200 birds. At present Ukrainian Grey ducks are raised on a few collective farms and private plots in the Ukraine.

Ukrainian Grey ducks have a strong constitution with a well-developed musculature. They are active and good foragers. They have a small head; a broad and deep body, and strong legs. The plumage is similar to that of mallards. The drakes have a dark grey or almost black head, shot with greenish colour, or dark brown with a white collar. The back is black-brown; the breast is red-brown; the lower part of the body is light grey. The wings are grey-brown with iridescent blue specula framed by black and white stripes; the bill is olive-coloured. The ducks have a dark brown head with two black stripes; the bill is dark olive-coloured, with a black tip. The neck, back, breast and the lower part of the body are brown; the wings are dark brown with blue specula.

The live weight of drakes is 3.3 kg and that of ducks is 2.9-3.0 kg. Egg production is 110-120 eggs per cycle. The duration of a cycle is 5.5 months. Egg weight is 80-90 g. Ducks mature at the age of six months. The hatching rate is 72-75%.

Ukrainian Grey ducks have sufficiently fast gains in the young and good viability. The 50-day-old ducklings weigh 2.3-2.4 kg and their survival rate is 95-96%. The survival rate of adults is 96-97%.

The considerable reduction in numbers of Ukrainian Grey ducks is due to the introduction of crosses of the Pekin duck with higher productivity and faster gains in the young. The breed group is maintained in a gene conservation flock.



UKRAINIAN WHITE (Ukrainskaya belaya)

A breed group developed at the Ukrainian Poultry Breeding Institute by selection of local breeds with infusion of blood of the Pekin duck. In the past this breed group was widespread. In 1974 Ukrainian White ducks numbered 26 700 birds; by 1980 their numbers had fallen to 6800. At present there is approximately the same number; they are raised on state and collective farms and on private plots in the Ukrainian and Moldavian republics.

The birds have a strong constitution and a small, slightly elongated head; the body is horizontal, long and broad, somewhat raised in front. The legs are short; shanks and feet are orange. The plumage is white. The drakes have a light yellow bill and the ducks have a dark yellow one.

The live weight of 5-month-old birds reaches 3.3 kg in drakes and 3.0 kg in ducks. Egg production is 120-130 eggs in the first cycle; the duration of the cycle is 5.5 months. Egg weight is 80-85 g. The 50-day-old ducklings weigh

2.0-2.1 kg; feed consumption is 3.3-3.4 kg per kg of gain. The hatching rate is good - 75-78%.

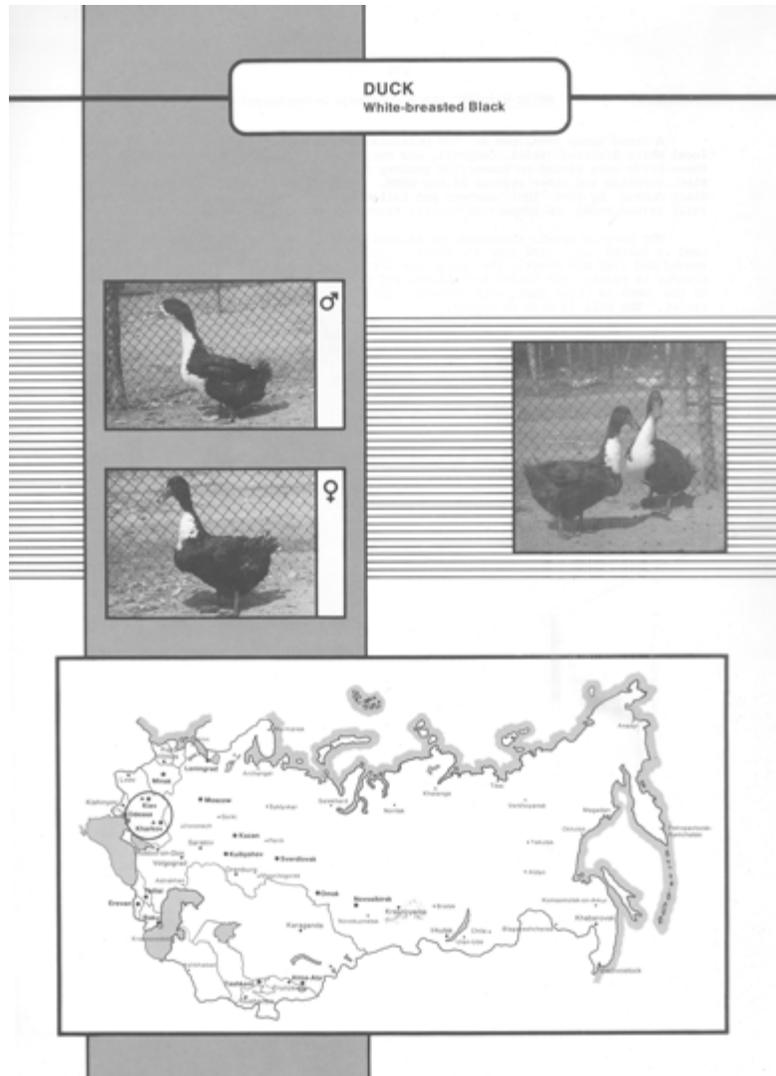
On the basis of this breed group the Ukrainian Poultry Breeding Institute has selected strains with higher productivity. The 49-day-old ducklings of these strains weigh 2.5-2.6 kg with 3.0-3.1 kg of feed consumed per kg of gain. Their egg production is 140-150 eggs per cycle.

Unlike the Pekin duck, on the basis of which commercial crosses have been developed, the Ukrainian White duck has a lower carcass fat content (22-24%), which is very important for high-quality meat production.

The ducks of this breed group are well adapted to the conditions of the area in which they were developed. The survival rate of ducklings up to 49 days of age is 98-100% and that of adult birds is 96-97%. Ukrainian White ducks can be used as a maternal line in crossing with Pekin ducks for broiler production.

The reduction in numbers of Ukrainian White ducks is due to the introduction of special strains and crosses of the Pekin duck, which have faster gains and weigh 2.9-3.0 kg at the age of 49 days.

The Ukrainian Poultry Breeding Institute is continuing selection work with this breed group using it as genetic material for development of strains with a low carcass fat content. Two strains of Ukrainian White duck are kept at the Kazakh Regional Experimental Station where studies are under way to determine its commercial value when raised in small flocks.



WHITE-BREASTED BLACK (Chernaya belogradaya)

A breed group developed at the Ukrainian Poultry Breeding Station by crossing local White-Breasted, Khaki Campbell, and Pekin ducks. In the past the flocks of these birds were raised on commercial poultry farms and on private plots in Kharkov, Kiev, Vinnitsa and other regions of the USSR. In 1974 there were 218 White-breasted Black ducks; by 1980 their numbers had fallen to 190. Nearly the same number are still raised today, on commercial poultry farms and on farmers' private plots.

The body is broad, elongated and raised; the breast is broad and the elongated head is turned up. The legs are short, close to the rear, and moderately thick; shanks and feet are black. The wings are strong and small, close to the body. The plumage is black; the breast and abdomen are partly white. In drakes the upper part of the neck is blue shot with violet; the wing specula are shot with green or violet. The bill is dark in colour.

White-breasted Black ducks have adequate productivity. The live weight of the drakes is 3.6-3.8 kg and that of the ducks is 3.0-3.3 kg. The 60-day-old

ducklings weigh 2.0 kg. Egg production is 120-130 eggs. Birds mature at the age of 6 months. The eggs are white and weigh 80-90 g. The survival rate of ducklings is 90-92% and that of adults is 95-96%.

White-breasted Black ducks have a high viability; they are good dabblers. The fertility and hatchability are 94 and 63-65% respectively.

White-breasted Black ducks serve as a genetic reserve for developing new breeds and strains for semi-extensive conditions.

