



www.turkjans.com

## Conservation of genetic resources in livestock breeding in the Experimental Station of Agriculture – Sredets

Nadejda PALOVA, Dimitrinka KRUSHEVA  
Experimental Station of Agriculture - Sredets 8300, Bulgaria  
nadejda\_palova@abv.bg

### Abstract

Protection and preservation of valuable local breeds is a priority of the Experimental Station of Agriculture - Sredets for implementation of the state policy in the field of breeding, management and conservation of genetic resources. These processes are a function of the Livestock Act, which defines as important tasks management of genetic resources, their use for efficient production of animal products and the conservation of populations of farm animals adapted to different agro-ecological regions of the country.

The East Balkan swine and Bulgarian gray cattle are local breeds, classified by risk status as endangered under the approach of FAO (2007). Both breeds are nuclei and are included in the records of the breeding herds maintained regulated by EASRAB.

In recent years due to aggressive human activity valuable local breeds that are part of the heritage of the country have irrevocably disappeared. Proper management of genetic resources requires compliance with the principles of sustainable development in agriculture and stopping loss of populations of local breeds.

Experimental Station of Agriculture - Sredets works on the ambitious task of contributing to the protection and maintenance of genetic diversity among domestic animals in Bulgaria, by storing and maintaining both valuable rare breeds - Bulgarian gray cattle and East Balkan swine.

**Keywords:** Genetic Resources, East Balkan swine, Bulgarian gray cattle, Strandja, local breeds

### Introduction

As a result of human activity over the past few decades valuable local breeds have disappeared and continue to disappear, others are at the critical minimum of existence. The old breeds of farm animals are part of the heritage of a country. They are adapted to local conditions and are resistant to diseases. Precisely for this reason they are preferred in organic livestock farming, where the use of veterinary-medicinal preparations is excluded. Today organic farming fits not only to the strategy for sustainable development as a global model for the development of agriculture, but it has developed as a response to the need to produce high quality and safe agricultural products, meeting the needs and desires of consumers (Gaidarska and Yovchevska, 2003).

Major trend of pigs and cattle breeding in the world is looking for solutions for the most economical use of natural resources and environmental protection. According to Hadzhieva (2004), the application of environmentally friendly technologies in small farms makes it possible to realize the biological traits of animals, production to be cheaper and competitive. Use of natural resources in mountainous and hilly areas in an

extensive manner of breeding animals is becoming more important, depending on the characteristics of individual regions.

Strandja region covers the southern part of South-Eastern Bulgaria. The climate is determined by the combined effect of the Black Sea, Strandja and Sakar Mountains, in the western part Mediterranean climatic influence penetrates. These specific agro-climatic and soil conditions determine the structure of agricultural crops and animal species in the area. The region of Strandja features an ecological purity, too. Main fodder source of food for animals in this area are natural meadows, pastures and forest areas (Stoeva et al., 2005), the low nutritional value of grass from natural grassland is the reason for extending the fattening period. Pasture fattening system corresponds largely to the trend in the European countries. According to Hinkovski and Stoykov (2001) an important task in livestock breeding is the preservation of indigenous breeds and breeds in all animal species in Bulgaria, organizing the production of environmental goods, storing the biogenocenosis, improving and expanding the production of specific Bulgarian agricultural products having a good domestic and international market.

In the Experiment Station of Agriculture - Sredets the native breeds East Balkan swine and Bulgarian grey cattle are maintained and kept in a clean state. The main purpose of the farm is to provide breeding material.

## **I. General information, phenotypic characteristics and performance indicators**

### **1. East Balkan swine**

This is the only one native breed of swine preserved until now in a pure state and this is due to a number of her advantages - good adaptability to the extreme conditions of the region, strong constitution, a strong herd instinct, great longevity and delicious and quality meat, suitable for production of delicacies. The fact that this breed is grown in ecologically clean regions and uses mostly natural food sources is also significant.

The East Balkan swine was common in the Eastern Balkan Mountains and the Northern slope of Strandja Mountain even 2500 years ago. The breed is a prototype of the Mediterranean peat swine and originates from wild *Sus skrofa skrofa*. The East Balkan swine is formed mainly under the influence of natural selection under very low human intervention (Petrov et al., 1983). She is extremely adaptable to local physical and geographic conditions and she is resistant to diseases. Its reproduction is secure and survivability of offspring - high (Danchev, 1984).

