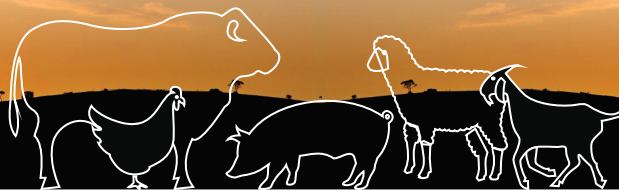


ISBN 978 - 86 - 82431 - 71 - 8

4<sup>th</sup> INTERNATIONAL CONGRESS

# PROCEEDINGS

**NEW PERSPECTIVES AND CHALLENGES  
OF SUSTAINABLE LIVESTOCK PRODUCTION**



Belgrade, Serbia 7<sup>th</sup> - 9<sup>th</sup> October 2015

## CONSERVATION OF AUTOCHTHONOUS SHEEP BREEDS IN SERBIA AND SLOVENIA

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Invited paper

**Abstract:** The objective of this paper is to review the status of autochthonous breeds of sheep in Serbia and Slovenia, of their conservation breeding program goals and incentives. The adopted definition of a breed is either a sub-specific group of domestic livestock geographical and/or cultural separation from phenotypically similar groups has led to acceptance of its separate identity. Autochthonous breeds were developed in specific rearing conditions and consequently have specific genes responsible for good adaptability and fertility, disease resistance, maternal instinct and longevity. The autochthonous breeds of sheep in Serbia include: Pirot Pramenka Krivovirska, Bardoka, Karachanska, Lipska, Vlaskho Vitoroga Pramenka and Chokan Tsigai, whereas in Slovenia: Istria Pramenka, White Landscape Pramenka, Lake-Solčavska and Bovec sheep. The main purpose of conserving the autochthonous sheep breeds in general is to preserve resistance, longevity, maternal instinct, the specificity of each race, increasing the number of heads or maintaining a stable level, as well as preventing of inbreeding. With regard to conservation of genetic resources in Serbia is represented by model *in situ*, while in Slovenia the *in situ* and *ex situ* program. The incentives in Serbia per head for endangered breeds of sheep is 37 EUR, in Slovenia 13.4 EUR per head.

**Key words:** sheep, autochthonous, Pramenka, conservation program

### Introduction

According to *FAO (1999)* adopted definition, the breed is: »Either a sub-specific group of domestic livestock with definable and identifiable external characteristics that enable it to be separated by visual appraisal from other similarly defined groups within the same species or a group for which geographical and/or

cultural separation from phenotypically similar groups has led to acceptance of its separate identity«. Hall (2004) also compares several proposals for breed definition and prefers the simplest one, given by *Lerner and Donald (1966)*: "a breed is whatever a government says it is". Statement of Keith Hammond's "a breed is a breed if enough people say it is" could probably be overgeneralizing (*Woolliams and Toro, 2007*).

*FAO (2007)* developed the classification system for breed populations, distinguishing among local breeds and regional or international trans-boundary breeds. Many different terms exist such as "autochthonous", "native", "indigenous", "heritage", "patrimonial", "naturalized" or "locally adapted" which are used in different countries for breed classification. Terms "native", "indigenous" and "autochthonous" are frequently used and could be synonymous. Autochthonous breeds were developed in specific rearing conditions and consequently have specific genes responsible for good adaptability and fertility, disease resistance, maternal instinct and longevity. Unfortunately, they are losing competition with more productive, intensively reared breeds, where the profit is the primary goal.

Autochthonous breeds, in addition to being a source of genetic diversity for livestock production, constitute a part of the national heritage and provide the identity of the local community. The long-term survival of these breeds is not only a matter of insurance for the future needs of agriculture development. The conservation is a matter of protecting and cherishing cultures and traditions that helps to sustain local communities. In the majority of the European countries, farmers who are keeping endangered autochthonous breeds are supported by the state. In the case of 28 EU Member States incentives are managed by agro-environmental programmes within the National Rural Development Programmes. Nevertheless, levels, scopes of supports, rules applied and practical arrangements differ substantially among the countries (*Subsibreed, 2014*).

