SAVING THE TUROPOLJE PIG IN CROATLA,

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SUMMARY

On the front lines of Croatia's war areas live the Turopolje pigs, in danger of extinction. Immediate action is sorely needed. The new European Foundation SAVE (Safeguard for Agricultural Varieties in Europe), an umbrella organization for the *in-situ* conservation of agricultural genetic resources, has started an international rescue project. The remaining pigs are listed and will be regrouped for a mating program, which avoids inbreeding. For an additional insurance, SAVE will also bring new breeding groups away from the front lines in, and outside of, Croatia. A breeding register has been set up provisionally at the herdbook office for endangered breeds with Pro Specie Rara in St.Gallen, Switzerland.

Key words: Genetic Resource s, Pig, Croatia

RESUME

En Croatie, entre les frontiéres de guerre, la race porcine du, Touropoije a tenement diminuée, qu'elle est menacée d'extinction. Une action immédiate est nécessaire. La nouvelle fondation européenne SAVE (Safegard pour I'Agriculture des Variétés d'Europe), une organisation faitière pour la conservation in-situ, a commencé un projet pilote international. Les porcins existants sont registrés et seront regroupés pour un programme d'accouplement, qui évite la consanguinity. Pour la sécurité additionnelle SAVE est en train de créer des nouveaux groupes d'é1evage loin des zones de guerre, en arriére-Croatie et mème A 1'étranger. Le registre de troupeau (herd-book) est administré provisoirement par la Fondation Pro Specie Rara, qui s'occupe A St.Gall/ Suisse du registre des troupeaux de bétail menacé.

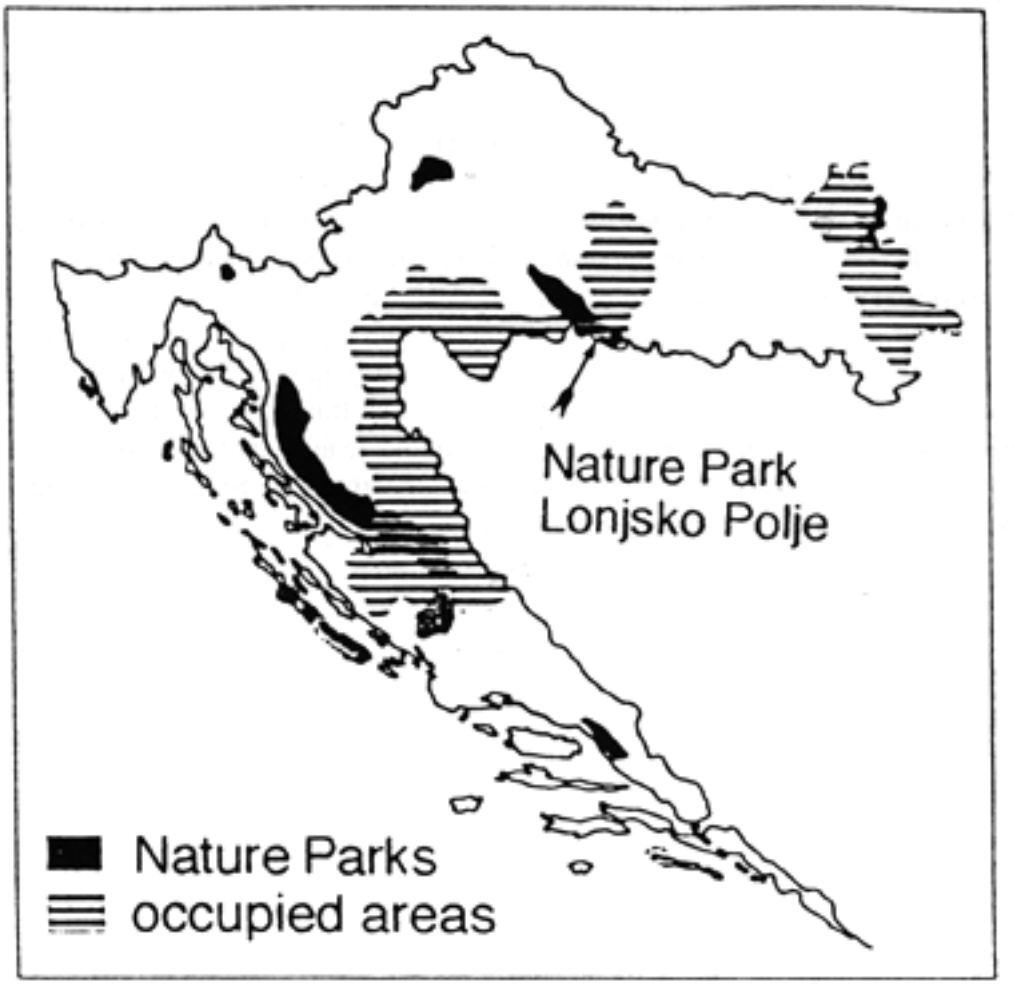
Mots clés : Ressources génétiques, porc, Croatie

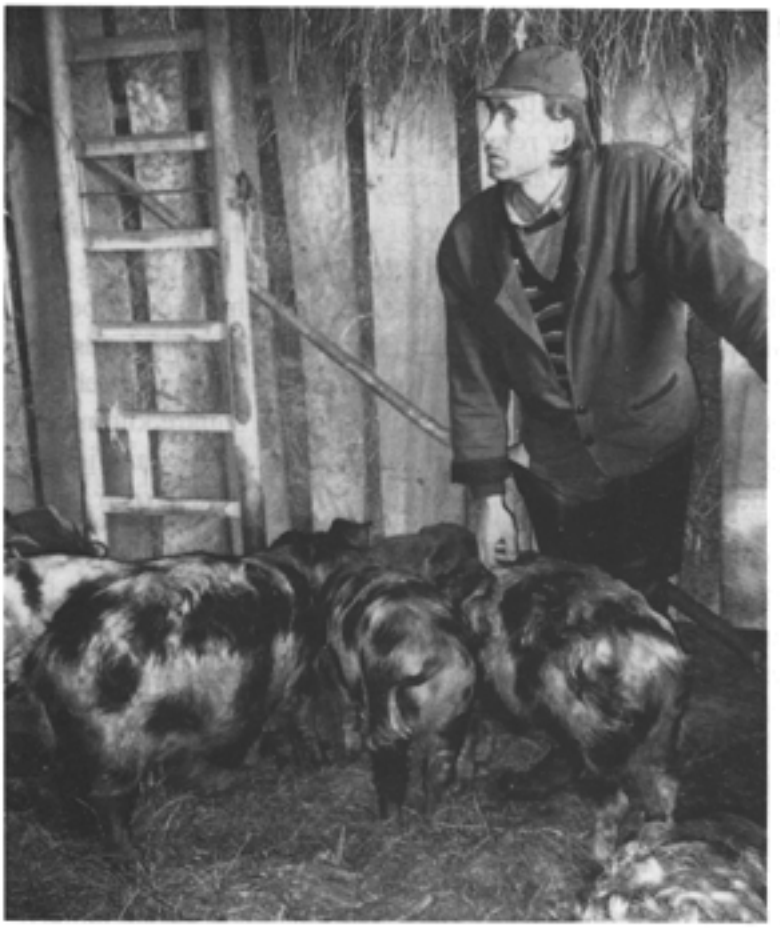
1.0 INTRODUCTION

The most valuable genetic and cultural heritages of biological diversity have survived primarily in marginal lands, with ethnic minorities or in barely accessible areas, i.e. in regions of high ecological adaptability and low pressure to change. This inheritance is particularly threatened in times of war or economic and political turmoil. The last of the Turopolje Pigs live on the front lines in Croatia between the Croatians and the Kraina Serbs and are in danger of being wiped out. In a war situation where people need help, it may, at first sight, seem cynical to work for the preservation'of a breed of farm animals. It must be clearly stated, however, that this sensitive project will especially help the local people to maintain one of the bases of their present and future survival. Furthermore, when the war broke out in October 1990, preservation measures were already being discussed and were postponed at that time. If we don't act now - while the front lines are "frozen" - there won't be anything left to rescue.