Hlebarov (1922) made the first scientific description of the breed by likening it to the wild boar with a head, which is not very big, and elongated muzzle and slightly broken skull-nose line. It is of medium height with not very long, compressed body, with well-developed front, short neck and croup brought down, roach back, short and strong legs. The entire body except the abdomen is covered with smooth hair, which is long and straight at the back and form a continuous, bristly comb from head to sacrum. The predominant colour of the East Balkan swine is black. Historically, depending on the state in different agro-ecological regions the East Balkan swine is presented by several exterior types differing in body weight and physique (Stoykov et al., 2007). In 2011 Palova and Marchev have performed a phenotypic characterization of swine herds in the Agriculture Experimental Station - Sredets by exterior indicators, body weight and type of physique, according to which they have determined them as pigs with average growth and strong bones without significant variations in the exterior.

She gives birth to 4 to 7 pigs in the litter, in rare cases up to 10 (Palova and Marchev, 2009; Palova, 2013). Under normal grazing with feeding

fattening pigs reach a live weight of 85-89 kg for about 270-300 days (Slanev et al., 1992; Palova, N., 2007). The type of breed is fat. Nakev et al., (2009) have conducted a number of studies on clinic indicators of the East Balkan swine. They confirm the allegation that the fat has a hard, grainy texture and the meat has a high content of intramuscular fat with good technological properties to produce delicacies (Strandja delicacy called Strandjansko dyado, Strandja salted ham, Strandja fillet, Strandja flat sausage, etc.). The quality and fatty acid composition of pig's meat from East Balkan breed according to Marchev et al. (2010) is characterized by a higher content of polyunsaturated fatty acids compared with the cultural breeds and optimal n-6/n-3 ratio, which corresponds to the European standards for healthy eating.

The East Balkan swine is bred in herds. It is grown environmentally friendly using year-round grazing. Growing a fattened pig takes about 10 da forest area and 250 kg fodder (Program Agriculture Experimental Station, 1995). Quality and productivity of pasture determine the success of grassland breeding.

The swine herd in the Agriculture Experimental Station - Sredets amounts to 50 animals. Insemination of sows is made as per preliminary approved occasional plan. Ratio sows: boar is 15 : 1. Gestation lasts 112 - 114 days, receiving up to two farrows per year. Under the right conditions piglets can pasture with their mothers after 20 days of their farrowing. All newborns are numbered with pedigree number to the 21st day by cuttings ears and marking with ear tags, according to veterinary requirements. The breed is characterized by well-developed maternal instinct. The piglets are weaned at about two months when they reach a live weight 8-10 kg. A team of pigs for breeding is established depending on origin, fertility and typicality.

### **2. Bulgarian gray cattle**

Local gray cattle has been derived from crosses of short-horn (*Bos taurus brachycerus*) and longhorn (*Bos taurus primigenius*) cattle. Savov and Totev (1954) have identified several types of gray cattle depending on agro-ecological conditions in each region that differ in body weight, body size and productivity. The most widespread are two breeds - the Iskar and Mesta Grey cattle. In all earlier publications it is called Bulgarian gray cattle (Vladimirov, 1934; Krastev, 1969; Vakarelski, 1974), the authors reflect undoubtedly the unity of genetic heredity of Grey population. Subsequently Venev et al. (1980) have developed a standard for Bulgarian grey cattle as

per eight exterior indicators. The Iskar breed has been characterized by Vladimirov and Kumanov (1953), and the local gray cattle by Ivanov (1977) and Gorinov (1990) as per various biological and economic indicators.

Bulgarian grey cattle are medium-sized, with short and stocky body. The front zone is well-developed, the croup is tapered back, often eaves-like. Cows have medium, elongated head in proportion with the body, which in bulls is relatively short and broad. The eyes are large, black and alive. The ears are normal, moving, and hairy from the inside. The inside of the ear has slightly yellowish and oily skin. Black rhino mirror is surrounded by rare long hair. Horns of cows are bow-like. Their colour is grey-white with a black tip. Bull horns are thicker and shorter, directed sideways and slightly forward.

The back is straight or slightly recessed at the loin. Animals have well-developed withers, strong and properly set limbs with well-developed joints and strong tendons. Hooves are small, black and very strong. The average age of cows under exclusion from breeding is 15-17 years. Economic fertility of Bulgarian grey cattle ranges from 57 to 89% and is directly dependent on the conditions of feeding and breeding. In about 80-85% of cows a natural seasonality of calving is observed - during March, April and May.

