Professional paper
10.7251/AGRENG2101127M
UDC 636.1/.5(497.6)

AUTOCHTHONOUS BREEDS OF DOMESTIC ANIMALS AND CONSERVATION MEASURES

Zoran MALETIC

Ministry of Agriculture, Forestry and Water Management, Department of Agriculture, Food Industry and Rural Development
*Corresponding author: maleticz @gmail.com

ABSTRACT

Recently, highly productive breeds of various species of domestic animals have been used in livestock production, which has resulted in the destruction of indigenous breeds of domestic animals around the world, even in our area. This is the first reason why indigenous races and strains have been endangered. Another reason is that domestic, indigenous breeds were crossed with specialized breeds, which were imported, and in that way their genetic diversity was negatively affected. Resistance is lost, adaptation to the conditions in which they were created, the ability to survive in nature. Indigenous breeds of different species of domestic animals, which are recognized in the Republic of Srpska (B&H) are gatačko cattle and buša (cattle), Vlašić pramenka, Podveleška pramenka, Kupres pramenka (sheep), domestic Balkan horned goat (goats), Bosnian mountain horse (horses), mangulica (pigs) and pogrmuša hen or živičarka hen (poultry). By acceding to international conventions, B&H /Republic of Srpska has committed itself to establishing a system of measures that will enable the conservation of biological diversity and the protection of indigenous and endangered breeds of domestic animals. The choice of a strategy for the conservation of diversity, the establishment of an adequate conservation scheme, and the implementation of a conservation strategy are some of the key elements of any process for the conservation of genetic diversity. Preservation of autochthonous and protected breeds of domestic animals is possible through preservation in the original environment (in situ) and preservation outside the original environment (ex situ). There is a possibility of combining these models of conservation of animal genetic resources.

Keywords: *autochthonous races, in situ, ex situ, gene bank.*

INTRODUCTION

New times have brought the modernization of production in agriculture, which has affected the increase in productivity in all its areas, and therefore in animal and livestock production. Certainly, such production uses highly productive breeds of different species of domestic animals, which has resulted in the destruction of indigenous breeds of domestic animals around the world, even in our area. This is

the first reason why indigenous, traditional breeds and strains have been endangered. Another reason is that domestic, indigenous breeds were crossed with specialized breeds, which were imported, and in that way their genetic diversity was negatively affected. Resistance is lost, adaptation to the conditions in which they were created, the ability to survive in nature. All of the above are basic prerequisites for extensive cultivation (Taberlet et al., 2008). That is why there is a need to preserve animal genetic resources, which affect various aspects of a country (cultural, sociological, social, research, environmental).

The values of indigenous breeds of domestic animals are indisputable. These races influence the revitalization of rural areas through the creation of additional income for the local population. Then, they are suitable for the use and maintenance of pasture areas, prevention of devastation and succession of habitats (biotopes). When it comes to organic livestock production and the development of recognizable traditional brands, the inclusion of indigenous breeds is indispensable, a priority. They are an integral part of the ecosystem on which many other plant and animal species depend.

Preservation of indigenous breeds of domestic animals is possible through two models. The first model is preservation in the original environment (in situ) and preservation outside the original environment (ex situ). There is a possibility of combining these models of conservation of abnormal genetic resources. In order to approach the choice of models for the conservation of genetic resources, the factors on which these models depend must be respected.

The aim of this paper is, based on literature data, to point out the importance and role of genetic resources in animal husbandry, to present the autochthonous breeds of different species of domestic animals in the Republic of Srpska and to point out the measures for their preservation.

MATERIALS AND METHODS

The research was conducted in two parts. In the first part of the research, we will look at the importance and role of genetic resources in animal husbandry, then at the analysis of autochthonous breeds of different species of domestic animals in the Republic of Srpska and their degree of endangerment. The Law on Animal Husbandry of the Republic of Srpska from 2015 lists the recognized breeds and strains of different species of domestic animals, which will be described in the paper. In the second part of the research, we will point out the most important measures for the conservation of animal genetic resources.