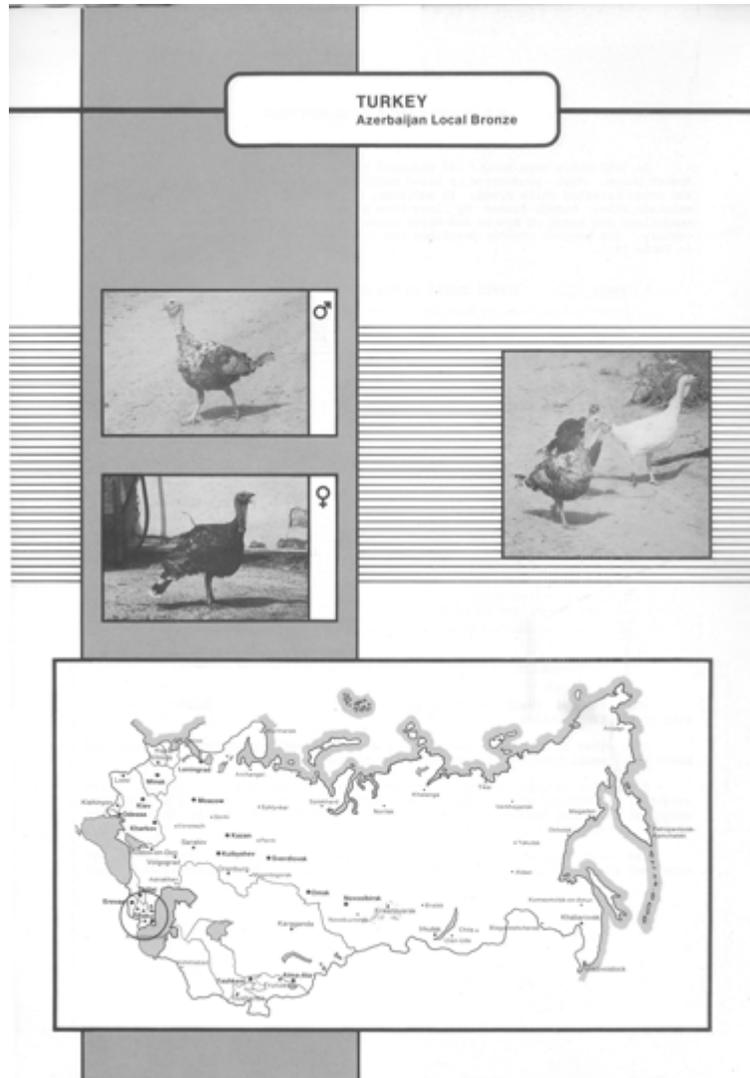
16. TURKEYS

V.I. Fisinin and K.V. Zlochevskaya

In 1980 there were about 334 thousand turkeys in the socialized sector of the Soviet Union. Meat production is based mainly on crosses selected on the basis of the Broad-breasted White breed. In addition, non-specialized farms and private plots maintain other breeds formed by long-term selection under specific environmental conditions and based on Bronze and White turkeys first imported to Russia in the 17th century. The present chapter describes the local, rare or declining breeds tabulated in Table 16.1.

Table 16.1 TURKEY BREEDS IN THE SOVIET UNION

	<u>Number of adults</u>	
	1974	1980
<u>LOCAL BREEDS</u>		
Azerbaijan Local Bronze		few
Black Tikhoretsk	7700	4 000
Georgian Local		few
Moscow Bronze		few
Moscow White	80 000	5300
North Caucasus Bronze	63 000	24300
North Caucasus White	42 000	3300
Silver		few
Stalingrad Bronze		few
Ukrainian Bronze		few
Uzbek Local		few
<u>COMMERCIAL BREEDS</u>		
Broad-breasted Bronze		27 300
Broad-breasted White		144 200
Other Commercial Turkeys		47 600



AZERBAIJAN LOCAL BRONZE (Azerbaijanskaya mestnaya bronzovaya)

These turkeys result from random crossing of local low-productive varieties with breeds from outside the Republic.

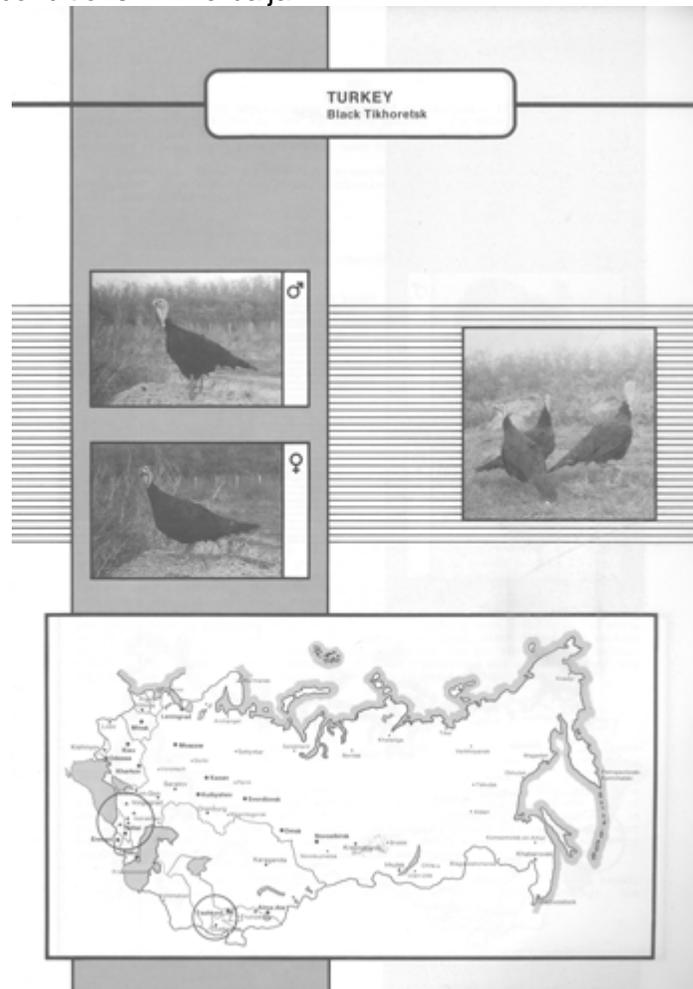
Like other local breeds, Azerbaijan turkeys have well-developed legs, deep and broad body, small head and deep breast. The plumage is bronze.

Production characteristics of Azerbaijan turkeys are not good enough. Live weight of 6-month-old males is 4.6-4.8 kg, females 3.2-3.4 kg. By the 17th week live weight of the young reaches about 2 kg. Egg production is 30-40 eggs, hatching rate 70-72%. Survival rate is 90-92%.

The main biological features of Azerbaijan turkeys are the following: excellent adaptability to Azerbaijan environments and extensive conditions; good eating qualities of the meat; rather high yield of muscles - 47-52% of the carcass; dressing percentage 87-88% at the age of 5-6 months. The main disadvantage of the Local Azerbaijan, as of other local breeds, is low

egg production and growth rate. For these reasons local turkeys are not used for commercial purposes.

Azerbaijan Local turkeys are preserved as germ plasm for creating new populations of turkeys having higher productivity and well adapted to semi-extensive conditions in Azerbaijan.



BLACK TIKHORETSK (Chernaya tikhoretskaya)

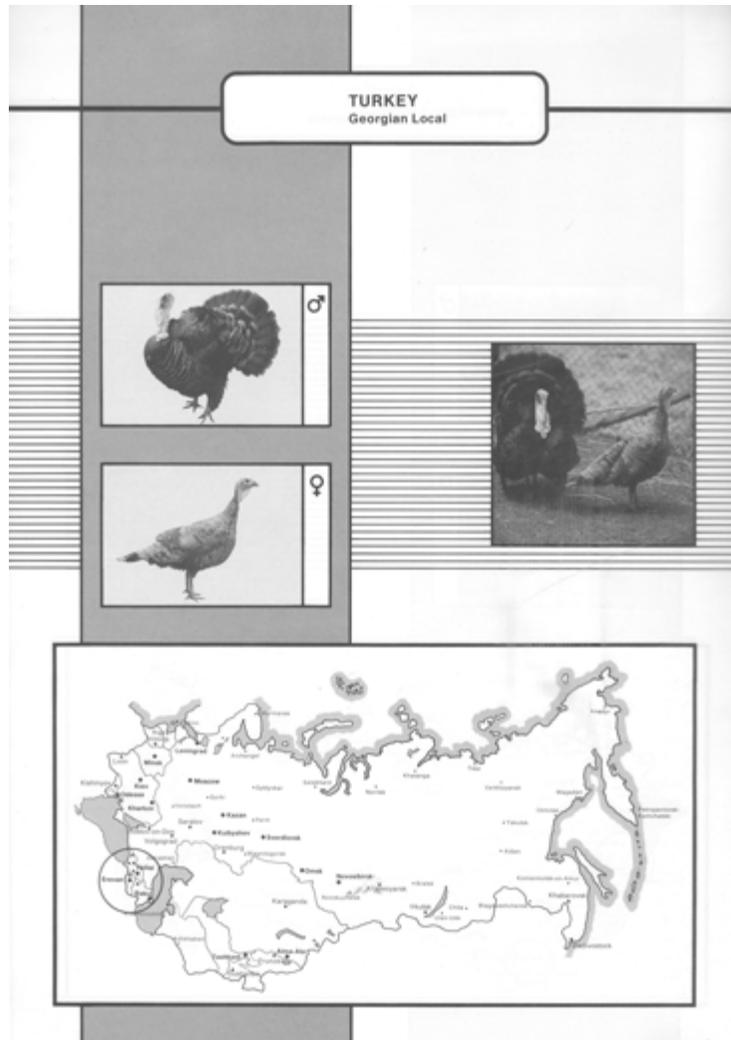
Previously this breed group was known under the name Black Kuban or Black Krasnodar. The Black Tikhoretsk was developed in Tikhoretsk region of Krasnodar territory by prolonged mass selection of local black turkeys. Systematic work started in 1951-52 when Tikhoretsk state breeding station was established and continued from 1960 in Tikhoretsk state breeding centre. Black Tikhoretsk turkeys are found mainly in the North Caucasus and in Transcaucasia. They numbered 7700 in 1974 and more than 4000 in 1980; at present the stock remains approximately the same.