The aim of the study was to collect data about autochthonous sheep breeds in Serbia and Slovenia, and to compare conservation programs, breeding goals and incentives.

## **Short description of breeds**

Autochthonous populations of Pramenka (Zackel) sheep represent a unique genetic inheritance existing thousands of years and as such are an important element of regional agro-biodiversity, tradition and cultural heritage of Serbia and Slovenia as well. Specific climatic, hydrological, feeding conditions and migration caused the formation of different strains (ecotypes) of Pramenka, which differ among each other by morphological, reproductive and productive traits

(*Stojanović, 2005; 2006; 2009*). Due to significant differences among individual strains in Slovenia, Croatia and Bosnia and Herzegovina, strains acquired the status of the breed.

### **Short description of autochthonous sheep breeds in Slovenia**

In Slovenia four autochthonous sheep breeds are geographically distributed: Istrian Pramenka, Bela Krajina Pramenka, Jezersko-Solčava sheep and Bovec sheep.

#### **The Bela Krajina Pramenka**

The breed is widespread in the southeast part of Slovenia and is used for the lamb production (Figure 1). The ewes of the Bela Krajina Pramenka weigh over 50 kg, while rams over 65 to 70 kg. The animals have long fringed wool, which is not appropriate for manufacturing. The coat colour is mainly white with black spots on the head and legs. The sheep's tails are very long almost reaching the ground. Rams have extremely large horns, which are curled several times according to the age. Ewes may have horns as well but shorter (*Kompan et al., 1996*). Ewes are seasonally poly-estruses with an average 1.18 lambs per year (*Zajc et al., 2015*). Lambs are reaching 25 kg in their third or fourth month. The Bela Krajina Pramenka lambs have high dressing percentage due to thin bones (*Grabrijan, 1996*). The population size is 900 animals and according to the national rules the population is endangered (*Register..., 2014*).



**Figure 1: The Bela Krajina Pramenka**

## The Istrian Pramenka

The Istrian Pramenka is widespread in the region of Karst and Istria and is used for milk production (Figure 2). Rams weight up to 95 kg, while ewes from 60 to 75 kg. The wool is white, black or white with black dots and does not cover the whole body (belly). Horns are present or not. The litter size is 1.05 lambs (*Zajc et al., 2015*) and the sheep produce 119 kg of milk yield in lactation. The milk contains in average 7.2% milk fat and 5.9% milk proteins. The population size is 1.150 animals (*Register..., 2014*) and according to the national rules the population is endangered.



Figure 2: The Istrian Pramenka

## The Bovec sheep

The Bovec sheep is widespread in the upper Soča valley and it is used for milk production (Figure 3). The body weight of rams is between 45 and 50 kg, while ewes weight from 35 to 40 kg. The wool is rough, white, brown or black. Sheep are horn-less with short ears. The milk yield is in average 221 kg with 6.3% milk fat and 5.5% milk protein. The population size is 3.400 animals (*Register..., 2014*) and according to national rules the population is at risk.



**Figure 3: The Bovec sheep**

### **The Jezersko-Solčava sheep**

The Jezersko-Solčava sheep is widespread across Slovenia and it is used for lamb production (Figure 4). The body weight of ewes is between 65 and 75 kg, while rams weigh over 100 kg. The coat colour is mainly white, while there are some sheep with brown colour. Ewes are year-round poly-estruses. The litter size is 1.32 lambs (*Zajc et al., 2015*). The population size of Jezersko-Solčava sheep is 17.000 and according to national rules population is not endangered (*Register..., 2014*).



**Figure 4: The Jezersko-Solčava sheep**

**Table 1: The Population size of four Slovenian sheep breeds from 1990 to 2014**

Breed/Year	1990*	2000	2010	2014
Jezerko-Solčava sheep	3.000	4.500	17.200	17.000
Bovec sheep	1.200	1.500	3.500	3.400
Bela Krajina Pramenka	400	600	880	900
Istrian Pramenka	200	250	1.150	1.150

\*estimation

### Short description of autochthonous sheep breeds in Serbia

Autochthonous sheep breeds were described by a large number of authors (*Belić et al. 1986, Mitić, 1986; Petrović and Nenadić, 1992; Radović et al., 1997; Krajinović et al., 1997; Ruzic-Muslić, 2002; 2006; 2007; 2011; 2012; Trailović et al., 2006; Ćinkulov et al., 2008; Savić et al., 2011; Savić et al., 2012; Petrović et al., 2013*). The main reason for decreased population size of different Pramenka breed, in last two decades, was the uncontrolled introgression and displacement crossing with cosmopolitan breeds (Merinolandschaf, Ile de France) for the fattening performance improving. Consequently, certain strains of Pramenka acquire the status "critical" and "vulnerable".

