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## 13. DOMESTIC FOWL

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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.

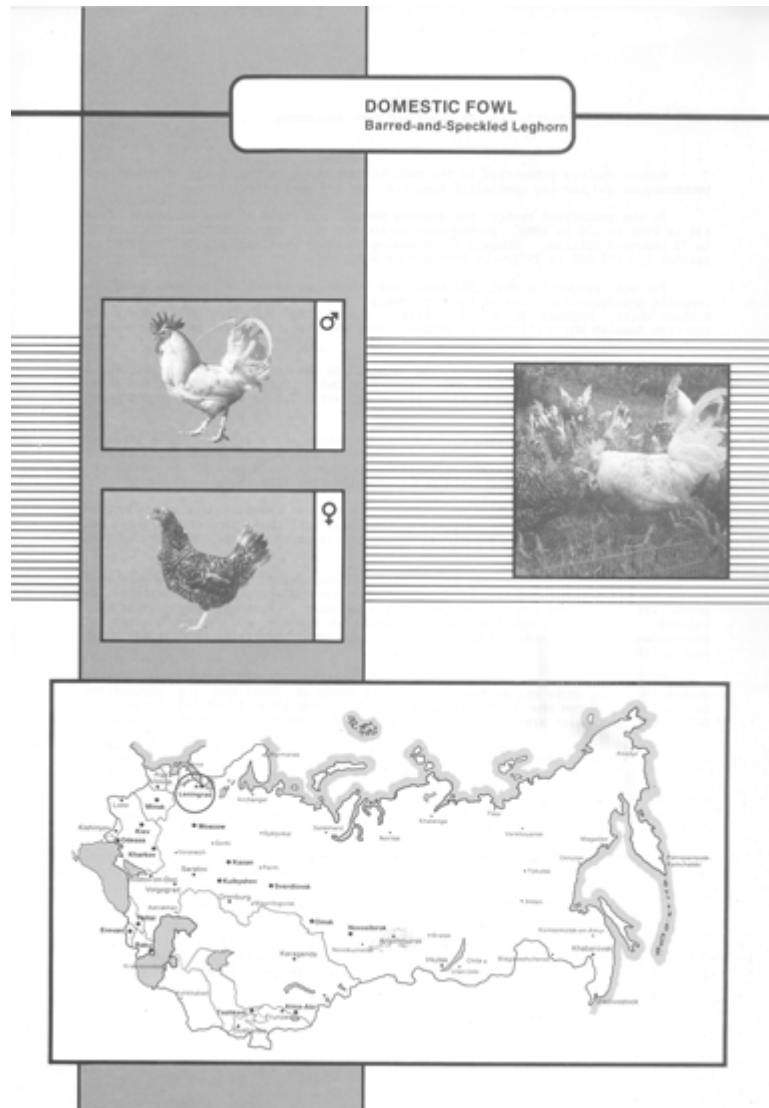
However, industrialization of poultry breeding has led to a drastic reduction in the number of breeds. The majority of them have lost their productive value and are maintained only as a genetic resource in research centres and by amateur breeders.

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
<b><u>EGG BREEDS</u></b>		
Barred-and-Speckled Leghorn	-	0.2
Black Speckled Australorp	0.8	0.12
Russian White	29 730	4390
<b><u>EGG-MEAT BREEDS</u></b>		
Moscow	61	42
Moscow White	18	97
Poltava Clay	747	626
<b><u>MEAT-EGG BREEDS</u></b>		
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
<b><u>MEAT BREEDS</u></b>		
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 (F<sub>2</sub>) 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.

