



THE INTERNATIONAL SYMPOSIUM ON ANIMAL SCIENCE

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21000 Novi Sad, Trg D. Obradovića 8
Tel.: ++(021) 6350-711; 4853-308;
Fax: ++(021) 6350-019
web: <http://www.polj.uns.ac.rs>
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PRODUCTIVITY OF LIPA SHEEP IN CENTRAL SERBIA

Cekić B.¹, Ružić-Muslić D.¹, Maksimović N.¹, Caro Petrović V.¹, Bijelić Z.,¹ Ćosić I.¹

Abstract: The area of central Serbia is very suitable area for small ruminant production, due to its hilly-mountainous region, rich in pastures, and free from heavy use of pesticides, which make it great for organic production. In the territory of central Serbia, representative of autochthonous (indigenous) sheep breeds is pramenka (zackel) with its differentiated strains: Sjenica strain, Svrljig strain, Krivovir strain, Karakachan strain, Pirot strain, Lipa strain and Bardoka (White Metohian strain). Aim of this study was to investigate Lipa strain: number of controlled heads, their productivity parameters and milk parameters. Observed data were processed using the statistical package Statistica for Windows (Stat. Soft Inc.), whereby the basic parameters of descriptive statistics (arithmetic mean, variation coefficient, standard deviation and standard error) were calculated. In this study, total of 840 adult animals were observed. Average observed body weight (BW) of lambs were: BW on birth 3.56 kg, BW after 30 days 12.72 kg and BW on weaning 27.14 kg, while BW of adult sheep was 66.18 kg. Fertility index was 1.31 and average wool production was 3.24 kg. Average lactation lasted for 125 days, with milk production of 102.16 kg, 5.74% protein and 7.12% milk fat. Indigenous breeds are irreplaceable in sustainable systems because they are evolutionary adapted to the conditions in which they are reared. Lipa strain is one of them and due to its productions in humble conditions it is one of the key for sustainable sheep production.

Keywords: Indigenous breeds, sustainable development, zackel, milk

Introduction

The area of Central Serbia is very suitable area for sheep production, because it is mainly mountainous region, rich in pastures, and free from heavy use of pesticide. Out of 826,834 ha of grassland and 601,152 ha meadow in Serbia, about 86% are located in mountain area where it is about 50% of the rural population (Petrovic et al., 2017). Autochthonous genotypes of sheep and goats are mainly cultivated in the hilly-mountainous region, predominantly economically undeveloped regions with modest food sources (Žujović et al., 2011). Autochthonous populations of Pramenka (Zackel) sheep represent a unique genetic inheritance existing thousands of years and as such are an important element of

¹ Cekić Bogdan, MSc, research trainee, Ružić-Muslić Dragana, PhD, principal research fellow, Maksimović Nevena, PhD, research associate, Caro Petrović Violeta, PhD, research associate, Bijelić Zorica, PhD, senior research associate, Ćosić Ivan, MSc, research trainee – Institute for Animal Husbandry, Autoput 16, 11080 Zemun-Belgrade
Corresponding author: Cekić Bogdan, email: bogdancekic@gmail.com

regional agro-biodiversity, tradition and cultural heritage of Serbia (Ružić Muslić et al., 2015). This group of sheep is characterized by triple combined production ability, and is reared for the production of meat, milk and wool (Cekić et al., 2018b). Due to the husbandry of imported, more productive genotypes zackel sheep with its strains deteriorated in number. Because of that, they become very endangered populations. In recent years, the government has been trying to revitalize and prevent further deterioration of this type of production throughout the strategy on the improvement of indigenous breeds. This strategy contains breeding programs of genetic resources, and there are significant funding resources for breeders for production of quality breeding animals, and animal genetic resources. Indigenous breeds are less demanding, and input is lower in their husbandry with high-quality products. With better organization, production costs are reduced, and along with the increased promotion of autochthonous genotypes they can be promoters of sustainable development, besides their primary impact on the maintenance of agro-biodiversity. The zackel is divided into strains formed in different conditions. Because of different climatic and nutritive conditions they differ in the exterior and productive parameters. These strains are named by the geographical regions, or towns where they were originally formed. Pramenka strains on the territory of central Serbia are: Sjenica strain, Svrlijig strain, Krivovir strain, Karakachan strain, Pirot strain, Lipa strain and Bardoka (White Metohian strain). Zackel strains are mainly used for lamb meat and sheep milk, which are most often processed into traditional products (Važić et al., 2017).