2.0 CHARACTERISTICS OF THE BREED, HUSBANDRY AND USE

The Turopolje belong to the bacon pigs. The curly-haired animals are similar to the Swallowbelly Wooly Pig; they are grey-white-yellow with 5-9 saucer-sized black spots. The Turopolje are uncommonly hardy pigs, able to overwinter outdoors and forage extensively for themselves. They can survive on a minimal diet, with sows losing up to 50% of their body weight during the nursing period if need be.





Breeding group at Kratecko

Sows in winter

The Turopolje has adapted itself optimally to its life in the river bottom lands; this strain of slow-matuiing bacon pig was previously found along the entire length of the Sava River in Slovenia and Croatia. The Kraina Landpig has almost died out on the upper reaches of the river. In Mddle Croatia, between Zagreb, Sisak and Nova Gradiska, tiny remnants of the Turopolje have survived until today primarily in the Lonjsko Polye Nature Park and sporadically in the neighboring Odransko Polje.

The forester and wildlife biologist Goran Gugic has minutely studied the keeping and exploitation of pigs in the unoccupied part of the Lonjsko Polje Nature Park; this is described in his thesis, “Swine Husbandry and Sylvan Forage in Lonj sko Polje” (Munich, 1992). This preserve threatens to lose much of its ecological value if the natives lose their traditional extensive agriculture with old varieties: the pigs roam freely in the periodically flooded, square kilometersized communally-used grazing meadows and hardwood bottom lands. Since the prohibition of swine foraging in forests throughout the rest of Europe, the management of the Sava river lands today is unique.

The free-ranging pigs are an attraction of the nature park. They root in shallow water for food, enjoy cracking large fresh-water mussels and keep the shallows free of vegetation. Their rooting in the meadows breaks up old grass and helps fresh grass to sprout. They improve the food chain in the riverain woods and the physical characteristics of hydromorphic soils. At night, the pigs are not herded into the villages, but are placed in pigsties in the meadows or forests. They respond only to the specific calls or whistles of their herders.

3.0 THE DANGER

The Turopolje overcome the hardships of their regularly flooded environment outstandingly. They swim well and can overwinter in the open. On the other hand, they grow slowly and produce more bacon instead of the ham desired today. As a result, the farmers- have repeatedly tried introducing other less hardy breeds or crosses using foreign boars. As a result, the Turopolje population has decreased steadily in recent years..

The greatest blow to the Turopoljes, however, has been the war that broke out in Croatia in 1991. The entire southern part and a large part of the eastern area of the Lonjske Polje Nature Park was occupied by the Kraina Serbs and cut off from the Northeastern part (see map). Since then, this entire area has been used as a staging area by the armies. Regular troops, paramilitary bands and all sorts of questionable people are now moving around in this region. These have severely decimated the free-roaming pig herds and the remaining farmers have been forced to keep their pigs year-round in barns. Feed costs are higher than the profits from sales; as a result, the herds have been reduced even further.

The market situation has also changed completely because of the war and the economic crisis. Previously, the Turopolje sold well to the middle-class butchers (now ruined) and the Gavrilovic sausage factory. This was the chief purchaser of the bacon pigs and made the wellknown Gavrflovic salanii out of their flesh. The factory lies, however, in occupied Petrinj a and, for the time being, is out of the question as a purchaser. Even though there is hardly any fighting along the front at the moment, the Turopolje will not survive the next few months if measures are not taken quickly.

4.0 THE RESCUE PLAN

The nature protection foundation Euronatur has been active for years in the Lonjsko Poije Nature Park. It was already clear in 1990 that the wide expanses there could be protected only through the maintenance of the traditional agriculture and the preservation of the old robust breeds. An agricultural concept worked out by the wildlife biologist Goran Gugic can be fwly implemented, however, only after the war is over. In the meantime, an emergency program is necessary:

- Euronatur will, in order to preserve the old meadow husbandry, support the Turopoijes locally by paying the farmers a premium to help keep pure-blooded animals in their barns. A marketing plan will also be developed.
- SAVE will take on the additional insurance of building up new breeding groups away from the front fines in, and outside of, Croatia; they will assist the breeding programs technically. A herd book (breeding register) containing all desirable animals shall be established. Great weight will be put on the use of good breeding boars. Further remnant populations are being sought

5.0 FIRST SUCCESSES

The first animals were assessed and marked in the Sava meadows in early January, 1994. The Tiergarten Schoenbrunn in Vienna arranged for 3 young boars and 3 young sows to be transported to the Zagreb Zoo; these are the first breeding groups safely away from the front lines. The buying up of pure-bred young animals is not to be underestimated as a signal for the villagers: “Something is happening and the traditional breed is finally valued again!”

In the meantime Goran Gugic has made the inventory of the relipopulation and set up the breeding register. With a mating program which avoids inbreeding, the Turopolje pig may rise again. We cannot let these initial successes fool us, however. The way to the goal is a long and delicate process.

Transport of pig at the Zagreb Zoo

Pigstie in Sava meadows

IMPROVEMENT AND ADAPTATION OF THE FAYOUMI CHICKEN

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SUMMARY

The Fayoumi (Oasis/Province of Fayotimi) or Ramadi (village of Dar-el-Ramad) breed of chicken is said to have been introduced into this area in the early part of the 19th century; phenotypically it recalls the Silver Campine from which it is reputed to descend. A hardy and well adapted breed it was saved through the creation of the Fayoumi Poultry Research Station in 194é, which also assured an active improvement policy of the breed. The creation in 1958 of the Fayoumi Poultry Cooperative Society further strengthened the conservation of the breed and its use through distribution of genetic material to farmers and smallholders of the Fayoumi province. Since the early é0's the breed is reported to have been successfully introduced to countries as different as the UK and the USA, Vietn@ Iraq, Pakistan and India. Its adaptability and resistance to the problems of xyrotherrnic tropical and sub-tropical conditions is confirmed by its actual prevalence in Southern Egypt.

Key words: Genetic Resources, Poultry, Egypt

RESUME

On considère que la race de poulet Fayourni (Oasis/Province de Fayoumi) ou Ramadi (village de Dar-el-Ramad) ait été introduite dans cette zone au début du 19ème siécle. Du point de vue phénotypique elle ressemble à la race Silver Campine de laquelle on retient qu'elle descend. Cette race vigoureuse et bien adaptde a été conserves gr'ace à la création de la Station de Recherche pour le poulet Fayourni, qui d'ailleurs a assuré une politique d'amélioration continue de cette race. La création en 1958 de la Société Coopérative pour la race Fayoumi a renforcé la conservation de cette race A travers la distribution de matériel génétique aux agriculteurs et aux petits éleveurs de la province de Fayoumi. Dés le début des années 60 cette race a été introduite avec succés dans différents pays tel que le Royaume Uni ou les Etats Unis, le Vietnam, l'Iraq, le Pakistan et l'Inde. Son adaptability et sa resistance aux problémes des conditions xyrothermiques tropicales et subtropicales est confirmée par sa présence actuelle dans le Sud de I'Egypte.

Mots clés : Ressources génétiques, volaille, tgypte

1.0 INTRODUCTION

The Fayoumi breed of chickens has been for a considerable time in the Fayoum province in the western part of middle Egypt. From there the breed has been disseminated to all parts of the country. The origin of the breed is not definitely known. One theory is that it was introduced into Egypt from a village called "Biga" in Turkey during the reign of Mohamed Ali Pasha (I 9th Century), hence, its synonym "Bigawi". The other theory is that it originated from the "Silver Campine" breed and was introduced during the same reign or at the time of Napoleon's campaign in Egypt.

In fact the Fayoumi looks much more like the Silver Campine than any other breed but its barring is a sex-linked trait, while the barring in the silver campine is autésomal. It might be that the sex-linked barring gene has been introduced by crossing with other breeds since its first introduction.

In Egypt it is also called "Ramadi" named after the village Dar-el-Ramad, the most famous place from which the breed could be obtained from the native hatcheries. The Ministry of Agriculture of Egypt established "The Fayoum Poultry Research Station" (FPRS) in 194é near this village to maintain the breed and to improve its characteristics. For the same purpose, and to distribute the Fayou@ chickens to farmers and smallholders, the Fayoum Governorate established the "Fayoum Poultry Co-operative Society" (FPCS) in 1958.