### Pirot Pramenka

Pirot Pramenka is a multi-purpose breed (milk, meat, wool) widespread in the Pirot region, in south-eastern Serbia, on the Stara Planina through Pirot, Dimitrovgrad, Babušnica to Vlasina, Leskovac, Bela Palanka and Niš. The body is covered with white wool, except the face and lower parts of legs. The body weight of adult females is 50 - 55 kg, and rams varies in the range of 60 - 70kg. The fertility varies from 105 - 115%. Lambs are born with a body weight of 3 - 4 kg, and achieve a daily gain of 180 - 200 g. Body weight at 90 days of age is 20 - 22 kg, while ewes at 12 months weighing 38 - 45 kg. Milk yield varies from 70 - 100 liters per 180 days of lactation. The wool yield assortment in B, averaging 1.5 - 2.5 kg in ewes and 3 - 4 kg in rams. The Pirot Pramenka is suitable for rearing in all regions and production system (*Petrović et al, 2013*) and is known for its famous products, like Pirot cheese, Pirot lamb and Pirot kilim (wool). The population size is officially estimated on 27 heads (*DAD IS, 2014*).



**Figure 5: The Pirotaska Pramenka**

### **Krivovir Pramenka**

Krivovir Pramenka is reared in the eastern Serbia, next to the area of Krivi Vir. It is a multi-purpose breed (milk, meat, wool). The body is covered with a white fleece except the face and lower parts of legs. The head and legs are covered with a hair which is a monochrome yellow or scattered yellow colour. The head are long and the fleece on the scalp formed like cap (ćubu). Ewes are hornless while rams have spiral horns. The body weight of adult females is 50 - 55 kg, and rams are in range of 60 - 70 kg. Fertility ranges from 105 - 115%. Lambs are born with a weight of 3 - 4 kg, providing daily gain of 180 – 200 g. In the age of 90 days, they achieve a weight of 20 - 22kg. Milk yield is 30 - 70 litters in 180 days of lactation. The wool yield, assortment B, averages from 1.5 - 2.5 kg in ewes and 2.5 - 3.5 kg in rams (*Petrović et al, 2013*). The population size is 108 heads (*DAD-IS, 2014*).



**Figure 6: The Krivovirska Pramenka**



### **Bardoka (White Metohian Sheep)**

Bardoka is widespread in Metohija and Kosovo as well as in some parts of Montenegro. It's got the name from the white wool. In Albanian language the word "Bardoka" means the white sheep. In Serbia, it is present in the area of Stara Planina and the upland area of Pester. The body is covered with white wool, on the head, legs and ears. This is one of the larger strains of Pramenka. Body weight of ewes ranges from 38 - 45 kg, while rams from 60 - 67 kg. Bardoka is claimed to be the best dairy Pramenka. Ewes produce about 100 liters of milk, including the sucked milk, in 180 days of lactation based on modest rearing conditions. Fertility is about 105%. The wool yield is 1.2 - 2 kg in ewes and 2.5 kg in rams (*Petrović et al, 2013*). The population size is 36 heads (*DAD IS, 2014*).



**Figure 7: The Bardoka (White Metohian Sheep)**

### **Lipska pramenka**

Lipska Pramenka is reared near Smederevo in the village Lipa, after which it was named. The colour of wool is white, while the head and legs are covered with black hair. The average body weight of ewes is about 60 kg, and rams around 65 kg. Lambs birth weight is from 3.75 - 5.0 kg. In 180 days of lactation, ewes produce 100 liters of milk in average. Wool yield, assortment D, in ewes is 1.5 kg and 2.0 kg in rams in average (*Petrović et al, 2013*). Population size is represented by 513 heads (*DAD IS, 2014*).