RESULTS AND DISCUSSION

The importance and role of genetic resources in livestock

There are several reasons why the conservation and sustainable use of genetic resources in animal husbandry is necessary. In this paper, we will list some of the most important. The first of them is the socio-economic reason. The use of indigenous breeds and strains in livestock production meets the needs of the human

population in food as well as the needs of the industry for raw materials. In addition, in underdeveloped areas, livestock production is often one of the main sources of income and is the main driver of economic development in rural areas. The second reason is ecological, because the importance of genetic resources in animal husbandry is reflected in their role in the process of preserving the environment. The third reason is cultural-historical because indigenous races are part of the cultural and historical heritage. The importance of genetic resources in animal husbandry can be observed from both scientific and research aspects, which are reflected in specific sets of genes that usually possess indigenous breeds (disease resistance, longevity, acclimatization) and which are invaluable in the process of creating new and maintaining existing highly productive breeds, creating new breeding programs. Certainly one of the reasons that indicate the mentioned importance is the international obligation to preserve biodiversity. By acceding to international conventions, B&H /Republic of Srpska has committed itself to establishing a system of measures that will enable the conservation of biological diversity and the protection of indigenous and endangered breeds of domestic animals (Nikitovic et al., 2015).

Autochthonous races and strains in Republika Srpska (BiH)

The original and protected, i.e. autochthonous breeds of different species of domestic animals, which are recognized in the Republika Srpska (B&H) are the following: gatačko cattle and buša (cattle), Vlašić pramenka, Podveleška pramenka, Kupres pramenka (sheep), domestic Balkan horned goats), Bosnian mountain horse (horses), mangulica (pigs) and pogrmuša hen or živičarka hen (poultry), (Law on Animal Husbandry, Official Gazette of RS, No. 44/15, Article 40, paragraph 2).

Buša belongs to the group of short-horned cattle (*Bos brachyeros europeus*). Buša and its crossbreeds are located in undeveloped hilly, mountainous and karst areas south of the Sava and Danube. It was used for work, in the production of milk and meat. According to the appearance of the bush has a relatively small body, height at the withers up to 110 cm. Female heads have a body weight of 180 to 250 kg, and male heads about 300 kg. It belongs to the group of monochromatic cattle, and the shades range from gray, brown, red to black with a stripe on the back that contrasts with the base color. Buša is characterized by a dark pigmented mucous membrane with a light rim of hair around it - deer muzzle. The horns and hooves are always dark in color. Buša is late. Lactation lasts 9 months and gives about 1000 liters. In improved feeding conditions, it gives up to 3000 liters of milk (Adilović et al., 2014). It is characterized by good fertility and disease resistance. Other breeds, such as gatačko cattle, were created by breeding bushes and land reclamation work to improve production characteristics.

Gatačko cattle was created by breeding bushes with Viptal and Oberintal cattle. It is a short-legged beef, short-headed with a wide and uneven forehead. The muzzle is darkly pigmented with a light edge. The horns are thin, facing forward. The basic color is gray, it can also be brown, with dark shading on certain parts of the body.

Female necks weigh about 400 kg and males about 750 kg. Gatačko beef is most valued for its milk production, which goes up to 2,500 liters (Katica et al., 2004). According to literature sources, in this region, one breed of oats is autochthonous, ***pramenka***, with several strains: Vlašićki, Podveleški and Kupreški. Strains differ more in production, body weight, and wool quality than in morphological and physiological traits.

Vlašić pramenka is the most numerous strain of pramenka in BiH and is most represented in the vicinity of the mountain Vlašić. The body weight of females is about 35 kg, and males up to 60 kg. It gives up to 2.5kg of unwashed wool and 70 liters of milk plus 30 which sucks the lamb. It is known for the production of "Vlašić cheese" (Katica et al., 2004).