Lipa strain is named after the village Lipa, near Smederevo, where is traditionally bred. Besides the area around Smederevo, in the recent years, small populations of Lipa sheep are bred in the regions of Petrovac na Mlavi, Požarevac, Kruševac and even Leskovac.

The color of wool is white, while the head and legs are covered with black hair. Ewes are polled, and rams have large and strong horns, often triangularly shaped and twisted spirally. Color of the horns is yellowish to dark. The profile line is slightly convex, more expressed in rams than in ewes. Ears are short, covered with black hair and semi erected, horizontally oriented. The tail is long, almost reaching the ground. In literature data, 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., 2011).

The aim of this study was to analyze number and most important productive parameters of Lipa strain and to summarize their role in sustainable development of rural area of central Serbia.

Material and Methods

The research included Lipa strain ewes and rams. The number of animals is shown through the number of heads controlled by the production parameters, that is, through the number registered in the main book (Herdbook), as well as the number of immature animals. Number of animals is taken from the Annual Report of the Institute for Animal Husbandry from 2018. The data were collected from the territory of central Serbia. Determination of

the status of Lipa strain is determined according to the current List of Genetic Reserves of Domestic Animals (Ministry of Agriculture, Forestry and Water management, 2017). The endangerment status is calculated using the formula:

$$N_e = 4 \times N_m \times N_f / N, \text{ where is}$$

N_e – effective size of population; N_m – number of breeding rams, N_f – number of breeding sheep, N – total number of breeding animals. In relation to the level of endangerment, genotypes are classified into four groups: critically endangered ($N_e \leq 50$), highly endangered ($N_e > 50$ and $N \leq 200$), potentially endangered ($N_e > 200$ and $N \leq 1000$) and not endangered ($N > 1000$).

The weight of adult animals was measured at the beginning of the mating season, while the lambs and kids were measured at birth, with 30 days and on weaning, which was 90 days in the case of this genotype. The index of lambing is calculated as the index of the total number of descendants based on the total number of animals that gave birth. In addition to these parameters, yield of wool, as well as milk parameters were measured. Milk parameters that are followed are: lactation duration, milk yield for whole lactation, average daily milk production, and average protein content and average milk fat content. Milk control was carried out by a modified absolute (AT) method, carried out at intervals of 28-34 days, alternating in the morning and evening (ICAR, 2009). The first measurement was done up to 40 days after the partus, and the milk components (proteins and milk fat) were determined by Ekomilk and Milkoscan apparatus.

The collected data were processed using the statistical package Statistica for Windows (Stat. Soft Inc.), whereby the basic parameters of descriptive statistics (arithmetic mean, variation coefficient and standard deviation) were calculated.

Results and Discussion

Lipa sheep is reared in half-intensive systems, which includes pasture nutrition with supplementing with concentrates. In table 1 is showed number of heads of ewes and rams, and number of lambs left for reproduction in last five years. Although there is a trend of increase in number, the Lipa strain is still classified as potentially endangered genotype. In the 1930s population of Lipa strain numbered over 40 000 heads (Becskei et al., 2018), so current number of ewes and rams is still not satisfactory.