**Figure 8: The Lipka Pramenka**

### **Karakachan Pramenka**

Karakachan Pramenka is widespread in southeast Serbia, Bulgaria, Macedonia and Greece. A small sheep with strong constitution is covered with black wool except the head, ears and the lower parts of legs that are covered with black hair. The body weight of adult ewes is 35 - 45 kg, and rams varying in the range of 40 - 50 kg. Fertility varies from 105 - 110%. Lambs birth weight is 2 - 3 kg, and at 90 days reached a weight of 15 - 18 kg. Milk yield is poor, ranging from 30 - 40 liters in the 180 days of lactation period. Wool yield, assortment C, is about 2.0 kg in ewes and 3.0 kg in rams (*Petrović et al, 2013*). The population size is 67 heads (*DAD IS, 2014*).



**Figure 9: The Karakachan Pramenka**

### **Vlaskho Vitoroga Pramenka**

Vlaskho Vitoroga Pramenka is grown in the area of South Banat, in Kovin and Deliblato Sands. The fleece colour is white or light brown. The head and legs are covered with white hair. Very special characteristic of breed are large spiral twisted horns. The ewes' average body weight is about 35.0 kg while 40.0 kg in rams. The average milk yield during 100 - 150 days of lactation is 80 - 110 liters. Ewes' fertility is 120% (*Savić et al., 2013*). The fineness of wool is reached to 38  $\mu\text{m}$  in ewes and 41  $\mu\text{m}$  in rams. The population size is 466 heads (*DAD IS, 2014*).



**Figure 10: The Vlaskho Vitoroga Pramenka**

### **The Chokan Tsigai**

The Chokan Tsigai is a lowland multi-purpose sheep breed. The breed originated from the Asia Minor, from where it was spread throughout the Eastern Europe. In the eighteenth century has expanded from Romania to Vojvodina and plain land areas of Serbia. The wool colour is white. The legs and head are covered with black hair. The ewes' body weight is 70 - 75 kg, while rams from 110 - 120 kg. In the intensive fattening conditions, lambs at 90 days achieve 31 kg of body weight. Milk yield is remarkable and ranges from 50 - 150 liters in 180 days of lactation period. Ewes produce in average 2.5 - 4 kg greasy wool, while rams 3.5 - 5.0 kg. The population size is 480 heads (*DAD IS, 2014*).



Figure 11. The Chokan Tsigai

Table 2. The population size of endangered sheep breeds in Serbia (DAD - IS,2014)

Breed/Year	2005	2009	2012	2013	2014
Pirot Pramenka	450	40	60	66	27*
Krivovir Pramenka	300	300	125	356	108*
Bardoka	900	50	50	47	36*
Lipska Pramenka	70	150	380	470	513*
Karakachan Pramenka	-	-	130	84	67*
Vlach Vitoroga Pramenka	46	350	219	425	416*
Chokan Tsigai	300	450	632	223	480*

\* Data refer to animals with a full pedigree; animals with incomplete pedigree were not taken into consideration

There was an evident negative trend of population size of Pirot, Krivovir and Karakachanska Pramenka as well as Bardoka. The encouraging fact is that the population size of Lipska Pramenka, Vlach Vitoroga Pramenka and Chokan Tsigai increased.

## Risk status assessment

### Risk status assessment for farm animal genetic resources in Slovenia

In Slovenia, the assessment of risk status for farm animal genetic resources is managed by Public service. In accordance with the Rules on biodiversity in livestock (*Ur. L. RS 90/04*) the risk status is estimated once per year. Till 2014, the assessment of the breed risk status was based only on the purebred female population size, registered in the herd book.