Black Tikhoretsk turkeys have a long and broad body, deep breast and medium-sized head. The plumage is black, with an iridescent tinge.

Live weight of adult males is 9.5-10 kg, females 4.5-5 kg; the 17-week-old young average 3.5 kg. At testing in the Rostov region, live weight of 17-week-old Black Tikhoretsk poult was 4.26 in males and 3.18 in females; at

22 weeks of age it was 5.8 and 3.9 kg respectively. Egg production during the 5-months laying period is 60 eggs or more. The hatching rate is over 70%, hatchability 80-86% and survival rate 87-88%.

Black Tikhoretsk turkeys are very active and adaptable to range conditions, while possessing relatively high meat qualities. In adult turkeys the dressing percentage reaches 92%, net meat yield 46-47% and yield of breast muscles 17-20%. In terms of fat deposition and biological value of meat 26-week-old Black Tikhoretsk turkeys were superior to the North Caucasus and Broad-breasted White. The limited occurrence and relatively small numbers of Black Tikhoretsk turkeys can be explained by the fact that they are adapted to the environments of their native region and are not competitive in commercial broiler production. Compared with Broad-breasted White turkeys, on the basis of which commercial crosses were bred, Black Tikhoretsk turkeys are slow-growing and have a lower carcass quality due to the plumage colour. However, they represent genetic material for new populations and crosses. They are kept pure as a reserve genetic resource in North Caucasus Regional Station.



GEORGIAN LOCAL (Gruzinskaya mestnaya)

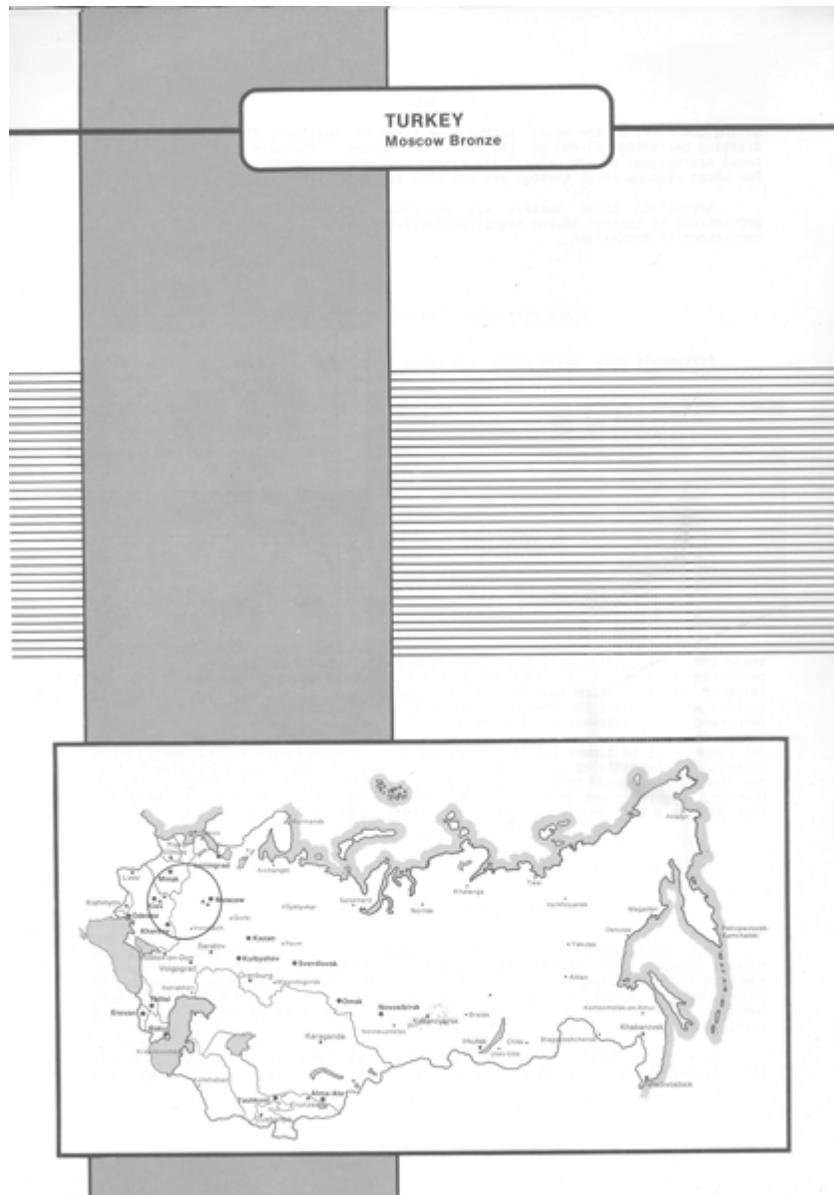
This breed resulted from crosses between local breeds and more productive turkeys brought from outside the Republic. Breeding of hybrids had the aim of adapting them to extensive conditions. There are several varieties differing in plumage colour: black, brown, buff, white and bronze; bronze and buff are the most numerous. The total stock is not large. Georgian Local turkeys are kept in private rural households and do not have any commercial importance.

Size is not large. The body and breast are broad and deep; the back is broad, sloping towards the tail. Wings are well developed; legs are strong and long; the tail also long. Colour of shanks and skin differs, depending on the plumage colour; in buff turkeys the shanks and toes are reddish pink.

Live weight is not high: 6.5-7 kg in adult males and 3.5-4 kg in females.

Egg production is low - not more than 30 eggs. Egg weight is 80 g. There is an improved variety of buff turkeys with higher live weight - 9-10 kg in males and 5 kg in females. They lay 40-60 eggs weighing 80 g. Hatchability of eggs is satisfactory and hatching rate reaches 65-70%.

Biological features include good viability and adaptability to local conditions. With improvements in rearing and management, production characteristics improve significantly. Live weight of males reaches 8 kg, females 4.5 kg, and egg production rises to 50. Shortcomings of Georgian Local turkeys are their late maturity and poor meat qualities. Age at maturity is 42-45 weeks. Live weight of the 17-week-old young is only 2-2.5 kg. Georgian Local turkeys are genetic material for breeding with highly productive commercial crosses in order to obtain new crosses adaptable to semi-extensive Transcaucasian conditions.



MOSCOW BRONZE (Moskovskaya bronzovaya)

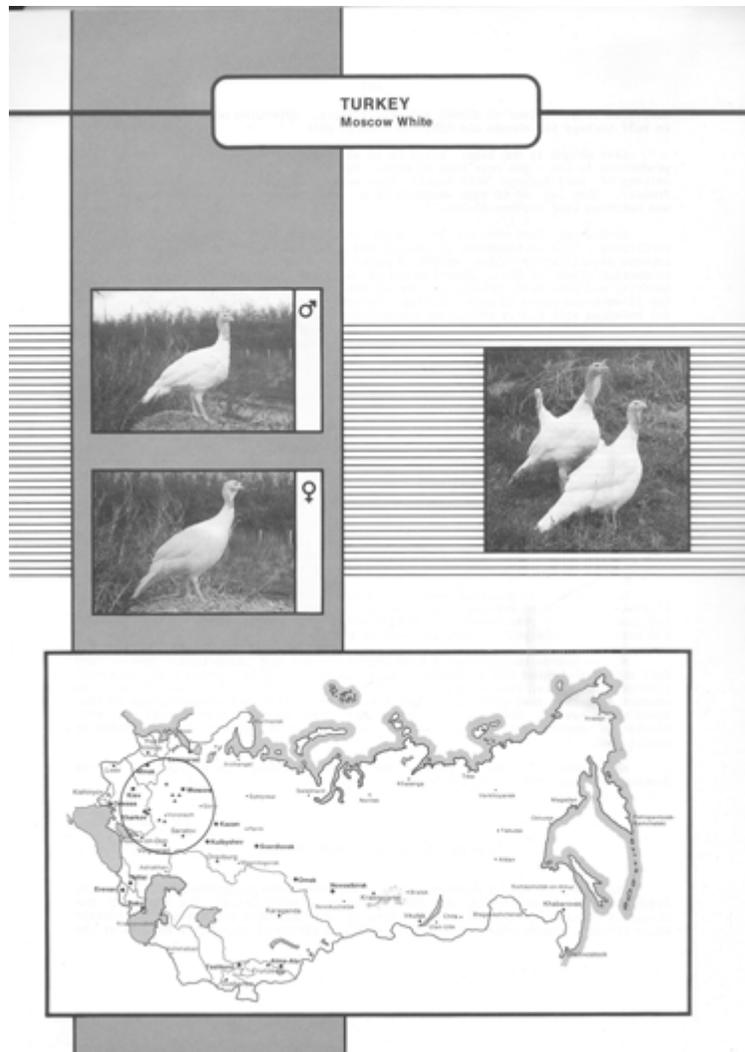
This breed group was produced in Beriozki state farm in Moscow region from crosses between local Bronze, North Caucasus Bronze and Broad-breasted Bronze. The breed was never widely distributed. Formerly these turkeys were raised on some poultry farms in Moscow and Voronezh regions, and in several Ukrainian farms. Today there still remain small populations in Kiev, Moscow and some other regions, mainly in private ownership and in farming enterprises having small turkey flocks under semi-extensive conditions.