Table 1. Number of heads of Lipa sheep in last five years

Number of heads/Year	2014	2015	2016	2017	2018
Ewes	510	505	591	686	911
Breeding lambs	107	425	220	290	402
Rams	13	15	28	30	30

The average productive parameters are showed in the table 2. Body weight of lambs on birth is similar to Becskei et al. (2018), while Petrović et al. (2009) showed higher values of birth body weight, and similar body weight after 30 days of life. Body weight of lambs in first month is highly correlated with milk production of their mothers. High growth rates of lambs (and body weight) can be explained by the fact that this genotype is one of the most productive in milk production (Cekic et al., 2018a). Lambs are usually weaned at the age of three months, and average body weight of weaned lambs is 27,16 kg, which is accordant to conclusions of Caro Petrovic et al. (2012). As for the body weight of the adult animals, it largely depends on the current condition of the animals at the moment of measurement. Namely, the ewes that came out of the winter husbandry regime, and/or are in the first stage of lactation, or that are kept on poorer pastures will have lower body mass than animals, which, for example, are in the first phase of pregnancy. As a result, published data indicate that this parameter varies most. The sheep lamb breeding index is 1.31 and it is in line with the published results. Fertility index of autochthonous genotypes is on average 1 - 1.3. A slightly better fertility of Lipa sheep can be partly due to the more favorable conditions of husbandry and nutrition.

Table 2. Descriptive statistics for productive and prolificacy traits of Lipa sheep

No. of controlled heads	Statistical parameter	Weight on birth (kg)	Weight on 30 days (kg)	Weight at weaning (kg)	Weight of adults (kg)	Prolificacy	Wool yield (kg)
840	\bar{x}	3,54	11,73	27,16	66,18	1,31	3,24
	SD	0,55	1,78	3,83	3,52	0,47	0,13
	CV (%)	15,69	15,19	14,10	5,32	36,08	3,87

Control of milk production was performed on a total of 629 heads and Table 3 shows the average milk production properties. For lactation, which lasted 125 days on average, ewes gave an average of 90.07 kg of milk, with protein content of 5,74% and average milk fat content 7,12%. The milk production was lower than reported by Becskei et al. (2018). The amount of milk is a characteristic of the genotype, but also of the diet and lactation period (Ilić et al., 2014). Lipa strain is fed in a semi-intensive system, and the nutrition of these animals is improved

Table 3. Control of milk production of Lipa sheep

Number of heads	Statistical parameter	Lactation period (days)	Total milk yield (kg)	Daily milk production (kg)	Average protein content (%)	Average milk fat content (%)
629	\bar{x}	125	90,07	0,72	5,74	7,12
	SD	20,96	21,96	0,11	0,37	0,38
	CV (%)	16,83	24,38	14,95	6,37	5,27

Most recent research findings on ruminant milk and meat products that were obtained under different management systems, indicate that certain differences do exist in product composition and quality, and most significantly, organic products recorded more favorable values for fatty acid composition, conjugated linoleic acid (CLA), antioxidants, such as the carotenoids, and vitamin E content (Jovanović et al., 2011). Sustainable production systems are based on limited use of synthetic fertilizers, pesticides, antibiotics, and in general they are based on the use of local resources. Because of that they have great influence on development of rural areas (Cekic et al., 2018a).

Conclusion

Thanks to the stimulating state measures, number of Lipa sheep increased in last few year. Still, this number is insufficient, because this genotype is still in danger of extinction. Production of Lipa sheep is satisfactory, but in comparison to imported, more productive, genotypes, they are too low. Because of that it is necessary to provide better support to breeders, so in addition to moral, they have a financial interest in preservation. This support must certainly be covered by professional, scientific and economic measures. Currently in Republic of Serbia measures of conserving zackel strains are implemented. If the huge importance that these genotypes have on the agro-diversity of the Republic of Serbia, and the whole of the Balkans is considered, it is evident that protection measures must be intensified. In addition to In situ, it has to be started with an ex situ conservation, and then cryopreservation, for all the zackel strains, and other genotypes that are considered genetic resources.

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