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AN ANALYSIS OF LAMB GROWTH AS A RESULT OF DIFFERENT NUTRITION METHODS IN A SEMI-INTENSIVE BREEDING SYSTEM

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ABSTRACT

The paper examines the impact of nutrition and breeding methods on lamb growth in the first 60 days after lambing. Two groups of lambs of the same age have been examined. The first group of 20 lambs spent 6 hours with their mothers, suckling at will, and they spent 18 hours alone in a cubicle where they were served food: concentrated food and dried and crushed alfalfa. The second group of 20 lambs spent 18 hours with their mothers, suckling at will, while the rest of the day they spent alone in a cubicle where they were also served food: concentrated food and dried and crushed alfalfa. At the beginning of the experiment, the average weight of lambs at birth did not present statistical significance and it was 3.6 kg. During the experiment, depending on the method of breeding and meal composition, the difference in daily increments was not statistically significant during the initial 20 days. However, in the period to follow, in the second half of the experiment, the difference in lamb growth was statistically significant, whereby in group II one could observe larger increments of 205 g during the second measurement, i.e. 359 g during the final measurement. The obtained results have been presented in a table form by calculating the mean value and standard error, and then the variable of quantitative traits was established by resorting to the standard t-test. The lambs which consumed milk at will in the first thirty days showed a significant difference at the level $p < 0.01$, while the lambs in group II in the second half of the experiment showed a statistically significant difference at the level $p < 0.05$ when it comes to daily and total increments.

Key words: liquid diet, lamb, growth, consumption, conversion.

INTRODUCTION

The entire sheep production in Serbia is characterised by the following: extensiveness, mostly natural production, low weight of sheep and lambs at slaughter, low net weight of slaughtered heads, poor racial composition, insufficient fertility of sheep, inadequate nutrition, outdated breeding methods, inadequate health protection, unsatisfactory organisation of market and marketing, especially in terms of exports, etc. followed by low prices of sheep products due to the lack of a long-term policy of improving sheep production and insignificant investments in this production. Nowadays, when sheep production is increasingly taking on an industrial character in terms of organisation, technological processes, and rationalisation (Gutić et al, 2006) it is imperative to seek new possibilities for improving production results in animal husbandry. In the past several decades the prevailing stance in science is reflected in the belief that there is no efficient production of lamb meat without the crossbreeding of different sheep varieties. It resulted in conducting different research studies and publishing a significant number of scientific papers around the world (Long et al, 1989; Petrović et al, 2009; Momani Shaker, 2002).

Many other researchers state that crossbreeds have a larger body weight at birth and higher growth in comparison to purebreds. As a result, they reach the final body weight faster before the slaughter (Doloksaribu et al, 2000; Freking et al, 2004; Snowder & Duckett, 2003; Fogarty, 2006, Cloete et al, 2008). Likewise, sheep milk is the best and virtually irreplaceable food for a newborn lamb and it is unimaginable that a young lamb does not suck colostrum. According to numerous research studies, nursing lambs achieve better results in terms of growth, food conversion, and health status (Petrović et al. 2009, 2012; Momani Shaker, 2002). Previous experiences show that the improvement of sheep production depends on environmental and financial preconditions (Pešić et al, 2020), and it requires the introduction of new and modern experimental techniques to evaluate individual traits and products (Krainović & Savić, 1992).

This research aimed to prove the impact of different breeding and feeding conditions on the growth of lambs in the first 60 days of life.

MATERIAL AND METHODS

Animals: The research included head of the F1 generation, crossbreeds of the Pramenka-Svrlji breed of sheep (mother) and Württemberg rams (father), which were fed in a group-control system, on a sheep farm in the village of Batiševac, near Babušnica. In order to determine the effect of different feeding technology, two groups were formed with 20 marked lambs each, which were completely uniform in all parameters (body mass, age). The trial lasted 60 days. During the experiment, the production results and the health condition of the lambs were monitored. During the day, the lambs spent different periods in the company of their mothers and alone, closed in a box.

First group (I). The lambs of the first group (I) stayed with their mothers for 6 hours, while they spent the rest of the day, 18 hours, alone. In the company of their mothers, they used mother's milk, while in the period when the lambs were alone, they were served concentrated food and alfalfa hay.