Podveleška pramenka is grown in the areas of Gacko and Nevesinje (Katica et al., 2004). The body weight of females is about 30 kg, and males up to 40 kg. They give up to 45 liters of milk and about 1 kg of wool per year.

Kupreška pramenka has lower wool production, up to 2 kg per year. The weight of sheep is from 35 to 40 kg, and rams up to 65 kg. It gives about 80 liters of milk. The domestic Balkan horned goat belongs to the group of Balkan primitives. The body is overgrown with a thick crest, and the color varies from black and white to black. Its head is long, its horns are double-edged and have the shape of a saber. There are also hornless individuals. The body weight of females is from 30 to 40 kg, and males up to 40 to 60 kg. Goats are kept for the production of milk, meat and fertilizers, and yet milk is their most important product. The average annual milk yield of our domestic goat is up to 130 liters (Adilović et al., 2014).

The Bosnian mountain horse originates from the wild horses tarpan and prževalski. By applying land reclamation, this horse was improved to a certain extent, but it still remained a pack, primitive domestic breed of horse with certain exterior features of tarpan, Przewalski and Arabian horse. Selection, breeding work on the domestic mountain horse began in the time of the former Yugoslavia (1908), in Bosnia and Herzegovina. Two male lines were created in the Bosnian hills: Miško and Barut, and eleven mares (from I to XI). The main breeding goal was to create as strong, bony and durable a pack horse as possible (Telalbašić and Žiga, 2008). Based on its appearance, this race has a more or less pronounced square body format. The height of the ridge is between 120 and 140 cm. The weight of adult heads ranges from 300 to 350 kg. The step is spacious, the gait is very careful and safe, especially when moving on the so-called. “Goat trails,” similar to donkeys. The head bears the characteristic of the original forms inherited from the tarpan, the Przewalski and the Arabian horse. At the same time, it is easy to notice the Przewalski type when the head is more massive, with a more convex profile, narrow forehead, narrowed muzzle, and on the other hand the Arab influence on the finer forms of the head, while the tarpan influence on the appearance of the head was much smaller. The neck is moderately long, well set. The ridge is pronounced, high and long, the back is medium long, the lumbar part is short, and the joint is firm and short, and gives the horse a compact appearance (shape), which is the basic characteristic of pack horses. The croup is well developed,

slightly bent and square in shape. With good nutrition and care, the croup is round, round and fallen, and the root of the tail is usually low planted. The legs are relatively high (60% of the height at the withers), the shins strong, the hooves small but firm. Sometimes the hind limbs have a cow or saber stance. These foot positions are not considered a defect because it is a consequence of adaptation to movement on hilly - mountainous terrains. The most common hair color is dorata, then green, crow, tool, kulasa. Along the spinal column provides the so-called. eel lines, and on the front extremities a transverse stripe of darker or lighter coat color. The domestic mountain horse belongs to the primitive, late-race breeds. Its use value is significant considering that no other breed of horse is able to perform work in conditions where it is widespread.

Mangulica originated from the forest. There are 2 strains of mangulica: - white strain that was selected in Hungary and lasa strain that was selected in Srem. The white strain of mangulica predominates in size. It is a breed of moderately long and broad head that is large in relation to the body, has a slightly curved profile with a strong snout that is always pigmented. The ears are lowered, the neck is short, of medium length, the torso is short, the back line is carp, the croup is lowered shoulders and thighs are moderately pronounced, the abdomen is well defined and rounded, the legs are of medium length and the hooves are tightly pigmented, the abdomen is 10 tits.

The pogrmuša hen or živičarka hen can be found in the most remote mountainous areas, where it lives in an almost semi-wild state. According to its appearance, it is a small hen that can fly very well. The body weight of chickens is about 1 kg, and roosters about 1.5 kg. The color of the bush is black or partridge, and it can be multicolored. It is raised for its meat and eggs. It is late ripening, laying capacity of up to 80 eggs per year. The instinct for laying eggs is well developed. The breed is resistant and resistant to poorer conditions of nutrition, care and accommodation. It can be crossed with noble breeds of chickens, in order to improve their resistance.