2.0 THE BREED

The Fayoumi is an active and hardy type of fowl and is placed by some people in the Mediterranean class. In contrast to all other Egyptian fowls, the adult Fayoumi birds are characterized by a uniform, distinct and sexually dimorphic plumage of black and white barred-like pattern although the barring is not uniform (Pencilled) (Picture 1). Silver-like feathers are found covering the neck and the saddle of the bird and they are markedly found,ih the male in the hackle and sickle feathers. The neck feathers are whiter and by selection, white neck lines may be produced. Single comb is generally found but sometimes it is split at the end. The skin is dark, nearly blue, but there are birds of lighter colour. The beak and shank are dark grey. The ear lobes are usually red but occasionally birds with white ear lobes are found and the eyes are deep brown. Rim-fan tail females may be produced by selection (Hossari, 1958).

The down feathers of day-old chicks have a spangled pattern with white and brown stripes along the back. The newly hatched chicks can be divided into six distinct classes according to these stripes and spots on the head.

3.0 DISTRIBUTION OUTSIDE EGYPT

The Fayoumi breed was first introduced to USA by Prof D.C. Warren in Purdue University in 1948 and then to Iowa State University by Prof A. W. Nordskog. The Fayoumi was also introduced to Iraq and Vietnam (Ghany et al, 19é2) and Sudan, Pakistan and India. Recently it was exported to the United Kingdom by the "Domestic Fowl Trust" of England (Eastwood, 1988).

4.0 FAYOUMI FLOCKS

In 194é a flock of Fayoumi chickens was established in the Fayoumi Poultry Research Station (FPRS) from a flock that used to be in Dokki (Cairo) Poultry Experiment Station. A further introduction to FPRS was made in 1951 where samples of day-old chicks from different native hatcheries in the Fayoum Governorate were collected and some selected cockerels were brought from raisers in the villages of Dar-el-Ramad, Menshat Abdalla and Kohafa, where the Fayoumi chickens were usually kept and successfully produced. Since that time, the flock at FPRS has been closed. Establishment of the Takamoli Poultry Project (TPP) flock in 1983 and the Poultry Strain Improvement Project in Beheira Province (PSIP) flocks in 1981 was made from the flock at FPRS.

At present there are three main flocks of Fayoumi chickens in Egypt, though they have one origin. These are kept at FPRS and TPP, in Fayoum Governorate and in PSIP in Beheira Governorate.The approximate size of these flocks are 1500, 45000 and 3500 - é000 layers, respectively. There are also small flocks for experimental purposes in some Agricultural Colleges which originated from the main ones.

There are two main lines developed in FPRS by Hossari (I 970), one by selection for egg number (PP) and another for body weight at 8 weeks of age (GG). There is also a random-bred control (RR) flock maintained at FPRS.

5.0 BREED PERFORMANCE

Table I shows the performance of the original flock (Hossari, 1958) and of the two lines GG and PP (Hossari et al, 1992). The average heritability estimates of some important characters reported by different workers are also given in table I (Abdel-Warith, 1993).

TABLE 1

Breedperformance and estimates of heritability (h2) for some traits.

Trait	Original Flock	Prodtiction Line	Egg Line	h2
Body wt. at 8 wks of age, g, male	361	579	657	0.57
female	329	444	504	0.41
Body wt. at 12 mo age, g	1120	1456	1671	0.40
Egg wt. at 1.2 mo age, g	45	46	47	0.33
Age at sexual maturity, day	188	172	203	0.24
Egg number to 72 wks of age/(annual)	134	216	183	
Fertility (%)	87	95	96	
[Hatchability	77	89	88	

6.0 DISTINCT CHARACTERISTICS OF THE FAYOUMI

6.1 High fertility and hatchability

Fayoumi had a higher fertility percentage when it was compared with most other breeds or strains of chickens (Eastwood, 1988, and Hossari et al, 1992). Radwan (I 992) showed that semen quantity and quality of the Fayoumi were higher and better than those of White Leghorn and Rhode Island Red (RIR) chickens. For comparison he used Fayoumi (PP & GG) lines and their crosses.

6.2 Performance under restricted feeding

Restricted feeding reduced growth of the Fayoumi during the growing period relatively less when compared with New Hampshire and White Leghorn (Dorgham, 1989).

6.3 Egg quality

Dorgham (1989) showed that Fayoumi eggs had less cholesterol than White Leghorn (7.3 vs 9.1 mg/g), wlile Mostageer (I 958) and Ali (I 993) reported a thicker shell for the Fayoumi egg than for other breeds (White Leghorn and RIR), hence eggs can withstand shipping with less breakage. The latter authors showed that yoke percentage was higher in the Fayoumi than White Leghorn chickens (3 6.3 2 vs 28. 01%

6.4 Proteins requirements

Ali (1977) and Darwish et al (1990) reported that the best laying performance was at 14% protein diet as compared to 16% or more for other breeds of chickens. Moreover, the amino acids requirement for the Fayoun-d chickens was estimated to be less than other breeds (El-Sheikh, 1987).

6.5 Disease resistence

Fayouré chickens have a lower mortality rate than other breeds or strains raised in Egypt. Many workers have quickly demonstrated the superiority of this breed over the imported breeds regarding disease resistance (Dardiry, 1945). Kenzy (1952) reported that,Fayoumi birds incubated with Rous Sarcoma virus showed no tumor development, while Price (I 95 8) pointed out that the Fayoumi was more resistant than White Leghorn to infection when Rous Sarcoma virus was injected into incubated eggs. Nordskog and Phillips (1960) reported that the Fayoumi was more resistant to leucosis, particularly to the neural type, compared with other breeds.

7.0 BREED SHORTCOMINGS

The Fayoumi is characterized with a dark shank and meat due to the concentration of melanin pigment. The Fayoumi is a small nervous bird and produces smaller eggs than standard breeds.

8.0 ADAPTATION

The Fayoumi chicken is more adapted under the Egyptian village conditions than other breeds. Moreover, its good adaptation in other countries has been reported in Iraq, Pakistan, India, VietnwA U.S.A. and England by Ghany et al (I 962). The Fayoumi is well adapted to tropical and semi-tropical conditions as evidenced by its prevalence in southern Egypt (Hossari et al, 1992). Ghany et al (1962) reviewed that the Fayoumi birds have good reproductive qualities with respect to fertility, hatchability and mortality, compared with the performance of the standard breeds in Egypt. Hossari (1975) found no reduction in fitness traits, fertility and egg production, of the

Fayoumi due to artificial selection towards increasing body weight. This could mean that natural selection did not affect artificial selection for body weight which implies that the Fayoun-d has a wider range of genetic homeostasis. If this interpretation were true, this could explain the wider range of adaptability of the Fayoumi chicken.

No experimental results could befound on the differential effect of heat on Fayoumi and other breeds, particularly exotic, under diferent degrees of intensification of production. ValleZarate et al (1988) compared the performance of Fayoumi and Dandarawi (another local Egyptian breed) with the medium-heavy high performance layer Dahlem Red (D) under 18-20'C and 32'C. "le high temperature adversely affected D, it still outperformed the other two local breeds in egg production and egg size under both temperatures, but fertility, yolk ratio, shell percentage and shell thickness were always better in Fayoumi and Dandarawi.