From 2015, the risk status is estimated on several parameters. Final assessment is always represented by the worst / lowest risk status. If only one parameter indicates that the breed is highly endangered, it will be classified according to that parameter. In Slovenia, the following parameters are used:

- Reproductive capacity of species. Species are divided on those with large (poultry, pigs, rabbits) and small (equines, cattle, sheep, goats) reproductive capacity. The risk status estimation is based on the combination of the number of pure-bred breeding females and pure-bred breeding males.
- Trend of population size and the percentage of females bred to males of the same breed. The reproductive capacity is considered as well. Populations are divided according to the trend of population size (increasing, stable or decreasing). The risk status estimation is based on the combination of population size and the number of pure-bred breeding males.
- Geographical distribution is measured as a length (km) of the radius of the circular area within which approximately 75 percent of the population lies. The concentration of population in a limited area or in a limited number of flocks / herds can be an important factor in the case of natural catastrophes and diseases.
- Inbreeding rate ( $\Delta F$ ) is estimated based on the numbers of breeding males and females from the pedigree information. The reliability of pedigree-based estimates of inbreeding depends on the number of generations of ancestry recorded. To obtain meaningful estimates, a minimum of five generations is recommended.

Breed population number in the country of origin is a basic factor for the assessment. However, population number at global level must be taken into account. Many breeds which are at risk in the country of origin can be found in other countries as well.

### **Risk status assessment for farm animal genetic resources in Serbia**

In Serbia, the criteria for the risk degree level are based on the classification recommended by the *FAO (1992)*. Classification was partly modified in 2007 and it is based on the number of female breeding animals in the population. In the critical category fall breed whose total number of female breeding animals is less than 100, a number equivalent to that of male breeding animals is less than 5 or breed with a total population of slightly over 100 animals, where 80% of heads of purebreds declined. The risk category includes breeds or endangered populations

with the number of female breeding animals between 100 and 1000 or equivalently the number of male breeding animals between 5 and 20, or breed which has slightly over 1000 head, where the participating animals of purebreds about 80% of the population was decline. In sensitive or vulnerable category are breeds with the number of female breeding animals between 1000 and 5000 or equivalently the number of male breeding animals between 20 and 100 or if the total population is slightly over 5,000, where the participating animals of purebreds about 80% of the population was decline. Semi-stable category has breeds with population size between 5.000 and 10.000 female breeding animals or equivalently between 100 and 500 males. Breed or population with the number of female breeding animals of more than 10,000 heads are not threatened, but it should observe.

Taking into consideration the above criteria four Serbian sheep breeds are at risk or in critical category: Pirot, Krivovir, and Karakachan Pramenka as well as Bardoka. In the endangered category following breeds are classified: Lipska and Vlach Vitoroga Pramenka and Chokan Tsigai.

## **Animal genetic resource conservation**

### **Program for Animal Genetic Resource conservation in Slovenia**

In Slovenia, the monitoring of conservation of farm animal genetic resources is managed by the Public service for animal genetic resources conservation under the Department of Animal Science, Biotechnical Faculty, University of Ljubljana. Monitoring started in the year 1990 with inventory of each autochthonous population (breed), its characteristics, history, production systems and knowledge. After years of work on farm animal genetic resources continued within the long term conservation programme supported by the Ministry of Agriculture. Conservation program for farm animals represents long-term process to ensure the protection and conservation of species, breeds and strains in the Republic of Slovenia. The program is harmonised with the Interlaken Declaration and includes direct and indirect monitoring of endangered autochthonous and traditional breeds. The conservation programme includes: inventory of farm animals, monitoring of the risk status, ways of conservation and biological, phenotypic and genetic characterisation. Public Service provides and maintains genetic reserves of species, breeds and strains of farm animals like a minimum number of live breeding animals, semen doses, ova or embryos. *In situ* conservation – is managed on the »Ark-farms«. The main purpose of the farm is to keep and maintains the herds, and makes presentations of the endangered breeds to the general public. Ark-farms are farms, centres, business or institutions that maintain the endangered breeds of animals' *in-situ*. *Ex situ in vitro* conservation or

cryopreservation represent a permanent storing of animal genetic resources. Stored genetic material facilitates the retrospective genetic studies of populations, isolation of interesting genomic segments, and preservation of breed specific alleles. Moreover, the finest stored genetic material allows the reconstruction of the population in the case of serious threats or even extinction. The depository of tissues includes isolated nucleic acids (DNA, RNA) as well as tissue samples (blood, skin, hair, muscle) of locally adapted breeds (*Public service...*, 2014). Public Service prepares a report of monitored farm animal genetic resource once per year. Annual incentives are additionally financial measures to support the conservation of the endangered autochthonous breeds. Despite two breeds of sheep in Slovenia that are highly endangered, the level of subsidies for sheep included in the environmental payments are equal i.e. 13.41 € (*Subsibreed*, 2014).