Models of preservation of autochthonous breeds of domestic animals

The selection of a diversity conservation strategy, the establishment of an adequate conservation scheme, and the implementation of a conservation strategy are some of the key elements of any process for the conservation of genetic diversity (FAO, 2007). Republika Srpska does not have a gene bank for animal genetic resources. The preconditions for opening a gene bank to which genetic material will be deposited are not complete, so it is necessary to apply for projects related to this topic. Preservation of autochthonous and protected breeds of domestic animals is possible through preservation in the original environment (in situ) and preservation outside the original environment (ex situ). There is a possibility of combining these models of conservation of abnormal genetic resources.

In order to approach the choice of models for the conservation of genetic resources, the factors on which these models depend must be respected. Some of them are production (economic) competitiveness, population size (real, effective), degree of vulnerability (population trend, genetic structure, reproductive efficiency),

geographical distribution (dispersion) of the population, interest (sensibility) of the local community and the general public for protection.

In situ conservation model is the preservation of indigenous breeds by active cultivation in their original cultivation areas, which is the primary form of protection. In their original breeding area, the endangered breed will successfully maintain viability and exhibit production characteristics. In this model, the breeding program is envisaged and implemented, monitoring of merging and productivity is envisaged. In the case of small breeds, one of the major challenges will be to avoid or minimize inbreeding. Precise record keeping and strict mating control, which has already been mentioned, will especially contribute to this. The advantage of the in situ model lies in low investments, but also productivity in the environment in which the heads are located, and income can be generated on the farm. Precisely because of that, that is, because of maintaining contact with the environment, the term on farm method of preservation is introduced. This method of conservation can develop in several directions: control of the size, distribution and structure of the race; genetic consolidation and breed advancement; optimization of production systems and technologies suitable for indigenous breeds; animating the public and promoting race. In addition to the stated advantages of the in situ conservation model, which refers to the possibility of using the breed for food production, there is also tourism, education, preservation of traditional knowledge. It should be noted that this is a model of preserving live animals that does not require the inclusion of expensive materials, equipment, etc. On the other hand, the disadvantages of this model of preservation of indigenous breeds and strains are that you need to have land, labor, then there is the danger of losing population, part of the population or the entire population, due to disease or other disasters. In situ conservation programs implemented in domestic animal populations have been shown to be more or less successful, but need to be upgraded to avoid losing genetic variability (Matković et al., 2008). In conclusion, the in situ conservation model is more difficult to preserve genetic material, compared to ex situ conservation methods. The sustainability of this program lies in the creation of a breeding program on the farm, ie production on the farm, which usually refers to a traditional product.

The ex situ model of conservation of indigenous races is considered an important tool to avoid irreparable loss of races or genes. This model represents an approach to the protection of indigenous races outside their natural environment, which is the basic difference in relation to in situ conservation. Ex situ conservation or model of preservation of autochthonous races, basically takes place in two forms, namely: - Ex situ in vivo or conservation of live animals, by raising live animals outside their original area, such as zoos, museums, national parks, specialized farms, etc. Individuals from this model may possibly help the reconstruction of a breed, due to its extinction . - Ex situ in vitro or preservation of genetic material in gene banks, is the conservation of genetic material (sperm, eggs, embryos, stem cells) or criconservation. Tissue cells stored in liquid nitrogen enable partial or complete reconstruction of a breed in case of its disappearance, then it enables easier

recovery of the endangered population, reduction of the degree of breeding in the family, etc. The combination of in situ and ex situ conservation methods is the most reliable and efficient way of preservation.

Organizing in situ models of indigenous race conservation and ex situ conservation represents the formation of a gene bank. ***A gene bank*** is genetic material (gametes, eggs, sperm, tissue cells) collected, prepared, stored and stored appropriately in liquid nitrogen. Genetic material of races of local, regional and global significance is stored in the gene bank, in accordance with the selection and storage strategy (Čačić and Orehovački, 2014).