9.0 IMPROVEMENT OF THE FAYOUMI FOWL

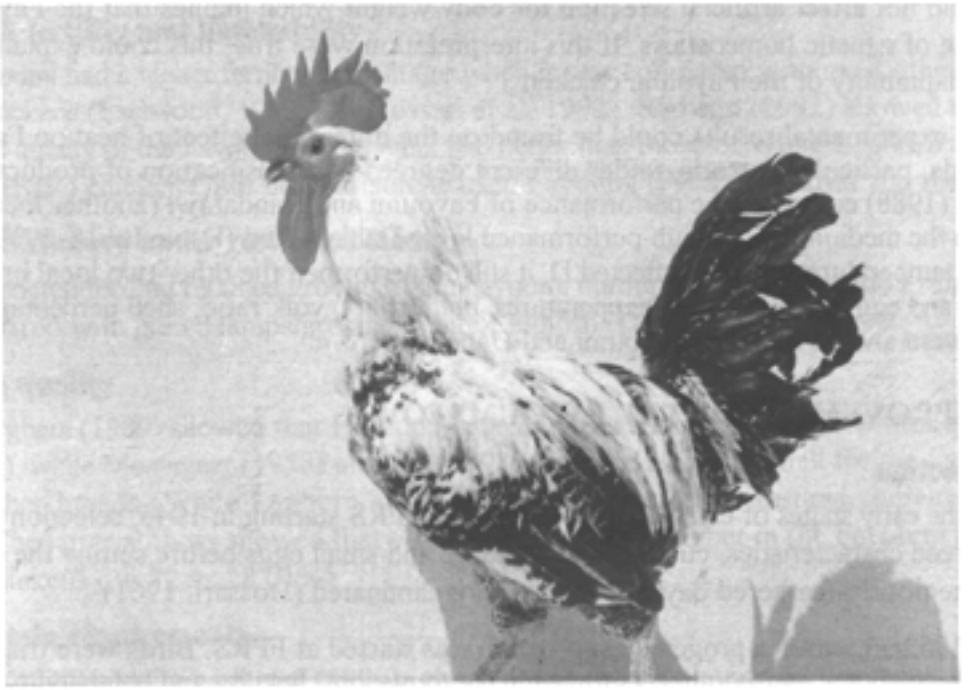
9.1 Selection

In the early stages of establishing the flock at FPRS starting in 1946, selection was mainly based on breed characteristics, culling the very large and small eggs before setting the eggs and at hatching the poorly-feathered day-old chicks were eliminated (Hossari, 1961).

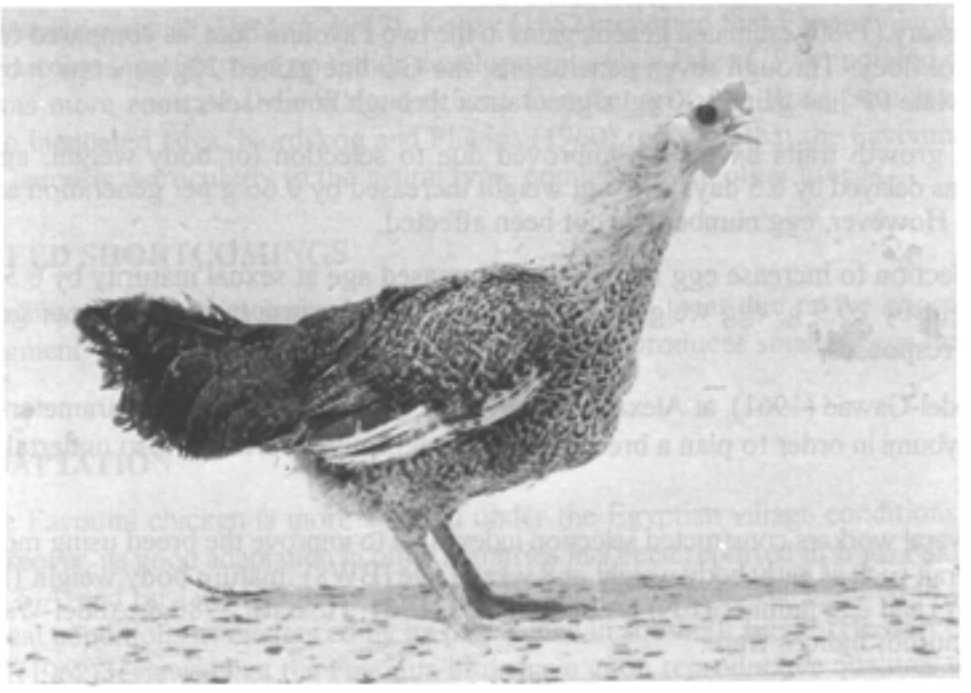
In 1952/53 season a progeny-test program was started at FPRS. Birds were trapnested and individual records for egg number, egg weight, body weight, fertility and hatchability were kept. From 1953 to 1957 a sib-test plan was started and the best breeders for intensity of egg production (first two months) were selected as parents for the next generation. Selection was carried out in two directions, increased body weight at 8 weeks of age and increase of egg number (Hossari, 1961). Two lines of Fayoumi were established, the egg line (GG) and the production line (PP), respectively. The reasons for choosing body weight at 8 wks as a criterion for selection to improve body size was its high heritability estimated at 0. 5 5.

Hossary (1980) estimated genetic gains in the two Fayoumi lines, as compared to a randombred control flock. Through seven generations, the GG line gained 20 g/generation by individual selection while PP line gained 20 eggs/generation through family selections.

As growth traits have been improved due to selection for body weight, age at sexual maturity



Fayoumi Rooster



Fayoumi Hen

was delayed by 6.5 days and egg weight increased by 0.66 g per generation as correlated responses. However, egg number has not been affected.

Selection to increase egg number has decreased age at sexual maturity by 6.5 days, adult body weight by 20.9 g, egg weight by 0.64 g and winter pause by 5.8 days, per generation as correlated responses.

Abdel-Gawad (1961), at Alexandria University, estimated the genetic parameters of another flock of Fayoun-d in order to plan a breeding program. Similar work was also undertaken at Cairo University.

Several workers constructed selection indexes (1) to improve the breed using more than one economic trait such as early body weight at 8 wks of age (BW8), mature body weight (MBW), egg weight (EW) and egg number (EN) (Abdel-Gawad, 1961, Hossari, 1980 & Abdel-Warith, 1993). The latter author indices were:

1= 0. 11 94 MBW + 0. 7261 EW + 0. 7481 EN (3 traits)

1= 0,7490 BW8 + 0.1221 MBW + 0.7132 EW + 0.7306 EW (4 traits)

Different selection methods to improve the two lines of the Fayoumi (GG and PP) have been tested (Hossari, 1980). There is evidence that mixed family selection method (half plus full sibs) was not more efficient than individual selection or ordinary family selection (full sibs) to increase body weight or egg number in the two lines unless dam family size is increased to ten or more, which is difficult to attain in practice. Increasing the number of dams per sire is not so critical. Combined individual selection and family selection in an index could be a useful method to improve the two lines relatively more rapidly even with regard to early body weight which shows a high h' estimate.

9.2 Crossing for heterosis

Crossing the two lines of the Fayoumi with each other improved some productive and reproductive traits (Hossari, 1970). Many workers found that the economic traits were . improved and a considerable heterosis was obtained, when crossing the Fayoumi with other breeds i.e. White Leghorn (WL), RIR and New Hampshire (NH) (Kader Pt al, 1986, Hossari and Dorgham 1992). The economic evaluation of Fayoumi (F) crosses; two-way, Fx RIR, and three-way cross, RIR x Gimmeza (Fayoumi x Plymouth), was carried out under a controlled environment as compared with WL of Hypeco and LSL of Lohman (commercial layers). The actual economic return from the Fayoumi cross F x RIR exceeded that of the commercial strains because of its good adaptation and more favorable market demand on it (Hossari, 1993). It is also observed that crossing the Fayoumi with other foreign breeds and strains has improved adaptation and fitness traits of the crosses as compared to the exotic parental breeds.

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PRESERVATION OF LIVESTOCK GENETIC RESOURCES IN BULGARIA

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SUMMARY

The objective of this study is to present the local livestock breeds threatened with extinction as well to suggest an alternative initiative for their preservation and utilization. Both the geographical location and natural resources of Bulgaria are prerequisites for a large variety among species and strains of farm animals. Traditionally a considerable number of local breeds and strains have been bred on the territory of the country. In the recent 25-30 years an evident decline of their numbers is marked chiefly due to the introduction of high-productive, widespread breeds. This study presents the biological features of local indigenous breeds of farm animals threatened with extinction as well as the specificity of their region of location. The genetic research results based on polymorphism of serum blood proteins and blood groups are discussed. The diversity of indigenous sheep breeds is the largest, and 15 of them are under control. In latter years investigations show that they are 1.3 to 3.6 per cent from the total number of this species. The genetic analyses attest that these specific genetic resources can be used for keeping the genetic variety within and between sheep populations as well as for improving the adaptability of the newlyestablished breeds. Among the cattle two local breeds are of interest for genetic resources preservation purposes. As the most attractive emerges, Rhodope's Short-Horned cattle having unique biological characteristics as a representative of *Bos Taunis* in Europe and whose domain of location is over 1800 meters above sea level. The only impressive strain among the pig breeds has a different biological status from the well-known breeds on the European continent. The results of the present study show that the investigated indigenous breeds and strains are mainly located in mountainous regions considered as "hard" for farming. Thus, the preservation of genetic resources of local farm animals will contribute in using their valuable abilities of adaptation for breeding programmes in ecologically clear regions.