### **Conservation models for autochthonous breeds of sheep in Serbia**

In the Republic of Serbia, the only conservation model of genetic resources is *in situ* implemented by the Ministry of Agriculture and Environmental Protection. This model is an active dynamic approach to the protection of breed in its native environment and is acceptable due to lower initial investments, active function in food production (generating revenue) and maintaining the vitality of the population.

Conservation program *in situ* includes:

- monitoring the population size, structure and distribution of breed,
- genetic consolidation and improvement of breed,
- establishing the production parameters of breeds,
- subsidies per head of endangered sheep breeds in the amount of 4.500 dinars,
- optimization of production systems and technologies suitable for genetic resources,
- to raise public awareness and promotion of endangered breeds.

According to the Regulations on incentives for the conservation of animal genetic resources ("RS Official Gazette", No. 83/13), in the field of sheep belongs Pramenka (Pirrot, Krivovir, Bardoka, Lipska, Vlach Vitoroga, Karakachan) and Chokan Tsigai.

## Breeding program and breeding objectives

### Breeding program and breeding objectives for autochthonous sheep breeds in Slovenia

Breeding programmes for sheep are managed by recognised breeding organization like Association of Small Ruminant Breeders in Slovenia. Biotechnical Faculty (Department of Animal Science), Veterinary Faculty, Agriculture Institute and Regional agriculture chambers carries out specific tasks. Within the breeding program, some specific conservation tasks are included. The main breeding goal in the breeding programmes for endangered autochthonous sheep breeds (Istrian pramenka, Bela Krajina pramenka, Bovec sheep) is to preserve type traits specific for each breed, to prevent increasing of inbreeding and to increase the population size or to keep it stable. However, the main breeding goal in the breeding programme for Jezersko-Solčava sheep, which is not endangered, is to preserve good fertility and year round poly-estruses as well as to improve conformation and meat quality. Additional breeding goals are to preserve calm temperament, longevity, resistance and adaptability to poor rearing conditions and the ability of grazing. Breeding goals connected with production (Table 3) depends on the risk status of the breed and includes fertility traits (litter size), production traits according to the breed purpose (daily gain, milk yield, fat and protein content) and to increase the frequency of the ARR allele to improve the TSE resistance. Likewise, breeding goal for Jezersko-Solčava and Bovec sheep include the improvement of wool quality (*Program za izvedbo...*, 2010).

**Table 3. Breeding goal for Slovenian sheep breeds until the year 2015**

Breed	Main breed purpose	Litter size	Daily gain till weaning (g/day)	Milk yield (suckled + milked)	Milk fat/protein content (%)	ARR genotype frequency (%)
Istrian Pramenka	milk	1.23	230	140	7.2/5.8	40
Bovec sheep	milk	1.30	280	240	6.4/5.5	26
Bela Krajina Pramenka	meat	1.20	220	/	/	40
Jezersko Solčava sheep	meat	1.23	240	/	/	28

### Breeding program and breeding objectives for autochthonous sheep breeds in Serbia

The main purpose of conserving the autochthonous sheep breeds in general is to preserve resistance, longevity, maternal instinct, the specificity of each race,



increasing the number of heads or maintaining a stable level, as well as preventing of inbreeding. In the next table shows the breeding goal according to breed.

**Table 4. Breeding goal for Serbian sheep breeds**

Breed	Main breed purpose	Litter size	Daily gain till weaning (g/day)	Milk yield (litters)	Wool yield (kg)	Wool fineness ( $\mu$ )
Pirot Pramenka	Meat, milk, wool	1.20	220	100	3.0-4.0	35
Krivovir Pramenka		1.20	220	80	2.5 - 3.5	35
Bardoka		1.10	210	110	2.0 - 3.0	45
Lipska Pramenka		1.20	230	110	3.0 - 4.0	35
Karakachan Pramenka		1.10	200	50	2.0 - 3.0	35
Vlach Vitoroga Pramenka		1.15	/	/	2.0 - 3.0	40
Chokan Tsigai		1.30	/	/	2.5 - 4.0	33