At the national level, the establishment of a gene bank should involve relevant institutions, and often non-governmental organizations. The genetic material stored in the gene bank is a public good, and accordingly the responsible services take care of its functioning.

The strategic reasons for establishing a domestic animal gene bank are the following: – support for in vivo programs for the conservation of indigenous breeds of domestic animals,

– have a backup of the population that would be used in case of a problem in in situ programs,

– increase in the effective size of populations, which results in a reduction in genetic loss,

– the possibility of reconstruction of the breed, whether it is an extinction of the population or a rapid decrease in the number of individuals due to disease or other disasters,

– creation of new lines or genera in case of their biological disappearance,

– population backup that can be used to modify the population,

– advisory role in animal population conservation and genetic management programs in small populations,

– conducting genetic and other scientific research.

CONCLUSION

Indigenous breeds of different species of domestic animals, which are recognized in the Republika Srpska (B&H) are the following: gatačko cattle and buša (cattle), Vlašić pramenka, Podveleška pramenka, Kupres pramenka (sheep), domestic Balkan horned goat (goats), Bosnian mountain horse (horses), mangulica (pigs) and pogrmuša hen or živičarka hen (poultry). By acceding to international conventions, B&H / Republic of Srpska has committed itself to establishing a system of measures that will enable the conservation of biological diversity and the protection of indigenous and endangered breeds of domestic animals. The choice of a strategy for the conservation of diversity, the establishment of an adequate conservation scheme, and the implementation of a conservation strategy are some of the key elements of any process for the conservation of genetic diversity. Preservation of autochthonous and protected breeds of domestic animals is possible through preservation in the original environment (in situ) and preservation outside

the original environment (ex situ). There is a possibility of combining these models of conservation of animal genetic resources.

REFERENCES

Adilović S., Andrijanić M., Adilović E., Ravić I. (2014). Bosanskohercegovačke autohtone pasmine domaćih životinja /*Indigenous breeds of domestic animals in Bosnia and Herzegovina*/ drugo dopunjeno izdanje, Univerzitet u Sarajevu, Veterinarski fakultet, Sarajevo, 247

Čačić M., Orehovački V. (2014). Uloga banke gena u očuvanju izvornih pashmina Republike Hrvatske */The role of gene banks in the preservation of native breeds of the Republic of Croatia/.* Predavanje. 22. Jesenski međunarodni bjelovarski sajam, Gudovac.

FAO (2007). *The state of world's resources for food and agriculture*. Commission on genetic resources for food and agriculture. Food and Agriculture Organization of the United Nations, Rome, Italy.

Katica V,. Hadžiomerović, Z., Salkić, A., Šakić, V., Softić, A. (2004). Autohtone pasmine domaćih životinja u Bosni i Hercegovini /*Indigenous breeds of domestic animals in Bosnia and Herzegovina*/ Promocult, Sarajevo, 171.

Matković M., Majić – Balić I., Božić P., Horvat Š. (2008). Izvantjelesno očuvanje životinjske genetske raznolikosti u banci gena /*Extracorporeal conservation of animal genetic diversity in a gene bank*/ Rad u Centru za reprodukciju u stočarstvu Hrvatske d.o.o. Stočarstvo, 62(1): 39-42.

Taberlet P., Valentini A., Rezaei H.R., Naderi S., Pompanon F., Negrini R., Ajmone-Marsan P. (2008). *Are cattle, sheep and goats endangered species?* Mol Ecol. 17, 275-284.

Telalbašić R., Žiga E. (2008). Bosanski brdski konj /Bosnian mountain horse/. Monografija, Sarajevo.

MPVŠ (2015). Zakon o stočarstvu Republike Srpske /*Law on Animal Husbandry of the Republic of Srpska*/. Službeni glasnik Republike Srpske, 21. maj 2015, 44/15. Ministarstvo poljoprivrede, vodoprivrede i šumarstva.