Key words: Livestock, Genetic resources, Indigenous breeds, Bulgaria

RESUME

L'objectif de ce travail est de présenter la menace d'extinction des races locales d'animaux et de suggérer une initiative alternative pour leur conservation et utilisation. Aussi bien le site géographique que les ressources naturelles de la Bulgatie présentent les conditions nécessaires pour une grande variability entre espèces et races des animaux d'élevage. Traditionnellement, un grand nombre de races locales et espéces ont été croisés dans la zone. Dans 10 courant des dernières 2530 années, on a assists a une diminution importante de 1'effectif dù à une large introduction de race hautement productives. Cette étude présente les caractéristiques biologiques des races autochtones d'é1evage menacées d'extinction, ainsi que celles du site géographique. On présente également les résultats de la recherche génétique effectuée sur le polymorphisme des protéines du sérum et des groupes sanguins. La diversité plus importante se trouve chez les races ovines autochtones, et 15 de ces races sont sous contréle. Les recherches effectuées dans les derniéres années montrent que celles-ci représentent de 1.3 A 3.é pour cent du nombre total de cette espéce. Les analyses génétiques ont montré que cette spécifique ressource génétique peut étre utilisée pour conserver la variability génétique d l'intérieur et entre les populations ovine et aussi pour améliorer I'adaptabilité des races de nouvelles introduction. Partni les bovins on trouve deux races locales intéressantes dans le but de la conservation des ressources génétiques.

Une des races bovine plus importante est la Rhodope's Short-Horned qui possède des caractéristiques biologiques uniques, representatives du *Bos* Taurus en Europe, avec une localisation dans les milieux se trouvant A 1800 m d'altitude. La seule race importante parmi 1'espéce porcine présente des caractéristiques biologiques différentes de celles bien connues parmi les races du continent européen. Les résultats de cette étude montrent que les races locales se trouvent principalement dans les régions de montagne, considérées, normalement, comme zones difficiles pour 1'é1evage. Pour tout ceci, la conservation des ressources génétiques des races locales d'é1evage pourra ètre utilisée pour leur remarquable capacité d'adaptation dans des programmes d'amélioration génétique pour les régions tempérées.

Mots clés : Bétail, ressources génétiques, races autochtones, Bulgarie

TABLE 1

Farm Animals Number in Biilgaria by October 1992

Livestock species	Total number	Compared to 1987	Mature Females
Cattle	1113949	-33.9%	526980
Sheep	5079938	-76.1%	3821094
Pigs	3214339	-37.5%	283393
Goats	599836	+22.0%	470424
Buffalo	23 27")	17.2%	12626
Fowl	24198600	51.4%	10291150

1.0 HISTORIC PRECONDITIONS FOR ANIMAL BREEDING DEVELOPMENT

Animal breeding has ancient traditions in Bulgaria. The great diversity of livestock species is typical for the country. This fact is determined by the different breeding conditions in the particular regions regardless of the relatively small territory of the country. In addition to that both the ethnographic peculiarities and traditions of the people inhabiting the different regions have played an important role. This is a crucial prerequisite for the formation of farm animals typical for each region, differing quite frequently not only by certain choice of breed but by choice of specie as well.

The present preservation of such a large variety of livestock could be related to a certain extent to the fact that animal breeding was one of the basic occupations of the population for centuries. As a consequence to that various breeds of cattle, sheep, goats, buffaloes, pigs, fowl, horses, etc., are preserved and being bred on the territory of the country.

2.0 FORAGE BACKGROUND AND LIVESTOCK BREEDING TECHNIQUES

The arable land in Bulgaria figures out to 4 649 979 hectares including 83 per cent fields, 7 per cent natural meadows, 7 per cent perennial plants, and the remaining area is occupied by artificially cultivated pastures. Of the total area of arable land 1 955 413 hectares are used for forage production: 47 per cent for fresh forages and 53 per cent for corn forages. Apart from all that, there are 2 035 000 hectares of uncultivated, natural pastures, mainly located in semimountainous and mountainous districts. The usage of these grasslands is extensive and the amount of forages cropped is limited. Basically these areas are intended for free pasture sheep and cattle breeding.

The artificial pastures are owned by state farms and by some research units. The main activity related to grassland areas is performed by the Institute of Mountain Agriculture and Animal Science near the town of Troyan. The whole research and development work for grassland maintenance and farming is concentrated there.

Cattle are predominantly tied, without using free pastures. As an exception are some beef and indigenous farms. Grassland farming is more typical for sheep and goat breeding. The rest of species and mostly fowl and pigs are concentrated in big breeding units close to the larger cities. 59 per cent of the pigs and 40 per cent of the fowl are bred in such farms.

3.0 STRUCTURE AND NUMBERS OF LIVESTOCK

Data on livestock numbers by species and their varying during the recent 5 - 6 years are presented in Table 1. The major decline in livestock numbers during the latter 2 years is due to the ongoing process of land restitution and reorganization. For instance the decline in cows is about 22 per cent, whereas their number in the private sector increased from 25 to 52 per cent at the end of 1992. The tendency in other farm animals is similar.

4.0 GENETIC RESOURCES OF LIVESTOCK

The major part of the local breeds are concentrated in state-owned farms and experimental research stations. The National Service for Selection and Reproduction in Animal Breeding (NSSRAB), supervised by the Ministry of Agriculture has undertaken their preservation and development. This state unit has branches in all major regions of the country. It includes é stations for artificial insemination, located in Sofia, Sliven, Varna, Veliko Tumovo, Shoumen and Pleven.

5.0INDIGENOUS CATTLE BREEDS

5.1 Grey bkar and Rhodope Short-Horned are of interest among cattle breeds. The Grey Stepland is an indigenous cattle breed, but spread in the neighbour Balkan countries as well. The two breeds discussed are attractive for some unique genotypes discovered by the research workers.

5.2 Rhodope Short-Horned breed is the smallest one of this species in Europe. These animals descend from craniological type *Bos Tauriis Brachiceros.* However some particular characters approximate it more to peat cattle than to culture brachiceros breeds. This breed represents the last remnants of the pre-historic cattle in Europe along with the Albanian, South-Montenegrian, Ilirian and Georgian *Brachiceros* cattle, originating from Asia.

Its distribution area is in the internal Western, Middle and partly Southern and Eastern Rhodope Mountains. These are forest lands 1800 meters above sea level. The animals are small and their height at withers is about 97 centimeters. The coat colour of this breed varies from light to dark brown, and even some with a black coat can be found. The homs are pale with dark tips, thin, soft and crumply and about 15 centimeters long. The hooves are dark and strong. Body weight varies between 160 and 220 kilograms. New-born calves weigh 14.6 kilograms on average. The milk yield of cows is between 966 and 1133 kilograms with 4.5 to 4.6 per cent fat [34,27]. The animals are not particular about farming and feeding conditions. In summertime they are fed on grasslands, in winter - mostly on hay and forest-leaves forage [35].

The genetic research on transfenin and erythrocytic antigens (Table,2) [6,7] shows that the frequency of transferrin types Tf A and Tf D of this breed are close to that of the *Brown Brachiceros* breeds in Germany and Switzerland. Furthermore, that the presence of the very rare transferrin allele Tf F, is discovered which is not common for any of the European cattle breeds, but is found, though rarely, in some local Asian and African strains. Availability of the Tf F allele allow us to confirm the hypothesis of other researchers [4] about the Asian origin of this breed.