The body is long and deep; the breast is broad and round. The head is broad, with sharply hooked beak which is light-pink at the tip and dark at the base. The eyes are nut-brown. The neck is long. The plumage is typical of bronze varieties.

Live weight of yearling males is about 12 kg and of females 6.5 kg; the 17-week young have an average weight of nearly 4 kg. Breeding age is 40-42 weeks. Egg production per year reaches 70-80 eggs weighing 85-87 g; hatching rate is 65-70% and survival of the young during the rearing period is 90%.

Moscow Bronze turkeys have a high reputation for meat production; however they fall somewhat behind Moscow White turkeys in this and other production characteristics. For this reason they are not so widely spread as Moscow Whites. In commercial turkey meat production, when specialized crosses are used, turkeys of this breed group are not competitive. At the same time, Moscow Bronze turkeys are well adapted to central regions of the USSR and have good records in semi-extensive conditions.

As a genetic resource, this breed group is useful for making new hybrid combinations suitable for semi-extensive conditions.



MOSCCW WHITE (Moskovskaya belaya)

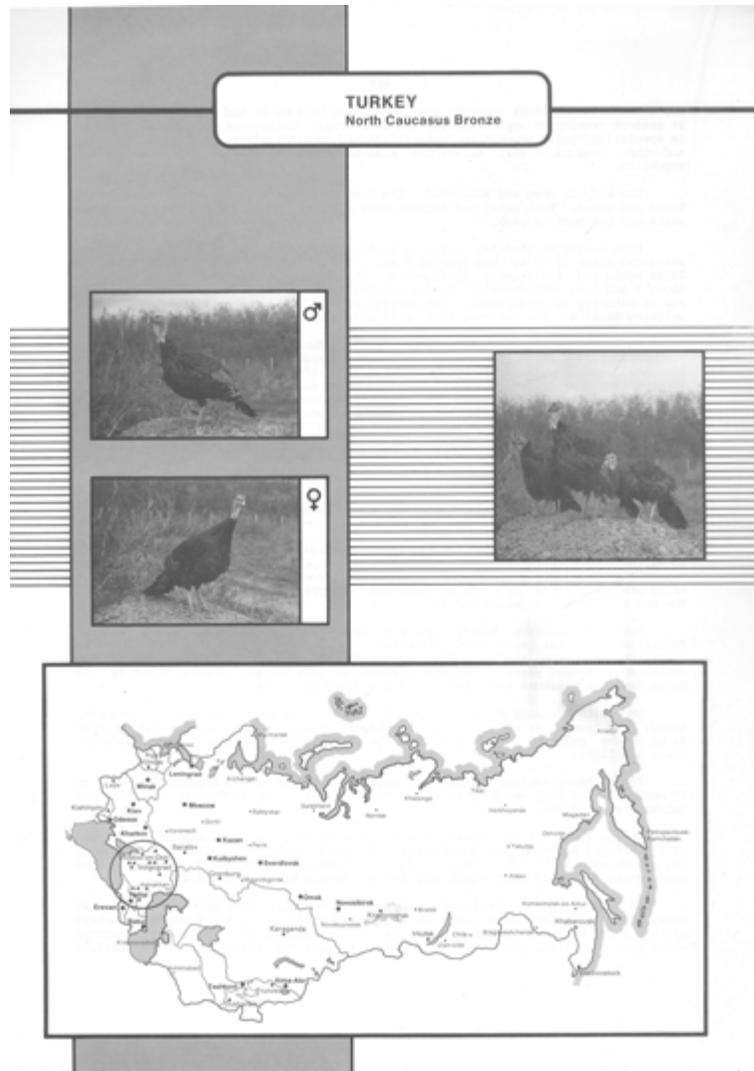
This breed group was produced at Beriozki state farm in Moscow region under the leadership of scientists from the Moscow Academy of Agriculture. The group was the result of crosses between local white turkeys and the White Holland and Beltsville White breeds. Moscow White turkeys were widely distributed in central regions of the USSR. In 1974 the stock numbered some 80 000 but by 1980 it had fallen to 53 000 and at present remains at approximately the same level. Turkeys of this breed are used in specialized poult production enterprises and in state farms of Moscow, Voronezh and other regions. This turkey can also be found in some of the constituent republics.

The body is deep and elongated. The head is elongated and wide. The breast is broad and round. Both males and females have a compact conformation. The plumage is white and the beak is pink.

Live weight of yearling males is 12-12.5 kg and of females 6.5-7 kg. Later, males can reach 17-19 kg and females 9 kg. The optimal slaughter age for males is 24-26 weeks and for females 20-22 weeks. The average live

weight at this age is about 7 and 4 kg respectively. Feed consumption per kg of weight gain is 3.3-3.4 kg. Age of maturity is 39-40 weeks. The average egg production per year reaches 90 eggs, weighing 86-87 g. The hatching rate is 75-80%.

Fertility and hatchability are nearly 90%. Turkeys of this breed group have a good meat yield - more than 65% of the carcass weight. The decrease in numbers of this breed group was caused by the introduction of lines of Broad-breasted White turkeys with higher live weight in young. Today, selection work with these turkeys is carried out in the Ukrainian Poultry Breeding Institute, in Golovurovski poultry breeding centre in the Ukraine and in Yegoryevsk poultry farm in Moscow region. In Golovurovski centre there are several lines which are used for a homebred cross. They are being improved by family selection.



NORTH CAUCASUS BRONZE (Severokavkazskaya bronzovaya)

This breed was developed in the former Pyatigorsk breeding centre by crossing local turkeys with the Broad-breasted Bronze. Local turkeys had a moderate live weight (3.5 kg) but displayed a high viability when kept out of doors. The Broad-breasted Bronze had a higher meat and egg production than the local turkeys. The new breed was recognized in 1956.

The North Caucasus Bronze is widely distributed in the south of the Russian Federation. It has also been introduced into Uzbekistan and the Transcaucasian republics. The total stock was about 63 000 in 1974 and 24 300 in 1980, i.e. it has decreased in recent years. Pedigree breeding of this variety is carried out by the North Caucasus Regional Experimental Poultry Breeding Station.