The local grey cattle has valuable biological and economic assets like strong and healthy constitution, adaptability to living environment, good productivity due to easy birth and notorious longevity. Animals use their natural resources more fully, are resistant to diseases and adverse living conditions (Gorinov, 2007). Milk production of cows is unsatisfactory and provides mostly the required amount of milk for breeding of offspring until weaning.

The herd of Bulgarian grey cattle breed reared in the Agriculture Experimental Station – Sredets numbers 50 animals. They fully meet the requirements for the formation of an elite breeding unit in the breed. All animals are recorded in the breeding book of the Association for breeding of native-autochthonic breeds in Bulgaria (2005) and form the elite part of the population.

The facilities meet the requirements for proper breeding of the female pig. The herd is intended to become one of the tribal bull breeding herds during the building of breeding structure and development of the breed rotation scheme of brood stock. Assessment of exterior and constitutional peculiarities in the medium of herd limited funds is a way for indirect retention of variability of heredity (Platikanov, 1930). The

establishment of the phenotypic characteristics of the grey cattle population as per main exterior indicators is indispensable in the process of building the genetic structure (Gorinov and Jotov, 2006). According to the authors animals bred in Strandja region highly reliably retreat to the type of the Iskar breed in body height and body mass.

Bases rearing breeds Bulgarian gray cattle and East Balkan swine owned by the Agriculture Experimental Station - Sredets, State owned enterprise are located at the foot of Stranja mountain and surrounded by extensive forests and clean pastures. Consolidation and preservation of the breed in its original form makes it possible to use the natural sources of Strandja. Animals in the Agriculture Experimental Station – Sredets are grown as per in situ method, which literally means "preservation on spot" of genetic resources in natural populations. This unconventional way of growing ensures the maintenance and use of traditional local varieties and breeds. For biodiversity conservation in remote areas where commercial breeds are not relevant this technique has been successfully applied due to particular climatic conditions. This makes new studies possible to develop and implement advanced programs for conservation of genetic resources, and to maintain traditional practices. When building bio consistent or environmentally friendly livestock breeding the efforts are always associated with the preservation of the gene pool of the indigenous breeds. Breeding programs provide ways of managing processes to protect Bulgarian gray cattle breeds and East Balkan swine, as part of the genetic diversity and source of information and genetic reserve for livestock development.

## II. Status and trends

At this time local populations of Grey Cattle and East Balkan swine are in critical condition, according to breeding criteria of FAO. Impaired breeding discipline and the limited number of animals does not allow determining the prevailing heredity and distribution of animals by type. Raising public commitment to animal genetic resources will contribute to the development of adequate policy and the adoption of legislative measures ensuring sustainable management in the future. Over the past few years the efforts of a number of research centres and individual research groups are oriented towards the search for green products safe to human health, alternative to the conventional performed so far production of foodstuffs of plant and animal origin.

Rational use of natural resources is a global trend that can be put into practice by keeping the animals in an extensive manner. Coupled with their

biological requirements this finds expression in environmentally friendly technologies, which, according to Nikolov (2003), fully comply with the specific requirements of the animals and most closely resemble to the natural environment for the type. In some rural areas, these breeds will take a certain place in achieving further social impact, and their breeding will create possibility for livelihood of the population.

In recent years, however, the breeding of the East Balkan swine in the country has experienced certain difficulties. The area of its distribution is quite narrowed due to its contact with wild boar, the return of forests and grasslands to their real owners, and after our joining the EU, the ban on animal vaccination against classical swine fever.

Protection of the East Balkan swine and Bulgarian gray cattle as a national genetic reserve, however, is necessary due to the fact that they have so far insufficiently studied genetic qualities of adaptability to natural environmental conditions. They may therefore prove to be better than the dominant cultural breeds in unexpected changes in the environment and the market. This advantage is fully applicable in case of extinction or depletion of useful genetic variance of existing breeds (Breeding Program, 2007). With their participation highly productive populations can be recovered and implemented after prolonged and targeted selection / Dimov and Velikov, 1984 /. According to Benkov (1975) the East Balkan swine could be the basis for the creation of mini pigs for medical and biological research. Regions where the East Balkan swine is grown can become attractive tourist destinations like the example of tourist hunting of Iberian pig in Spain.