5.3 Grey Iskar is a local cattle breed, kindred to the Grey Stepland breed spread in Europe. The craniological class of animals from this breed is between *Bov T Primigenius and Bos T Brachyceros* which distinguishes it from the Grey Stepland breed [6]. The region of distribution of the Grey Iskar Cattle was by the river valleys of Iskur, Vit, Osam, Skat and Rositsa [35]. At present a limited number of animals of this breed are mainly located near the town of Sevlievo and a few in private farms. The Grey Iskur breed has a grey coat colour with different shades. The muffles and eyelids are black. Homs are U-shaped, pale with black tips. The body is proportionate, legs are strong. Height at withers is about II 5 - 120 centimeters. Body weight is between 3 00 and 350 kilograms. Calves have birth weight about 20 - 22 kilograms. Average milk yield is 1200 1300 litres with 4.1 - 4.2 per cent fat while in herds with better farming conditions milk yields reach 1947 - 2648.9 fitres [39,24,35]. The length of the lactation period is 256 - 282 days. Animals of this breed resist unfavourable climatic conditions and diseases.

Local Indigenous Cattle, Pig, and Buffalo Breeds

TABLE 2:
A llele Frequency In Cattle

GREYISKAR			
Albumin (n— 1 84)	Makaveev 1980:	Alb A	0.636
		Alb B	0.364
Haemoglobin (n—275)	“ 1970:	Hb A	0.984
		Hb B	0.016
Haemoglobin (n= 1 89)	“ 1983	1-fb A	—
		HbB	0.071
Alkaline			
Phosphate (n— 1 90)	“ 1980:	AKPF	0.161
		AKp S	0.818
		AKPD	0.621
Transferrin (n—215)	“ 1965	Tf A	0.404
		Tf D	0.448
		Tf G	0.146
Transferrin (n=373)	“ 1970	Tf A	0.417
		Tf D	0.458
		TfE	0.215
		TfF	0.010
RHODOPE SHORT HORNED			
Transferrin (n=424)	Makaveev 1966:	Tf A	0.230
		Tf D	0.710
		TfE	0.046
		TfF	0.020

Grey Cattle

TABLE 3:
Numbers of Indigetious Cattle Breeds by January 1993

Name of breed	Region of distribution	Number	Ownership
1.Grey Iskar	Dragana, Sevlievo	75	Private Sector
	Troyan	6	State sector
	Shoumen	30	” “
	Chiflika	20	” “
	Total Number	131	
2.Grey	Groudovo	30	State sector
	Stoudena, Svilengrad	50	” “
	Ustrem	100	” “
	Lovech region	50	Private sector
	Total number	230	
3.Rhodope Short Horned	Hamzovo, Smolyan	80	State Sector
	Smolyan region	70	Private Sector
	Total number	150	
Total Number of Indigenous Cattle		511	

The Grey Iskar breed has been an object for genetic research in terms of different blood serum components: albumins, transferring, haemoglobins, amylase, etc. Some of the more interesting results are presented in Table 2. The frequency of haemoglobin atteles in this breed differs significantly from the widespread European cultivated breeds by very low values of Hb B allele frequency [9, 36]. The presence of the Akp D allele is rare, thus its higher frequency invokes definite interest among geneticists. Analysing the obtained results, it is worth noticing that just as in Rhodope Short-Horned cattle breed the transferrin allele Tf F is found in Grey Iskur breed. These investigations prove the unique genetic status of the breed compared to the rest of the European cattle breeds.

6.0 INDIGENOUS SHEEP BREEDS

By numbers and diversity the local indigenous sheep breeds and strains in Bulgaria significantly exceed other farm animal species (Table 4). By contrast with cattle, sheep breeds have domains of distribution in different districts of the country - in lowlands, semi-mountainous and mountainous regions. Some of these breeds (Pleven Black-Face, Sakarska), although valuable as a specific genetic resource, will not be described in detail, since they are not threatened with extinction.

6.1 INDIGENOUS SHEEP BRTTDS IN LOWLANDS AND MMI-MOUNTAINOUS ITRUS

6.1.1 The **Karnobatska** sheep breed is a local strain of the Red-Brown sheep bred in Eastern Bulgaria for ages. It is supposed that the origin of this breed has much in common with Tzigay sheep and Asia Minor sheep breeds [33]. At present there are 650 Karnobatska ewes bred in a state-owned farm.

The animals of this breed are small and compact with a well-built body. Rams have heavy whirled homs while ewes are polled. Their fleece colour is mostly red and brown and very rarely pale. Their height is 50 - 55 centimeters, length - about 60 centimeters. Ewes'body weight is 31 kilograms on average, rams' - 3 8 - 40 kilograms. The body weight of new-born lambs is about 3 kilograms. Kamobatska is a dual-purpose breed with equal emphasis on meat and wool. The meat has good eating qualities, since fattening is only from free grazing. Fleece weight is about 2.4 kilograms exceeding other indigenous sheep breeds in the country. Staple length is 18 centimeters. Average milk yield per ewe vafies between 40 and 50 litres for 150 days of lactation. Milk fat is 8.4 to 8.97 per cent, casein - 3.98 per cent, lactose - 5.47 per cent. The investigations of haemoglobin alleles showed that animals of this breed have the very rare allele Hb A with frequency of 0.07 [9].

6.1.2 **Copper-Red Shoumen** breed is distributed mainly in the North-Eastern part of Bulgariain regions with moderate continental climatic conditions from 0 to 800 meters above sea level. Representatives of this breed are medium-to-large with average body weight of 43 - 45 kilograms, compact body with height of 59 centimeters and length of 64 centimeters [3,3 1]. Fleece colour is rusty-red, while one can find individuals with black fleeces. Ewes are polled, rams have twisted horns. They usually have well covered body and legs free of wool. Twining rate is about 25 - 30 per cent. The milk yield per lactation period is 48 litres on average with 7.32 per cent fat. Wool production per ewe is about 2.6 kilograms [16]. The results of polymorphic analyses of blood serum proteins are shown in Table 5 [12,13]. The presence of some rare alleles such as Tf G, Alb F, Alb S, Alb W is found, compared to the available allele pool on the Balkans.

6.1.3 The **Starozagorvka** breed is the most typical among the indigenous sheep bred in

Local Indigenous Sheep Breeds

Bulgarian lowlands. The regions of distribution are valleys around the city of Stara Zagora, peculiar of moderate continental climatic conditions. The breed is thought to have developed from crossing Tzigay and Zackel. The animals are large and body weight of mature ewes is up to 60 - 70 kilograms. Weaning weight of lambs is 4.3 kilograms. Height is 64 - 65 centimeters, length - about 70 centimeters. The fleece colour is white. Sheep of this breed have an elongated head, sagging ears, long neck and levelled back. Face, belly and legs are free of wool [3 1]. Milk yield is 165 litres with 6.09 per cent fat and 5.92 per cent proteins [2]. Wool production is about 3.7 kilograms [3 1]. Owing to its high productivity and good adaptability to local conditions the Starozagorska breed is used as a terminal for improving crosses with cultivated sheep breeds. The implemented genetic research [221 shows presence of the rare haemoglobin allele Hb A at high frequency of 0.470.

6.1.4 The *Matishka* breed is distributed mainly in the private farms by the valley of river Maritza near the cities of Plovdiv and Pazardjik. 350 individuals of this breed are registered. Animals are multi-purpose with emphasis on meat, wool and milk. Average milk yield per lactation is 120 litres. They have semi-coarse, white and levelled lustrous wool. Average fleece weight is about 2.4 - 2.8 kilograms. Sheep of this breed are large, with long legs, light shouldered and long body, light bone system and strong hooves. Rams and ewes are polled. Ears are large and sagging. Their height is about 65 centimeters, body weight - 40 kilograms. Twining rate varies between 16 and 30 per cent [37,311.

6.1.5 The *Svishtoiska* breed is based mainly on private farms located in the lowlands between the rivers Danube, Yantra and Osam. The moderate continental climate is typical for these regions. According to some research work (30) this breed is an intermediate strain between Tzigay and Zackel breeds. The Svishtovska sheep is one of the largest indigenous breeds in Bulgaria. Animals are 68 centimeters high, and of 70 centimeters body length. Body weight is 42 - 44 kilograms. The body is well-covered with white wool. Very often face, poll, ears and legs are black or spotted. The animals have strong muscular body constitution and are resistant to hard climatic and feeding conditions. Milk yield is comparatively high: 90 - 1 00 litres with 8.2 per cent fat. Fleece weight is up to 2.7 kilograms. Ewes have early maturity and lambs rapid weight gain.