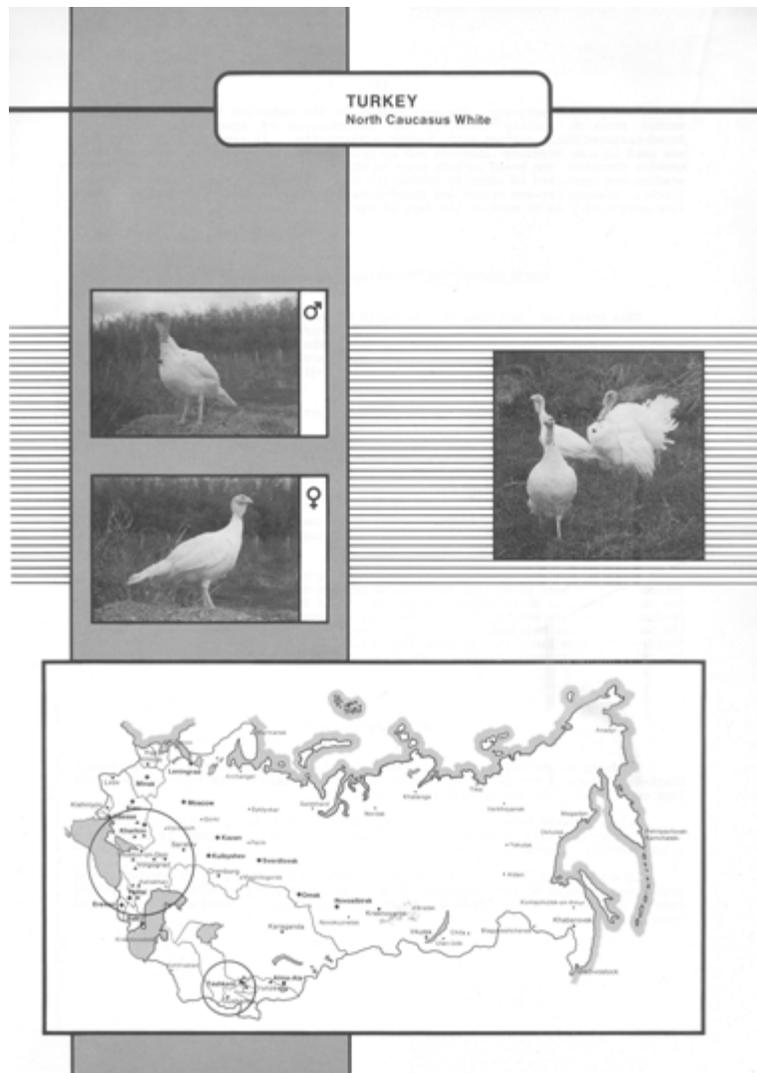
The North Caucasus Bronze is heavily built; the body is compact, elongated, broad; the head is of medium size; the breast is deep, broad,

round; the plumage is of bronze colour. Selection within the breed has resulted in two populations: heavy and light.

In the heavy variety 34-week-old males weigh 13-14 kg and females 7-8 kg; at 17 weeks of age they weigh 5 and 4 kg respectively. Egg production is 65-70 and hatching rate 70-75%.

In the light variety, 34-week-old males weigh 10-11 kg and females 5.5-6.8 kg; at 17 weeks of age they weigh 4.5 and 3.5 kg respectively. Egg production is above 70; hatching rate is 75%. They are faster growing than the heavy variety. Feed consumption per kg of body-weight gain for the Bronze breed is 3.2-3.4 kg.

In both varieties the breeding age is 32-34 weeks under intensive and 38-40 weeks under extensive conditions. The egg-laying period lasts 5-5.5 months. Turkeys of this breed have such valuable properties as adaptability to the local environment and a good viability. They have a high meat production. Fertility and hatchability are 82 and 90% respectively. The main reason for the reduction in the North Caucasus Bronze stock on poultry farms is the introduction of specialized crosses of Broad-breasted White turkeys with higher productivity. At present, Bronze turkeys are used in some breeding stations and by private owners in southern regions. As a genetic resource, the breed is kept pure in the North Caucasus Regional Station where studies are conducted to identify production characteristics of poultry bred in small flocks. Crosses between Bronze and Broad-breasted White turkeys give hybrids with a live weight of 5 kg or more at 120 days of age.



NORTH CAUCASUS WHITE (Belaya severokavkazskaya)

This breed was developed in the North Caucasus Regional Station by crossing North Caucasus Bronze and Broad-breasted White turkeys. Formerly this breed was widely distributed in southern regions of USSR. The stock was about 42 000 in 1974 and 33 300 in 1980, i.e. it has decreased considerably. The principal areas where turkeys of this breed are found include southern regions of the RSFSR and some farms in Ukraine and Uzbekistan.

The appearance is similar to that of the North Caucasus Bronze. Plumage and skin are white. Shanks and toes are light buff.

Egg production is high - 70-75; egg weight is 80.5-81 g; hatching and survival rates are 60-65% and 84-88% respectively. Live weight of 17-week-old poults is 4.8-5 kg; feed consumption per kg of gain is 3.3 kg. Live weight of adults is 11-12 kg for males and 7 kg for females.

These turkeys are well adapted to the environment of southern USSR. Fertility and hatchability of eggs are 84-87 and 70-75% respectively. The turkeys reach breeding age at 32-34 weeks of age.

The main reason for stock reduction of this breed in poultry farming is the introduction of more productive lines from crosses of Broad-breasted White turkeys. The North Caucasus White breed formed the basis for six lines differing in egg production and live weight of the young. At present these lines are maintained in the North Caucasus Regional Station as a reserve for commercial crosses. The genetic features of these lines are preserved by selection and choice of individuals having the required appearance and production characteristics.

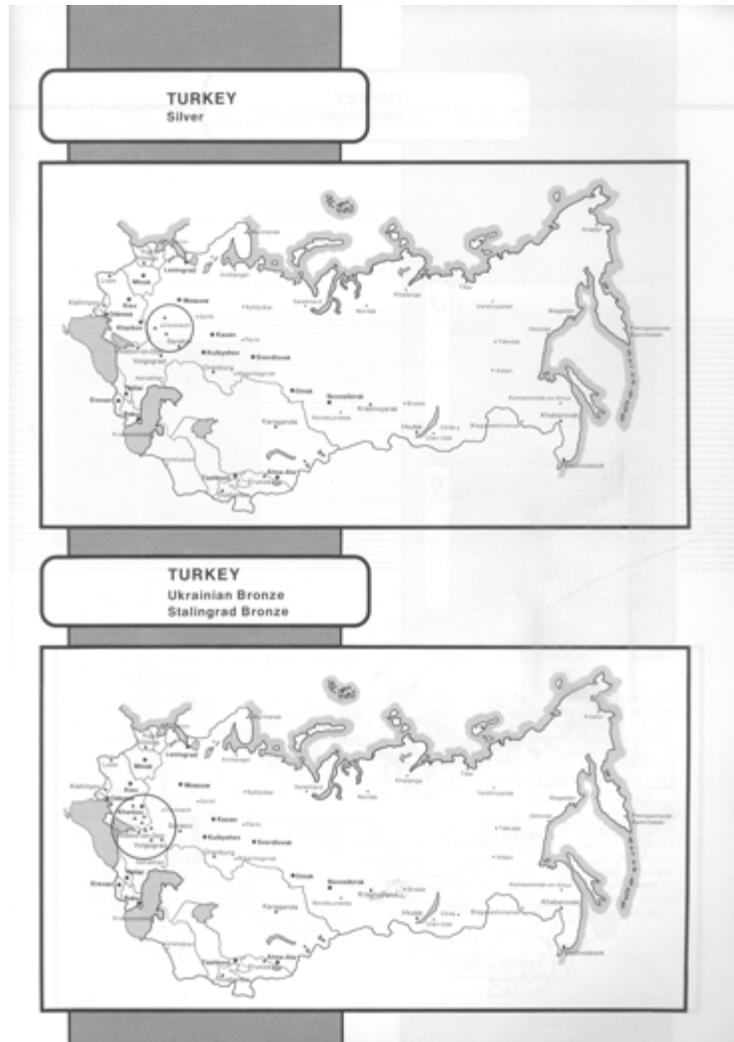
SILVER (Serebristaya)

Produced by amateur breeders on the basis of indigenous turkeys in the Central Black-Earth Zone of the USSR. At present the stock is small; the turkeys are mostly kept on private plots and by amateur breeders.

Silver turkeys have a broad and deep body; broad back, sloping towards the tail; strong and well-developed legs and wings; long tail. Plumage is silvery and silvery-white; shanks are reddish pink.

Live weight is rather high - 10 kg in males and up to 5 kg in females. Egg production is about 40 eggs weighing 80 g. Age at maturity is 40 weeks. Hatching rate is 70-75%. The egg shell may be of various colours - from white to spotted brown.

These turkeys are well adapted to the conditions of the Central Black-Earth Zone. They are known for their high fertility. They are maintained in a gene conservation flock.