Guidelines presented so far of modern agriculture and economic beneficial signs of the East Balkan swine and Bulgarian grey cattle show the need for a feasibility study by conducting research for production of a larger amount of ecologically clean meat from the breeds throughout the entire chain to obtain products of animal origin safe to human health. Implementation and timely execution of the ARSIS program for breeding and conservation of the East Balkan swine established in the Ministry of Agriculture and Forests with decision № 22/22.06.2006 and breeding program for Bulgarian gray cattle (Gorinov, 2007) is an important step in helping state policy on sustainable development and effective use of genetic resources in the country. For stimulation of preservation and breeding of these valuable rare species it is necessary to include the farmers in the Common agricultural policy for rural development and provide crediting to young farmers through

projects for small and medium businesses. An additional effect in their preservation can be achieved by compensating for losses in the growing of the East Balkan swine compared to conventional breeding of pigs, and the inclusion of the breed in the schemes of veterinary services similar to the wild form.

### III. Regulatory provisions

The national legislation of Bulgaria follows international trends, reflecting European standards in its regulatory framework. In this respect, research strategies in the Agricultural Academy in the field of livestock production is a challenge for the research community in view of creating programs for long-term preservation and development of national gene pool of indigenous breeds. It is a function of harmonization of Bulgarian legislation with the European legislation. The Convention on Biological Diversity in 1996 and the Convention on the Conservation of European wild flora and fauna and natural habitats are overexposed in the Biodiversity Act and the National Plan for the conservation of biodiversity and protected areas. These regulations govern the mandatory measures for the prevention of rare breeds. One of the main activities in the national agricultural and ecological program is related to the protection of agricultural lands with high natural value, preservation and restoration of biodiversity in them, maintaining of low intensity cultivation practices of local breeds. These activities should be structured in line with the habitat of the populations of valuable animals.

The state takes care of the protection and maintenance of genetic diversity among domestic animals in Bulgaria, which are a valuable resource for the selection activity. Furthermore, in order to increase the population of these unique breeds financial incentives are provided for their breeding under Measure 214 "Agricultural and environment payments" from the Program for Rural Development, under section "Conservation of endangered local breeds." The East Balkan swine and Bulgarian grey cattle are such ones; they are included in the list for protection of national Gene fund /Biodiversity Support Program. 1994/.

Under the new zoning (Regulation № 6/20.03.2007, SG/29/2007) of the East Balkan swine, a breeding area has been determined mainly in the mountain and forest regions of Shumen, Varna and Burgas region. It regulates the terms and conditions for the spread of the swine of this breed. In the regional development strategy of Burgas region the conservation of genetic resources and breeding of rare protected species is a priority. The Economic policy of the Regional

Centre for Scientific Applied Service -Sredets complies with these requirements, and for the most part it observes the principles of freedom of behavioural responses of animals.

A particularly up-to-date challenge before our country in the conditions of the European Union is the imposition of European standards in the production of green products, meeting the needs and desires of consumers (Gaidarska, V., Yovchevska, P, 2003.) At this stage the East Balkan swine and Bulgarian grey cattle are very suitable for production of ecologically clean meat in compliance with the requirements of Regulation № 35 on organic production of products of animal origin.

The Regulation is an important part of the preservation of valuable species. Its ascending gradation determine the right direction for the preservation and development of valuable rare breeds, giving a great chance to save that genuine national treasure.