6.1.6 The *Dabenska* sheep breed is spread throughout the lands around the town of Karlovo. At present this breed numbers 370, bred in a state-owned farm. The animals are large, 65 - 67 centimeters high and 68 - 70 centimeters long. Body weight is 40 kilograms [20] and the body is well-covered with wool. Typical for this sheep is the long tail. Ewes have late maturity and slow weight gain of lambs. Wool is a semi-coarse type, well levelled. Fleece weight is 2.5 kilograms. Milk yield is high - 94 litres [201. Analyses of polymorphic systems are presented in Table 5 [23, 101.

6.1.7 The numbers of *Breznishka* sheep is about 500, bred in some private farms near the towns Breznik, Radontir and Tran. Animals are medium-to-large with black spots around the eyes and nose. Legs are white, black or spotted and the tail is long. Ewes are polled, while rams are sometimes horned. Body weight is on average 40 kilograms, height is 60 centimeters. Milk yield of ewes is about 110 - 150 litres. Fleece weight is 2.0 - 2.6 kilograms with semi-coarse wool. Results on blood polymorphic analyses are shown in Table 5 [1].

6.1.8 **Kottenska** sheep breed is located in the semi-mountainous regions of Eastern Stara Planina. Animals are medium-to-large with strong body constitution. The body is well-covered with wool, which is relatively short but well levelled and softer than in mountainous sheep breeds. Wool production is 2.3 - 3. 0 kilograms. Milk yield is low: 40 litres per lactation. Individuals of this breed have very good adaptive capability. The Kotlenska breed differs from other sheep breeds located on the BAm Peninsula by the frequency of some afleles of the transferrin and albumin polymorphic systems [II, 13]. This breed is.a carrier of some very rare alleles : the albumin Alb T and transferrin Tf C.

Table 4: *Numbers of Indigenous Sheep Breeds by January 1993*

Name of breed	Region of distribution	Number	Ownership
1. Pleven Black-Face	Pleven	10.300	State Sector
	Pleven	6.000	Private Sector
	Dobrich	800	State Sector
	Rousse	700	State Sector
	Sliven	500	State Sector
	Stara-Zagora	500	State Sector
	Vratsa	9.000	State Sector
		27.800	
2. Karakachanska	Lovetch	450	State Sector
	Smolyan	200	Private Sector
	Sofia	200	State Sector
	Shoumen	140	State Sector
		990	
3. Starazagorska	Stara Zagora	1.200	State Sector
4. Sakarska	Stara Zagora, Haskovo	2.400	State Sector
5. Kotlenska	Sliven	680	Private Sector
	Kotel	300	Private Sector
		980	
6. Replyanska	Vidin	1.300	State Sector
	Montana	1.600	Private Sector
		2.900	
7. Copper-Red Shoumen	Shoumen	430	Private Sector
8. Breznishka	Breznik	490	Private Sector
9. Marishka	Plovdiv	350	Private Sector
10. Svishtovska	Svishtov	240	Private Sector
	Pleven	200	
		440	
11. Karnobatska	Karnobat	650	State Sector
12. Strandjanska	Sliven	750	State Sector
13. Dabenska	Plovdiv	370	State Sector
14. Tetevenska	Teteven	450	State Sector
15. Staropaninska	Pleven	800	Private Sector
	Sofia	600	Private Sector
		1.400	
16. Srednogorska	Pirdop, Koprivshtitsa	920	Private Sector
Total Number of Indigenous Sheep		**42.680**	

6.2 INDIGENOUS SHEEP BREEDS IN MONTAINOUS AREAS

6.2.1 The ***Strandjanska*** sheep breed is spread throughout the highlands of Strandja mountain. Animals are very well adapted to the local conditions and are resistant to the piroplasmosis disease compared to the other breeds in the region. Individuals are one of the smallest in this country having body weight of about 30 kilograms. Height is 50 - 54 centimeters. Lambing weight is 3.0 3.5 kilograms. Twining rate is very low. The wool is coarse and fleece weight is hardly 2.1 kilograms [38].

Purebred animals are raised in state farms in the Sliven region. Often the valuable genetic resources of the Strandjanska breed are used in crossing to other.sheep breeds in the region aiming to improve their adaptability and endurance.

6.2.2 The **Srednogorska** sheep breed is raised by the private farmers on the slopes of the Sredna Gora and Stara Planina mountains near the town of Pirdop. This is a small sheep breed with body weight 3 5 - 38 kilograms. Body height is 60 - 65 -centimeters, and body length - 59 - 62 centimeters. Animals have a compact, well-built bod . Ewes are polled, rams have nice whirled horns. Lambing weight is about 3 kilograms. Ov ‘ er 70 per cent of the population have pale wool containing some red pigmented fibres and kemp. Usually the face, ears and legs. are black. Individuals with white red spotted wool are rarely found. Wool is mild and fine compared to other indigenous breeds but with very low fleece weight - 1.3 kilograms. Milk yield of ewes is 45 - 47 litres with 8.09 per cent fat. Fertility is low - about 90 - 100 per cent although ewes have unusual matemal abilities [3 7, 3 1].

6.2.3 The *Replyanska* sheep breed is a typical representative of the coarse wool breeds. Distributed is in the Western part of the Stara Planina mountains. The Replyanska breed is relatively small with a compact vigorous body. Extremely tenacious animals, they are very well adapted to mountainous farming and feeding conditions. Body weight is 34 kilograms on average. Height is 58 centimeters, length - about 65 centimeters. Over 95 per cent of the animals have white fleece. The whole body is well-c,overed by wool, including belly and legs. The wool is coarse of different qualities. Fleece weight is about 2.0 - 2.2 kilograms. Milk yield is 90 - 100 litres per lactation. Results of analyses carried out on poiymorphic erythrocyte enzyme and protein systems are shown in Table 6 [1].

6.2.4 The ***Karakachanska*** sheep breed is spread throughout mountain areas in Bulgaria. The number of purebred individuals of the indigenous Karakachanska sheep breed is very small. In different parts of the country there are larger numbers of crosses with other breeds. In the past the breed was one of the most widespread on the Balkans.

Animals are small, vigorous, strong-boned with short legs, lively and resistant to unfavourable climatic and feeding conditions, and diseases. Hooves are hard, rams have long, heavy whirled homs. The head profile is bowed. Face, ears, legs and nose are black. Most of the population has pigmented wool - grey-to-black, sometimes brown. Wool is predominantly coarse. Fleece weight is 1.5 - 2.5 kilograms. Body weight of ewes is 25 - 30 Hograrns, of rams - 40 - 45 kilograms. Body height of animals is about 57 centimeters. Body length is 62 - 69 centimeters. Belly, legs, poll and face are covered with wool. Milk yield is 40 - 55 litres with 6.5 - 8.0 fat percentage. The allele’ frequency of some polymorphic systems of the Karakachanska sheep breed are presented in Table 6 [1, 8].

7.0 INDIGENOUS PIG BREEDS

7.l. The **Eastern-Balkan (Iztochno-Balkanska)** pig breed is located in the 'mountainous areas of Eastern Bulg aria. It belongs to the group of small European primitive pig breeds with short prick ears. This local breed originated from the domesticated European pig *(Siis Skrofa Domestica).* Obviously at the later levels of its development this breed was also developed under the influence of Asian pig breeds *(Sus Skrofa Palustris Rutt).* The short legs and levelled back of the individuals [32] are a proof of this hypothesis.