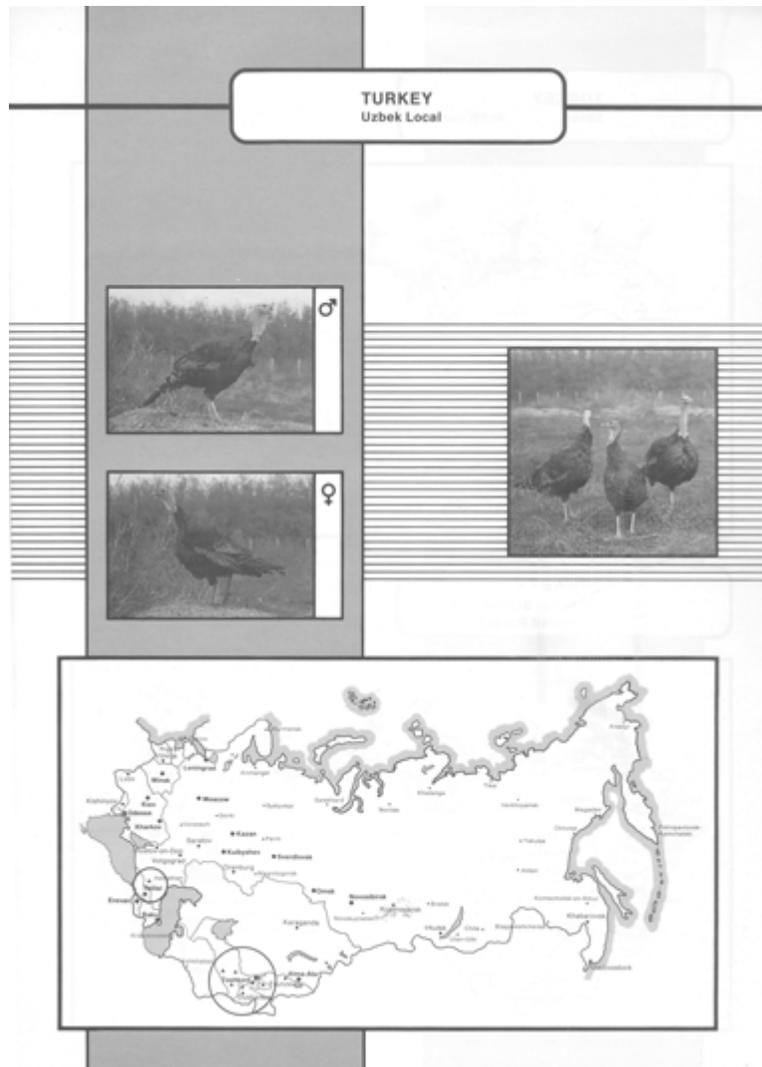


STALINGRAD BRONZE and UKRAINIAN BRONZE
(Stalingradskaya bronzovaya and Ukrainskaya bronzovaya)

These turkeys were developed by random crosses between local and Broad-breasted Bronze turkeys with further selection of the best individuals. Today they are raised on private plots and non-specialized farms. In appearance, Stalingrad and Ukrainian Bronze turkeys resemble the Broad-breasted Bronze. They have a well-developed breast, strong legs and medium-sized head.

Live weight of adult males reaches 10-11 kg, females 5.5-7 kg; at 17 weeks the young weigh 4-4.5 kg. Egg production is 80-85 eggs.

These turkeys are well adapted to the areas of their origin. They have good meat qualities and developed breast muscles. There are gene conservation flocks of Stalingrad and Ukrainian Bronze turkeys.



UZBEK LOCAL (Uzbekskaya mestnaya)

Uzbek Local turkeys were developed through prolonged selection of local varieties which were well adapted to the environments of Central Asia. There are several varieties differing in plumage colour - bronze, buff, etc. The majority are bronze. Breeding work which has been in progress in recent years is directed to their improvement through crossing with higher-productive turkeys; the resulting hybrids are used for further multiplication. The leading role in this work belongs to the Uzbek Animal Husbandry Institute. Pure breeding is also used. The stock is not large and is scattered mainly among non-specialized farms and rural households. Bronze Uzbek turkeys have plumage which is typical for Broad-breasted Bronze turkeys; the plumage of Buff turkeys is shot with red. Live weight of Uzbek local turkeys is not high: 6-7 kg in adult males and 3.5-4 kg in females. Egg production is 45-50 eggs. The improved type of Bronze turkeys has higher values: live weight of adult males is about 10 kg, females 6 kg. By the 17th week live weight in Bronze and Buff populations respectively reaches: males 4.4-4.3 kg, females 3.1-3.15 kg. Feed

consumption per kg of weight gain is high - 3.6-4 kg. Egg production in the best groups reaches 70 or more; the hatching rate is 70-77%. Compared with the Bronze variety, Buff turkeys have a higher egg production (by 4-5%) but lower weight gain of the young.

Regarding biological features one can cite good adaptability to the climate of Uzbekistan and to extensive conditions. Uzbek turkeys have a high efficiency of feed utilization and rather high reproductive performance; fertility of eggs is 80-85% and hatching rate 92-97%. The main disadvantages of Uzbek turkeys are slow growth rate and poor meat qualities. Yield of breast muscles is 13-15%. The Uzbek Animal Husbandry Institute continues to improve production characteristics. As a genetic resource Uzbek Bronze and Buff turkeys are kept in the nuclear flock of the North Caucasus Regional Station, where studies of their production qualities are going on.

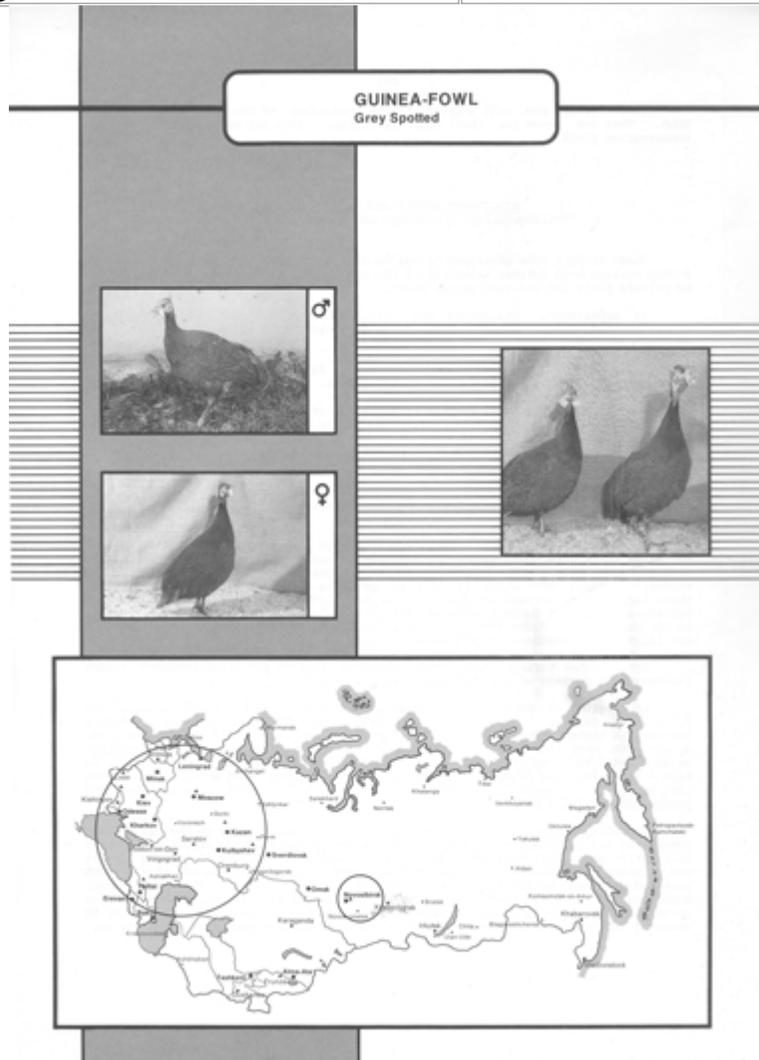
17. GUINEA-FOWL

V.I. Fisinin and K.V. Zlochevskaya

Guinea-fowl were first imported to Russia as ornamental birds in the 18th century. They have been used for egg and meat production only since 1945. In that year 300 grey-spotted and blue (lilac) birds were imported from Hungary; these were the initial material for the formation of local breeds. Present-day breeds and numbers are shown in Table 17.1.