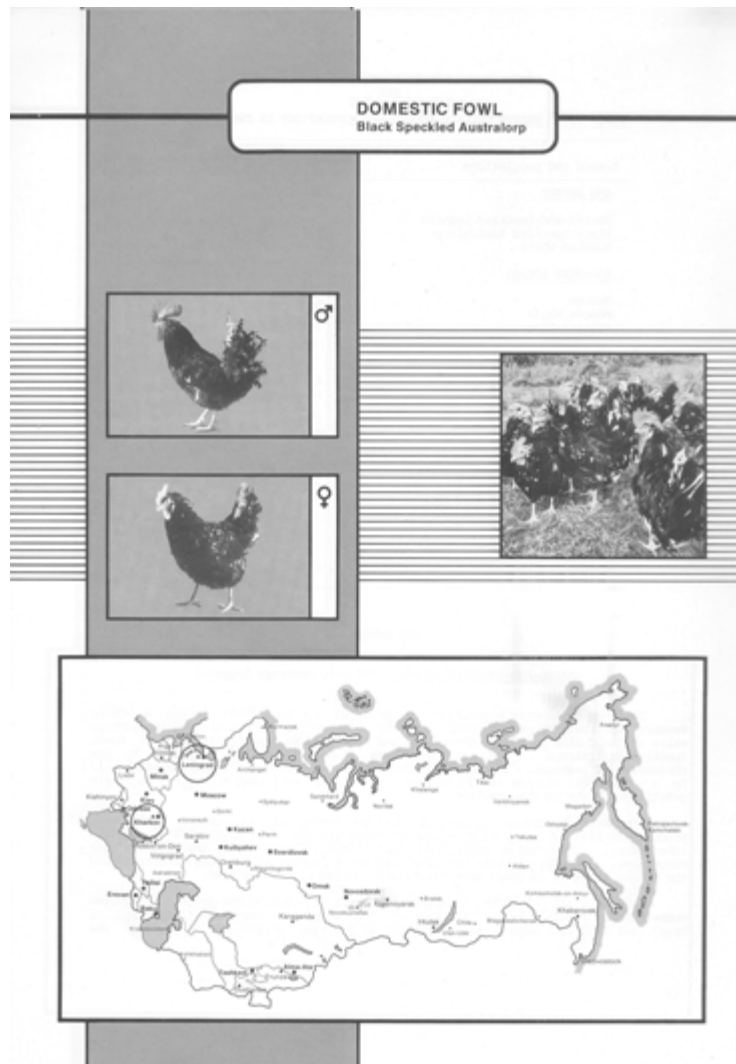
By 1984 the population of Barred-and-Speckled Leghorns reached 900. Of these 419 were kept in individual cages and from them were chosen 117 hens with a 4.5-month production of 111 eggs weighing  $61 \pm 0.2$  g. The selection differential in egg production was 14 eggs and in egg weight 3 g. The population 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 Barred 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.

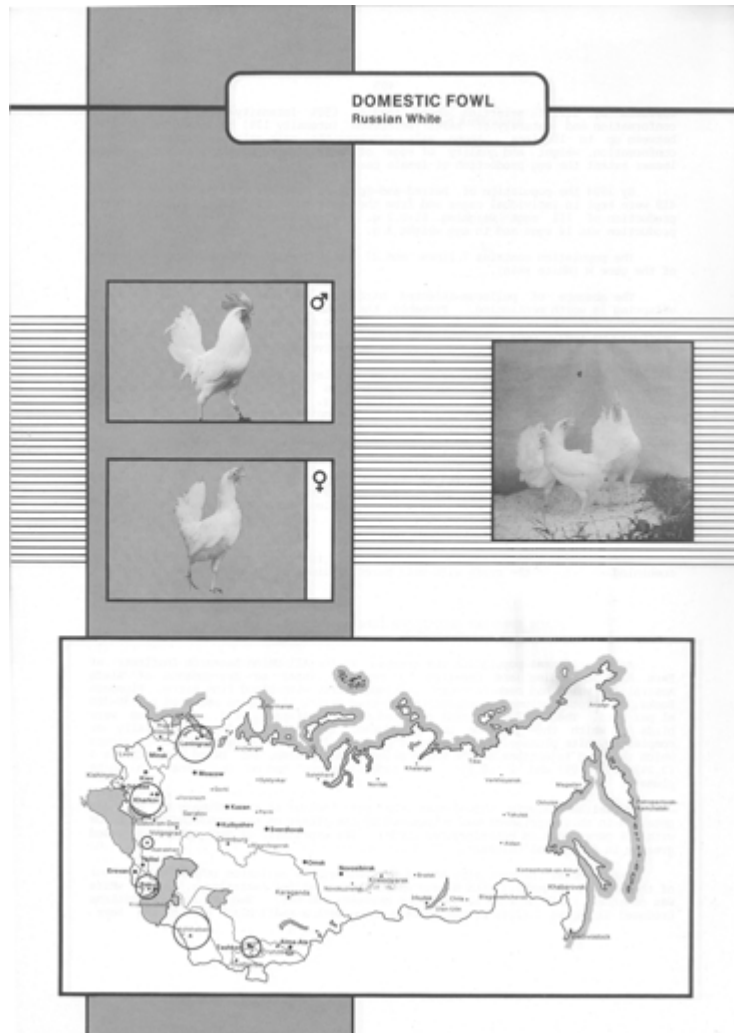
In breeding Black Speckled Australorps the chief attention was paid to mass selection for lower breeding age and higher egg weight. In 1975-76 their population reached 800-900 head. In 1976 they were joined by males of the C line of cross Shaver 288, in order to produce a new synthetic line. A small 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.