These pigs are raised in herds almost annually in the forests. The basic food are pannages. Animals practically do not suffer from diseases and can reach 15 - 16 years of age. Anatomically the pigs of this breed are similar to the'wild-boars. The head is very big with an elongated muzzle, having a slightly bowed nose and short strong frontal bones. The profile length of the skull is about 31.5 centimeters, the width of the frontlet is 9.8 centimeters. There are 7 cervical vertebrae, 14 thoracic (with 14 pairs ribs), 5 lumbar, 4 sacral and small knitted caudal vertebrae. Animals are of medium size and at the age of 3 years carcass length is II 0 - 120 centimeters and height is 70 - 80 centimeters. Within the natural environment its body gain reaches the maximal level at the 3rd year of age having 80 - 120 kilograms weight. In a particular cases one can find animals with 180 kilograms body weight. The body is compact, with heavy, strong shoulders, short neck, slightly bowed'up back and skewed rump. The coat is sleek over the whole body, while in a stress situation hard bristles, on the back go up. Ears are short, prick and move easily.

The prevalent coat colour is black (which is dominant), but there are individuals with a spotted coat, and very rarely white coloured. Sows farrow twice per year having 112 days pregnancy. The average litter size is 4 to 7 piglets, but sometimes reaches I 0. Sows have an unusual matemal ability. Duration of suckling period is about 3 months. By meat production capacity pigs of the Eastern Balkan breed defer to pigs of the contemporary cultivated breeds. Slaughter analyses show significant contents of intramuscular fat and low yielding meat carcass 32 per cent. The investigations for stress resistance with Hallotane test (21) showed that hardly 7.2 per cent of the treated group had positive reaction. This gives evidence to claim that the pigs of this breed have extraordinary adaptive abilities. Research on the blood groups antigen composition have shown significant dfferences with other pig breeds. In this breed one can find two very rare blood group antigens, Bb and Lf [5]. Other research work (28,14), confirms that the Eastern Balkan pig differs from other big breeds by the transferrin, amylase, 6-phosphogluconate dehydrogenase and phospho-hexisomerase. A research study [6] discusses the discovery of the phospho-hexisomerase, allele PFU C, on the basis of which the presence of genotype AC - not common with any other pig breed is determined. These results are confirmed in another work [1 5], as in addition it specifies that the unique genotypes of this breed are two: AC and AB. All these investigations prove the hypothesis that the Eastern-Balkah pig breed is unique in terms of genetic variety and is of unconditional interest for preserving as a valuable genetic resource.

Table 5: *Polymorphic Erythrocyte Enzyme and Protein Systems and Allele Frequency*

System	Allele	Allele Frequencies by Breeds			
		Copper-Red Shoumen	Breznishka	Kotlenska	Dabenska
Haemoglobin	Hb A	0.354	0.209	0.149	0.117
	Hb B	0.646	0.791	0.851	0.823
Catalase	Cat F		0.211	0.583	
	Cat S		0.789	0.413	
Diaphorase - 1	Dia 1A		0.546	0.598	
	Dia 1B		0.454	0.402	
Diaphorase - 2	Dia 2A		0.587	0.404	
	Dia 2B		0.413	0.596	
Carbonic Anhydrase	Ca F		0.014	-	
	Ca S		0.986	1.000	
X - Protein	X A		0.258		
	X a		0.742		
	X X	0.285		0.211	
	X x	0.715		0.789	
Arylesterase	EsA+			0.263	
	EsA-			0.737	
Alkaline Phosphatase	Akp B			0.442	
	Akp O			0.558	
Glutathion	GSH H	0.474			
	GSH R	0.526			
Albumin	Alb F	0.010		-	
	Alb S	0.051		-	
	Alb V	0.909		0.848	
	Alb W	0.030		0.130	
	Alb T	-		0.022	
Transferrin	Tf E	-		0.016	0.016
	Tf A	0.091		0.221	0.199
	Tf B	0.212		0.284	0.309
	Tf C	0.551		0.337	0.111
	Tf D	0.010		0.079	0.365
	Tf M	0.015		0.005	-
	Tf G	0.121		0.058	-

Table 6: *Polymorphic Erythrocyte Enzyme and Protein Systems and Allele Frequency*

System	Allele	Allele Frequencies by Breeds		
		Replyanska	Staroplaninska	Karakachanska
Haemoglobin	Hb A	0.400	0.208	0.202
	Hb B	0.600	0.792	0.798
Catalase	Cat F	0.323	0.329	0.360
	Cat S	0.677	0.671	0.640
Acid Phosphatase	Acp A	0.414	0.657	0.548
	Acp B	0.586	0.343	0.452
Diaphorase - 1	Dia 1A	0.786	0.517	0.615
	Dia 1B	0.214	0.483	0.385
Diaphorase - 2	Dia 2A	0.432	0.347	0.245
	Dia 2B	0.568	0.653	0.755
Carbonic Anhydrase	Ca F	0.005	-	0.014
	Ca S	0.995	1.000	0.986
X - Protein	X A	0.390	0.308	0.337
	X a	0.610	0.692	0.663
Arylesterase	EsA+			0.130
	EsA-			0.870
Alkaline Phosphatase	Akp B			0.293
	Akp O			0.707
Glutathion	GSH H			0.709
	GSH R			0.291
Albumin	Alb A			0.020
	Alb B			0.030
	Alb C			0.740
	Alb D			0.210
Transferrin	Tf A			0.200
	Tf B			0.110
	Tf C			0.180
	Tf D			0.460
	Tf E			0.050

8.0 INDIGENOUS LOCAL BUFFALO BREEDS

8.1 The Bulgarian Mediterranean Buffalo is a local breed. Its origin can be related to the Wild Asian Buffalo *(Bubalos Amee).* There are over 23,000 buffaloes, spread throughout the lowlands of southern and northern parts of the country. The present population was developed by crossing the local Mediterranean breed with some breeds imported from the Indian Subcontinent. As a consequence now the number of purebred animals of the local buffalo breed is limited to I or 2 per cent of the whole population. Small herds are bred in some state farms near the town of Shoumen, while larger ones are raised in the private sector, mostly in the northern part of the country.

The Bulgarian local buffalo is a large animal - 570 kilograms body weight, strong bonesystem and well-developed muscularity. Height at withers is about 130 centimeters. The coat is coloured black or brown-black. Horns are long and heavy with grey-black colour. The age of first calving of buffalo heifers is about 36 - 38 months. Pregnancy lasts 315 days [58]. Calving weight is about 34 kilograms. Milk yield is between 1500 and 1700 litres with 7.4 - 7.7 per cent fat [3,19,17]. The lactation period is 263 days.

Investigations on the characteristics of buffalo milk were carried out immediately after the Chernobyl disaster in 1986 - 1987. Compared to the other treated milks (dairy cattle, sheep and goat), the lowest rate of radioactive contamination of 519 Bq/1 was found in buffalo milk. Investigation also showed the lowest content of such radionucleotides as Iodine 13 1, Caesium 137 and Caesium 134 [3].

9.0 CONCLUSION AND POSSIBILITIES FOR PROTECTION AND UTILIZATION OF THE LOCAL INDIGENOUS LIVESTOCK BREEDS IN BULGARIA

In conclusion it is worth emphasizing the large variety of genetically valuable local livestock breeds in Bulgaria. Some of them belong to exclusively rare genotypes and could be of interest in the non-distant future pursuing the crucial objective for the preservation of a larger genetic diversity within different populations of farm animals. A certain way to preserve this precious genetic resource is designing and applying programmes for development and improvement of small populations of farm animals as well as the promotion of gene banks. There are some detached programmes with emphasis on the implementing of deep freezing of semen and embryos. This activity is applied mainly in cattle and buffalo breeding and is in practice for the most part in the Research Institutes where the necessary equipment and experts are available.

The majority of local indigenous animals are under the control of the National Service for Selection and Reproduction in Animal Breeding (NSSRAB). Although predominantly such animals are bred on the state-owned farms, the problems of protection of the local breeds are caused by the situation that some of them are property of private farmers. Their preservation is getting more complicated by the fact that these animals have lower productive abilities than the cultivated breeds, which makes them uncompetitive.

In this sense a reasonable financial support and preferences for the private owners will be indispensable. This necessity is made even more pronounced by the fact that more of this livestock is located in so-called “hard” regions in the mountainous parts of the country.

Thus the preservation of genetic resources of the indigenous local breeds of farm animals will give us a possibility for future utilization of their valuable adaptive abilities for developing animal husbandry in these ecologically clear regions of Bulgaria.

Strandjanska Sheep

East Balkan Pigs

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