Table 17.1 TYPES OF GUINEA-FOWL IN THE SOVIET UNION

	Numbers of adults
Grey Spotted	3 000
Blue	1 000
Cream	400
Siberian White	20 000
Zagorsk White-breasted	50 000

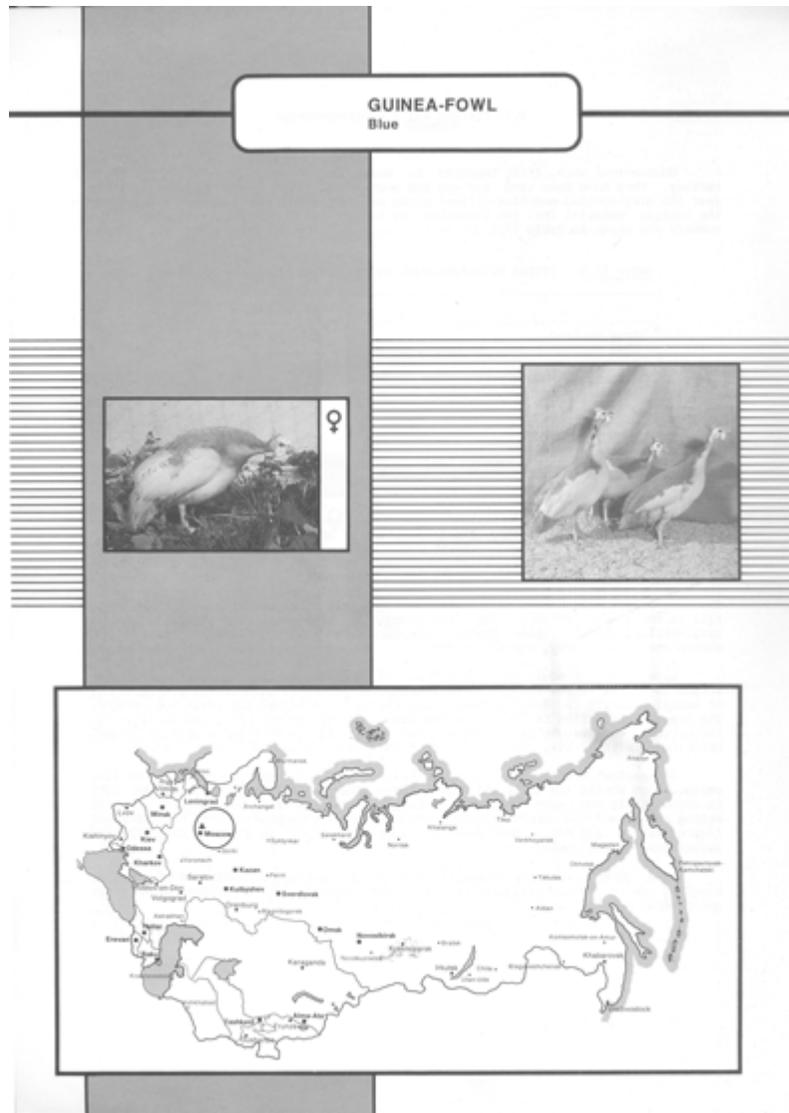


GREY SPOTTED or SILVER SPOTTED (Sero-krapchataya or serebristo-krapchataya)

This breed originally formed the bulk of all guinea-fowl in the country. At present, due to breeding and introduction of new breed groups, their proportion has decreased significantly. Today, the total stock of adults is about 3000.

The body is long, oval, set horizontally; the head is elongated, almost bare, with blue and white bony growths on it; the rings round the ears are round and red; the beak is dark pink. The neck is curved, scarcely feathered on its upper part. The back slopes towards the tail. The wings are well developed, round in shape. The tail is short and drooping. The neck plumage is blue-grey. The primaries have a cross-striped design; other feathers are dark grey with round whitish spots. The shanks are of dark grey, asphalt colour. Live weight of adult males is 1.5-1.6 kg, females 1.6-1.7 kg. At 70 days live weight of chicks is 800-850 g; feed consumption per kg of gain is 3.2-3.4 kg. Age at sexual maturity is 8-8.5 months. Egg laying is seasonal and lasts 5-6 months. The average production is 80-90 eggs per layer and 86% of eggs laid are suitable for incubation; egg weight is 45-46 g. The colour of egg shells is spotted cream. Hatching rate is 52-55%. Survival rate of the young and adults is high: 95-99%.

Guinea-fowl meat is highly palatable. The yield of edible meat is 52% of live weight. Egg shells are thick and very strong. When kept in a group the cocks tend to choose their own harem of hens. Fertility and hatchability of eggs with natural mating are 76 and 72% respectively; with artificial insemination the corresponding figures are 90 and 80%. Some poultry farms are engaged in breeding Grey Spotted guinea-fowl by mass selection. As a genetic resource they are kept in the All-Union Institute of Poultry Breeding where their productivity is being studied in comparison with other guinea-fowl populations.



BLUE (Golubaya)

This population originated from the Grey Spotted guinea-fowl by a colour mutation. Blue guinea-fowl also differ slightly from the Grey Spotted in production characteristics. There are no significant differences in conformation. (This colour is termed 'lilac' in western Europe.)

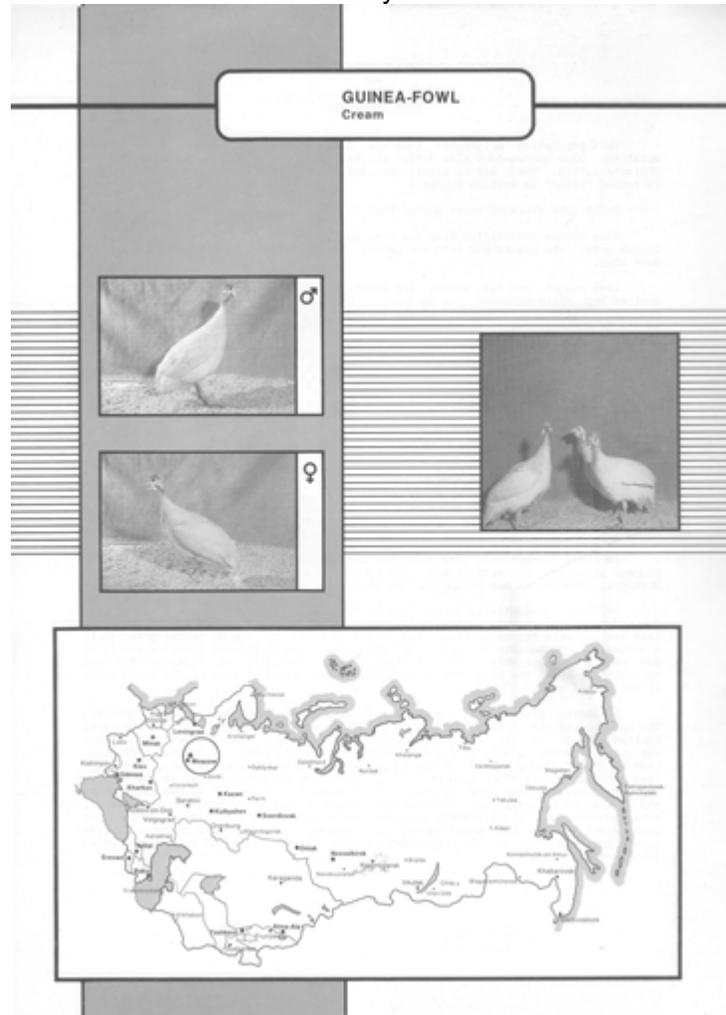
Today, the stock of these guinea-fowl is only about 1000 adults.

Blue guinea-fowl differ from the Grey Spotted mainly in plumage colour which is bluish grey. The shanks and skin are paler. The plumage can vary from light blue to dark blue.

Live weight and egg weight are lower, though only slightly, than in Grey Spotted and White-breasted guinea-fowl. Egg production is about 80 eggs per production cycle. Live weight of the 10-week-old young is 0.75-0.8 kg; that of adults is about 1.55-1.65 kg. Hatching rate is 50-52%.

Biological features of this population are similar to those of Grey Spotted guinea-fowl. Fertility and hatchability of eggs are about 75 and 70% respectively.

The All-Union Poultry Breeding Institute has begun breeding this guinea-fowl population and more detailed study of their economic characters.