#### References

- Association for breeding local-indigenous breeds in Bulgaria, 2004, Breeding programs, 9-10, Collection.
- Vakarelski Hr., 1974, Ethnography of Bulgaria, Bulgarian Academy of Science, Sofia.
- Venev I., E. Ivanova, T. Bogdanova, and V. Drabohlav, 1980, Handbook of breeding livestock, Zemizdat, Sofia.
- Vladimirov I. and St. Kumanov 1953, Iskar cattle, 320 pages, Zemizdat, Sofia.
- Gaydarska, C. and P. Yovchevska, 2003. Requirements and development of organic farming. Agriculture, 11-12, 24-25.
- Gorinov Y., 1991, research on the biological and economic indicators of local grey cattle and crossbred Hereford breed., 166 pages, Dissertation, Sofia.
- Gorinov, Y., 2007, a breeding program for Bulgarian gray cattle,
- Gorinov, Y. and B. Jotov, 2006, Phenotypic characterization of Bulgarian grey cattle types and exterior, Livestock Science, 4, 20-23.
- Danchev J., 1984, The indigenous primitive breed East Balkan swine in Strandja-Sakar Strandjansko-Sakar collection, Malko Tarnovo.
- Dimov, Y. and Velikov.V., 1984. Attempts to preserve the genetic resources in Bulgaria as per example of East Balkan swine. Genetics and Selection, 4, 306-310.
- Biological Diversity Act, 2002, SG/77.
- Livestock Act, 2000, State Gazette issue 65
- M. Ivanov, 1977, the possibility of using local grey cattle in the meat production field., 210 pages, Dissertation, Stara Zagora.
- Instructions for conducting breeding work in the preservation of local (indigenous) breeds in Bulgaria, 2003, Ministry of Agriculture and Forests, EASRAB, ISBN-945-98887-42-1 Sofia.
- Krastev, M., 1969, History of the Union of cattle breeding companies in Bulgaria, p.8, Zemizdat Sofia.
- Marchev, J., R. Nedeva, G. Nakev, S. Ivanova - Peneva, E. Gineva and N. Palova, 2010, Quality and fatty acid composition of meat of pigs from East Balkan breed reared in different habitats, Livestock Breeding Sciences, 5, 48-56.
- Nakev, Zh., N. Palova and R. Nedeva, 2009, Study on slaughter qualities of swine of East Balkan breed fed with mixtures with different levels of protein and amino acids, Ecology and Future, 2, 34-38.
- Regulation № 35 of 30.08.2001 on organic production of livestock, livestock products and foodstuffs of animal origin and markings on them, SG/80, 2001.
- Regulation № 6 of 20.03.2007 on the terms and conditions for pasture breeding of pigs from East Balkan breed and its crosses, SG No 29, 13-16.
- Nikolov V, 2003. Bases of organic farming. Livestock, 237-383.
- Palova, N. and Y. Marchev, 2011. Phenotypic characteristics of pigs from East Balkan breed the herd of Agricultural Experimental Station-Sredets, Journal of mountain agriculture on the Balkans, 4, 72-78
- Palova, N., 2007, Dissertation.
- Petrov, J., Tenev, S. and Koynarski, V., 1983. Microstructure on growth and skeletal muscle in pigs from Duroc breed, fattened to different body weight. Livestock Science, 5, 86.
- Platikanov N., 1930, Exterior and constitutional studies on local gray cows, Sofia.
- \*\*\* Program for development and promotion of livestock in Strandja-Sakar region and Eastern Balkan Mountains, 1995, Agricultural Experimental Station-Sredets.
- Savov T., S. and D. Totev, 1954, Breed distribution of cattle, sheep and pigs in Bulgaria. Bulgarian Academy of Science, Sofia, 27-33.
- Slanev, St., A. Stoikov, S. Stefanova, V. Bialkov and P. Marinova, 1992, Evaluation of the most important fattening and slaughter qualities of pigs from East Balkan breed to produce ecologically clean meat, International

- Symposium "Ecology 92", 24 to 26 September, Burgas, 344-348.
- Stoeva, K, V. Lingorski and Y. Kozhuharov, 2005. Natural grassland and pastures in Strandzha-bases for organic fodder production. BNC, vol.II, 574-577.
- Stoykov, A., Y.Marchev, S.Ivanova and K.Kulev, 2006, Breeding program for preservation and use of East Balkan swine, Shumen.
- Stoykov, A., S. Ivanova-Peneva, Y.Marchev, P.Dragoev, E.Gineva and K.Kulev, 2007. Preservation, sustainable development and effective use of the East Balkan swine, Livestock Science, 5, 73-77.
- Hadzhieva, V., 2004. Status and problems of pig farming in Bulgaria. Livestock Science, 1, 71-74.
- Hinkovski, T. and A. Stoykov, 2001, Guidelines for Livestock research in Bulgaria during the accession period, Livestock Science, 5, 63-65.
- Hlebarov, D, 1922. Sofia, East Balkan swine.
- Biodiversity Support Program. 1994. Conserving Biological Diversity in Bulgaria: The National Biological Diversity Conservation Strategy 7. Washington, DC: Biodiversity Support Program c / o World Wildlife Fund.
- CEC (Commission of the European Communities), 1999
- Palova, N., 2013, Investigation of some reproductive parameters in primiparous sows from the East Balkan breed after farrowing during the spring and winter season, Journal of Livestock Science Advances, 3 (8), 416-420.
- Palova, N. and Y. Marchev, 2009, Reproduction of East Balkan sows from the herd of the Experimental Station of Agriculture - Sredets. Slovak J. Anim. Sci., 42, 1, 1-5.
- WORLD WATCH LIST for domestic animal diversity, 2003, 3rd edition, FAO, Rome.