In order to managed and improve the future work on conservation of autochthonous sheep breeds in the Republic of Serbia, it is necessary to:

- Human resource development, the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively.
- Organizational development, the elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors (public, private and community).
- Institutional and legal framework development, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities.
- Monitor and coordinate national legislation with the EU and other international regulations, provide material and logistical assistance for the survival and stabilization of vulnerable populations or sheep breeds,
- To promote the sustainable use and proper management of AnGR with an aim of encouraging the multifunctional aspect of agriculture as a whole: valorisation of different forage resources in marginal agricultural areas, the production of safe food, diversification of the rural economy, development of agro-tourism in protected areas,
- Integration of AnGR concept with modern systems of sustainable development (eg, organic, biodynamic) and to undertake popularization of

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AnGR by organizing exhibitions and trade fairs of autochthonous sheep breeds

- Provide funding and facilitate the development of investigations relating to genetic characterization of autochthonous sheep breeds,

## Conclusion

Conservation of animal genetic resources for food and agriculture, sustainable use and development is responsibility of countries on national and global level. Growing population, changes in consumer demand, climate change and emerging diseases are factors which require adaptability of autochthonous breeds and potential to face an uncertain future. Therefore, we have to make certain that AnGR and especially autochthonous breeds will be conserved for the future generations. Slovenia adopted the Long term Conservation Programme harmonized with the FAO Global Plan of Action and Interlaken Declaration. Consequently, autochthonous sheep breeds are monitored sufficiently and population size remain stable or increased for the last few years.

In Serbia for the future the inventory and characterization of sheep breeds, monitoring of trends and risks are necessary steps for the future work. The additional criteria for the level of the endangerment should be accepted, such as: size of the female population, effective population size, degree of kinship, population trend, the geographic dispersion of population and reproductive ability. In addition to the *in situ* conservation models, the introduction of *ex situ* conservation system for the endangered sheep breeds in Serbia should be start.

## Acknowledgment

This paper has emerged as part of the Serbian-Slovenian bilateral project: "Morphological, production and genetic characterization of endangered breeds of sheep in Serbia and Slovenia"

## Konzervacija autohtonih rasa ovaca u Srbiji i Sloveniji

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## Rezime

Cilj ovog rada je pregled stanja autohtonih rasa ovaca u Srbiji i Sloveniji, njihovih programa očuvanja odgajivačkih ciljeva i podsticaja.

Prema *FAO (1999)* usvojenoj definiciji, rasa je: »Bilo sub-specifičnu grupa domaćih životinja sa definisanim i prepoznatljivim spoljnim karakteristikama koje omogućavaju da se vizuelno razlikuju od drugih slično definisanih grupa u okviru iste vrste ili grupe za koje je geografski i/ili kulturno odvajanje od fenotipski sličnih grupa dovelo do prihvatanja njihovog posebnog identiteta «.

Autohtone rase su razvijeni u specifičnim uslovima gajenja i samim tim imaju specifične gene odgovorne za dobru prilagodljivost i plodnost, otpornost na bolesti, materinski instinkt i dugovečnosti.

U autohtone rase ovaca u Srbiji spadaju: Pirotska pramenka, Krivovirska, Bardoka, Karakačanska, Lipska, Vlaško vitoroga i Čokanska cigaja, a u Sloveniji: Istarska Pramenka, Belo Krajinska Pramenka, Jezersko-Solčavska i Bovška ovca.

Glavni cilj očuvanja autohtonih rasa ovaca uopšte je očuvanje otpornosti, dugovečnosti, materinskog instikta, specifičnosti svake rase, povećanje broja grla ili održavanje stabilnog nivoa, kao i sprečavanje inbridinga.

U pogledu konzervacije genetičkih resursa u Srbiji je zastupljen model *in situ*, dok su u Sloveniji zastupljeni programi *in situ* i *ex situ*.

Podsticaji u Srbiji po grlu za ugrožene rase ovaca iznose 37 EUR, a u Sloveniji 13.4 EUR po grlu.

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