CREAM (Kremovaya)

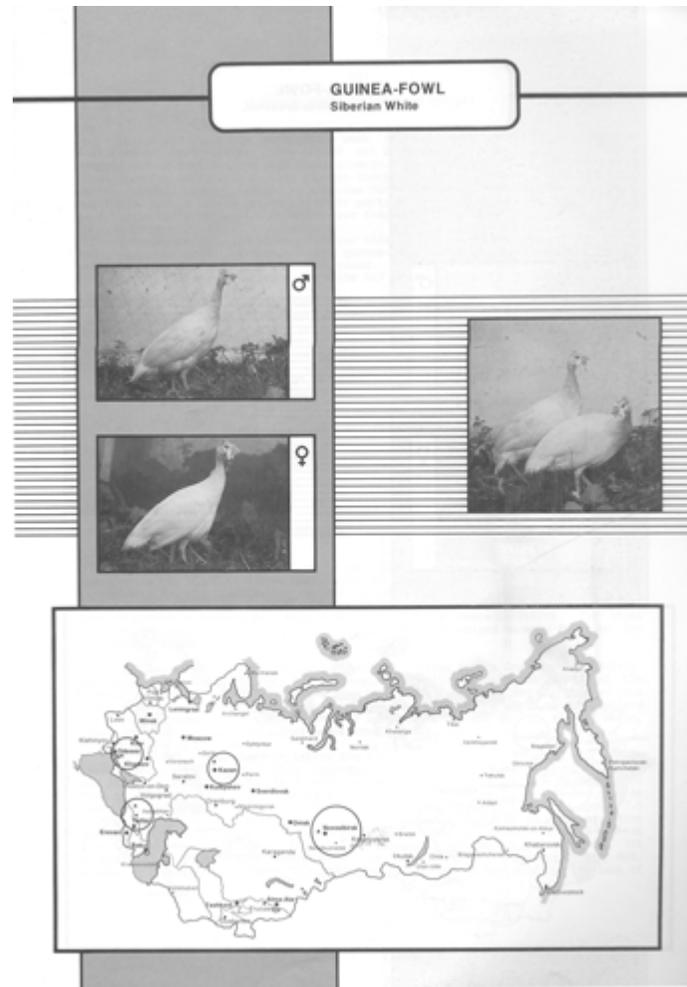
Abroad, they are known as White guinea-fowl. This variety occurred by mutation from the Grey Spotted. The stock of Cream guinea-fowl in the USSR is small - only about 400 adults; they are descendants of 4 specimens (2 males and 2 females) brought to the All-Union Poultry Breeding Institute from France in 1969.

In their conformation they are very similar to Grey Spotted guinea-fowl. The plumage is white, shot with cream. The round spots on the feathers are lighter and distinct. The shanks are yellow and the skin pale.

In their productivity Cream guinea-fowl are little inferior to the Grey Spotted. Live weight of adults is 1.6 kg; egg production is 80-90 and 85% of eggs laid are suitable for incubation. Egg weight is 44-45 g. Age of sexual maturity is 8 months. Hatching rate of eggs in natural mating and artificial insemination

is 55 and 65-75% respectively. In the latter case fertility of eggs is 90% and hatchability 80%. The birds have a high viability; survival rate of the young stock is 95% and of adults 97-99%.

Biological features of Cream guinea-fowl concern mainly the carcass quality. The carcass of the Cream variety has a better appearance than that of the Grey Spotted because of the white skin and light plumage. In crosses with other varieties, whether as male or female parents, they give highly productive offspring. Live weight of 70-day hybrid chicks (Cream males, White-breasted females) is 920 g; feed consumption per kg of gain is 3.1 kg. Fertility and hatchability of the crosses are very similar to the Grey Spotted. The figures are 75 and 72% in natural mating and 90 and 79% in artificial insemination. Breeding work with the Cream guinea-fowl, when resumed, can significantly increase their productivity, thereby encouraging their wider use in pure breeding and in crossing. As a genetic resource, Cream guinea-fowl are kept in the experimental farm of the All-Union Poultry Breeding Institute.



SIBERIAN WHITE (Sibirskaya belaya)

This breed group was produced in Omsk region by scientists from the Siberian Institute of Agriculture. They picked out from the Siberian population of Grey Spotted guinea-fowl mutants with light plumage. The breed group was created through close breeding and strict culling of weak low-productive specimens. In recent years it has become widely distributed in the Mari Autonomous Republic, in Stavropol territory, and in Crimea region and other parts of the Russian Federation. The stock of Siberian White guinea-fowl numbers more than 20 000 adults.

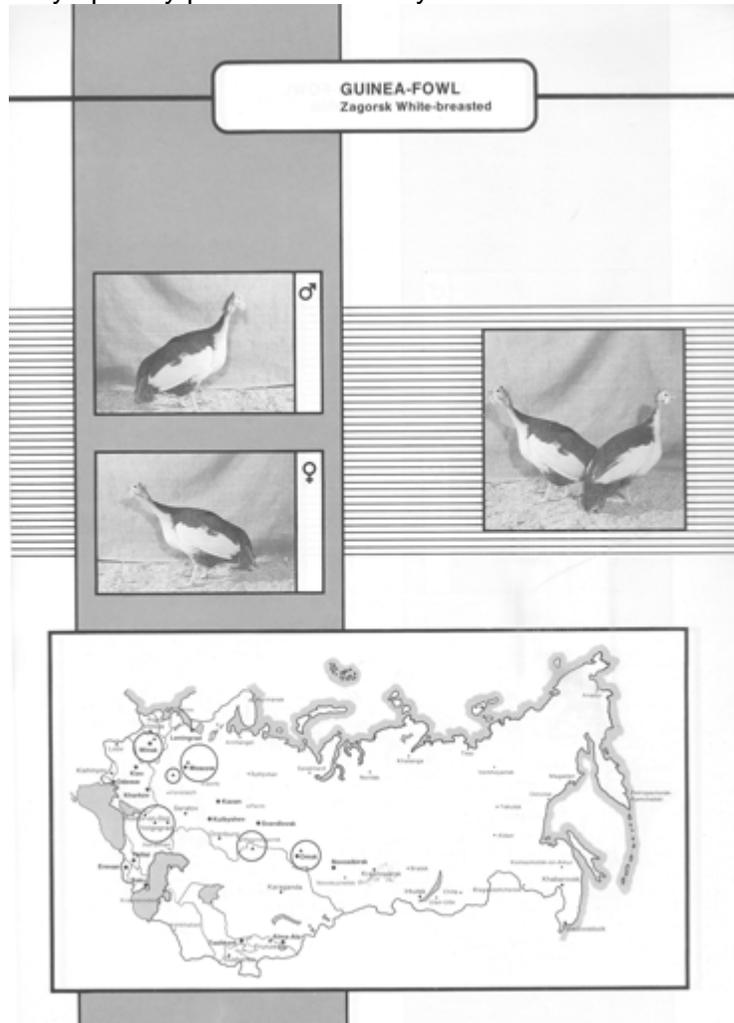
In conformation and plumage colour this variety is almost indistinguishable from the Cream breed. Probably, both guinea-fowl varieties carry the same mutant gene, but on a different genetic background. However, in the process of controlled breeding the plumage of the Siberian White has become lighter in colour.

Productivity of the Siberian White is superior to that of the Grey Spotted. Egg production averages 85-90 eggs but can reach 100 per cycle. Hatching rate is 53-54% (natural mating). Live weight of adults is approximately the same as in Zagorsk White-breasted guinea-fowl, i.e. 1.6-1.7 kg. Body

weight of the 10-week-old young is 0.85-0.95 kg and feed consumption is 3.2-3.4 kg per kg of gain.

Because of the white plumage and skin, their carcasses have a better appearance than those of the Grey Spotted. The breed is well adapted to the climatic conditions of Siberia. At the same time they are adaptable to conditions in the southern regions of the country. Fertility and hatchability of eggs in natural mating and artificial insemination are 75 and 90%, and 72 and 80%, respectively.

At present, pedigree breeding of Siberian White guinea-fowl is carried out at the Volzhskaya poultry plant under battery conditions.



ZAGORSK WHITE-BREASTED (Zagorskaya belogrudaya)

This breed group was produced in the All-Union Poultry Breeding Institute by transfusing the blood of Moscow White cocks to Grey Spotted guinea-fowl. Over a long period of time, the transfusion resulted in specimens with white pigmentation of the breast. They formed the foundation material for this breed group. Three lines have been developed by selection; they differ in production characteristics. The stock of these guinea-fowl is about 50 000

adults. They are raised on many farms in the Russian Federation and Ukraine.

The Zagorsk White-breasted guinea-fowl are similar to the Grey Spotted variety, but they are distinguished by better meat conformation and by the colour of the plumage and skin. The breast, part of the body under the wings and the abdomen have white plumage, resembling that of Moscow White fowl. The round spots on the feathers are barely visible. The shanks and beak are yellow and the skin is almost white. Zagorsk White-breasted guinea-fowl are strongly built.

Their production characteristics are very good. The lines selected for growth rate of the young stock have high indices: live weight of chicks is about 1 000 g, and feed consumption per kg is 3.1-3.2 kg. Egg production in the line selected for this trait is 115-120 eggs per cycle and their average weight is 45-46 g. An important biological feature of these guinea-fowl is the early breeding age - 7.5 months. The colour of egg shell, skin and shanks is lighter than in other varieties and this improves the appearance of the carcass. Yield of edible meat is 56-57% of live weight. Fertility and hatchability of eggs with natural mating are 76 and 73% respectively; in artificial insemination the corresponding figures are 90 and 80%. A wider utilization of Zagorsk White-breasted guinea-fowl is hampered by the lack of breeding farms specializing in their large-scale multiplication. Breeding work is going on in the All-Union Poultry Breeding Institute. Selection is based on cage keeping of the birds and new lines and crosses are being developed.

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