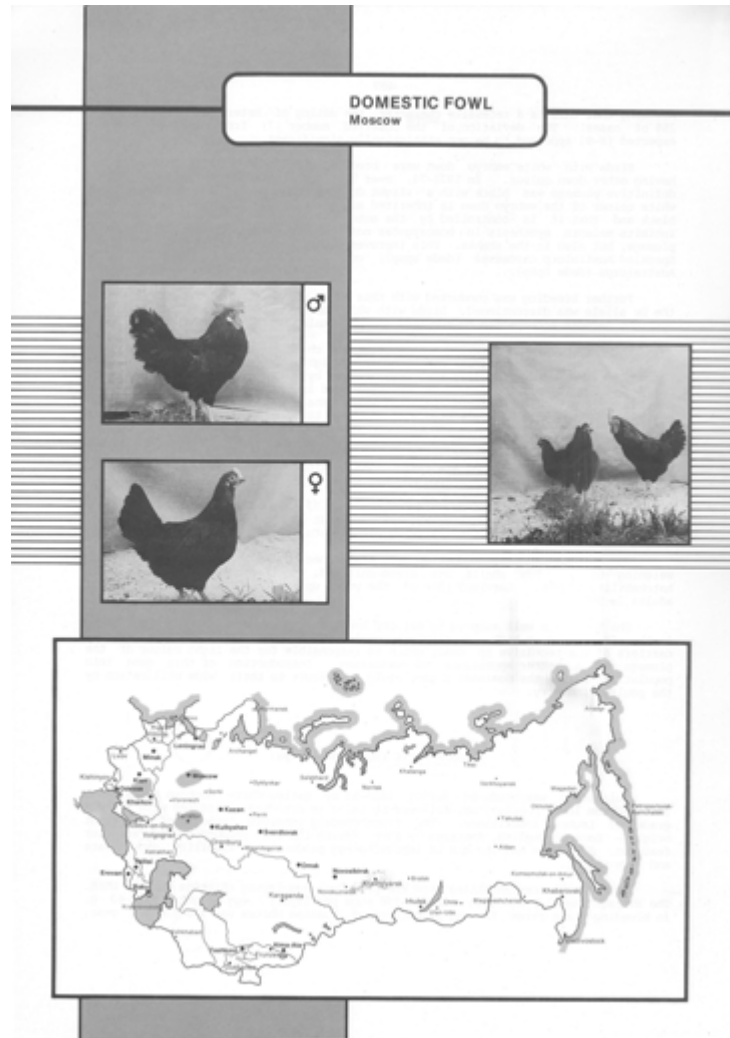
The live weight of 8-week-old pullets is 0.55 kg; that of cockerels is 0.56 kg. Adult hens weigh 1.6 kg, cocks 2.0 kg. Fertility of eggs reaches 93%; hatchability is 82%; survival rate of young and adults is 95 and 92% respectively. Egg production for the initial and intermediate population during 70 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.

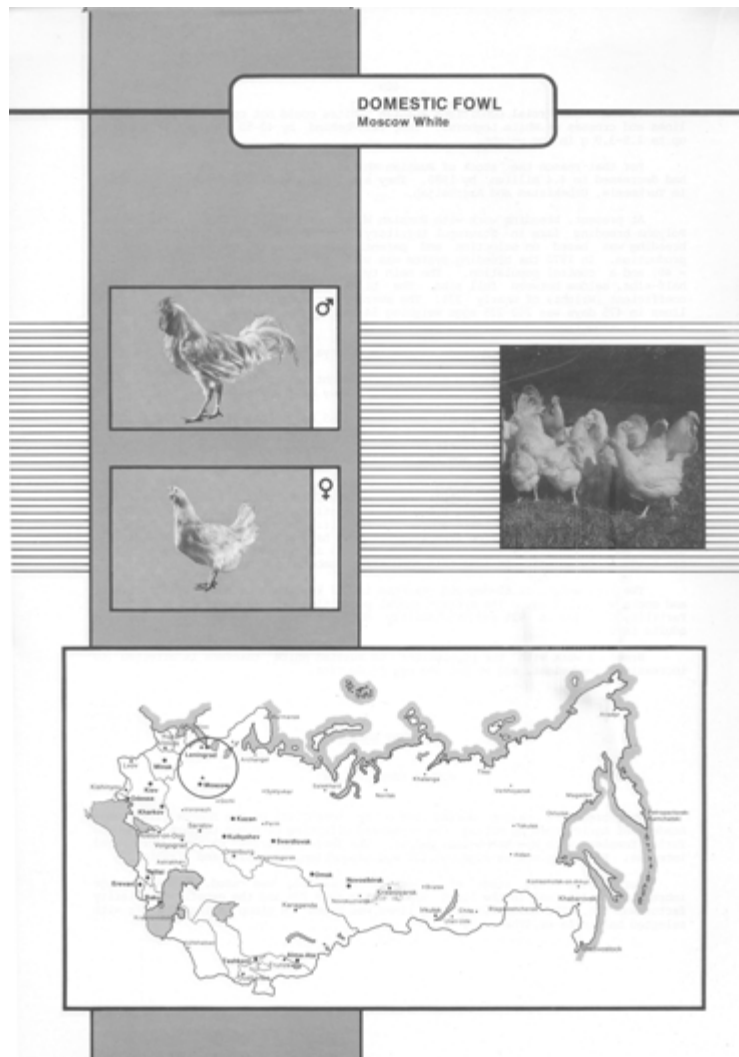
In the frequencies of ovalbumin genes ( $A = 0.989$ ) this breed is close to meat-type breeds and in the allele frequencies of the  $G_3$  locus ( $A = 0.750$ ) it is close to Brown and White Leghorns.

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.