Second group (II). The second group of lambs (II) stayed with their mothers for 18 hours, while they spent the rest of the day, 6 hours, alone. In the company of their mothers, they used mother's milk, while in the period when the lambs were alone, they were served concentrated food and alfalfa *hay.Ambiance conditions*: Semi-intensive fattening system was applied on the farm, which implies the breeding of animals in a facility with limited manure disposal. The animals in the facility were exposed to the same microclimatic conditions, with identical positions concerning light, ventilation, water, food, and manure disposal.

Measuring lambs´ body weight: Measuring the body weight of lambs, crossbreeds of Svrljig Pramenka race, and Württemberg rams, took place every morning before feeding by resorting to a precise digital scale with an accuracy of 50 g. The first measuring of lambs was performed immediately after lambing, and four more control measurements followed at intervals of 10 days.

Statistical analysis: All statistical analyses have been performed through the SPSS Statistics 25. The obtained results have been presented in a table form by calculating the average mean and standard error, and then a statistical test, t-test was used to establish the variable of quantitative traits.

Nutrition: According to applied technology as well as accommodation and nutrition conditions, the lambs were exclusively fed with milk in the first seven to ten days, whereby it was essential that lambs suck the colostrum after lambing. From the tenth day on, in specially partitioned cubicles the lambs started adjusting to the hay and concentrated nutrients. The lambs´ nutrition was arranged at will. They sucked milk when they were with their mothers and they were served concentrated food with 18% of SP and dried alfalfa during the period when they were alone in the cubicle. The mixture used in this experiment was intended for the

nutrition of lambs up to 15 kg of weight. The physical and chemical composition of the complete feed mixture for lambs up to 15 kg is shown in Table 1.

Table 1. The physical and chemical composition of the complete mixture used for feeding the lambs up to 15 kg

Composition of the mixture	Share	Jm/um
Metabolic energy ME	11.8	MJ/kg
Raw proteins	18	%
Moisture	13	%
Raw cellulose	6	%
Ash	8	%
Calcium	0.80-1.00	%
Oatmeal units	0.9	/kg
Phosphorus	0.50-0.70	%
Usable phosphorus	0.20	%
Sodium	0.30-0.40	%
Lysine	0.60	%
Methionine-cystine	0.40	%
Premix	1	%

*http://www.juniorkomerc.co.rs/hj18.html

RESULTS AND DISCUSSION

The obtained results relating to the lambs´ weight and growth indicate that the lambs which were fed sheep milk in the first ten days after lambing showed better results during the first measurement (II : I) 4.86 : 4.76. The difference between body weight is conspicuous even during the second measurement (II : I) 6.77 : 6.11 while during every subsequent control measurement the weight differences were in favour of lambs (I) which consumed bulky nutrients for a longer period during the day. Average values and variability of lambs´ body weight of the tested genotypes at birth observed in the first 20 days are shown in Table 2. Increased nutrition and development of the gastrointestinal tract resulted in changes in lambs´ body weight.

Calculated weights of lambs measured at the age of twenty days showed that the first group of lambs that suckled at will for 18 hours during the day and consumed concentrated food and alfalfa for 6 hours, had a lower body weight compared to group II lambs that suckled once, i.e. for 6 hours during the day, and consumed concentrate and alfalfa (0.100g) for the rest of the day. At the age of 60 days, the first group of lambs weighed less than 310 grams.

Similar results were reached by Kukovic et al. (2013) who examined the influence of a genotype and lamb fattening technology on meat production and quality. The carcass yield was lower in purebreds compared to crossbreeds. Similar results were presented by Ružić, Muslić, et al. (2012) who investigated the influence of two-race and three-race crossbreeding systems on the following sheep varieties: the Pirot Pramenka sheep, Württemberg, and Il de Franz in terms of yield and quality of lamb meat, deprived at 60 days of age and fattened up to 120 days of age, as well as Važić et al. (2015) who examined the results of Pramenka sheep in the territory of Bosnia.

Table 2. Results of changes in lamb weight by groups for the observed period of 1-60 days. (Author)

Lambs	*Weight*	Sd	p

	Day measurement	$\bar{X}$	min.	max.		
I group	1	3.66^{a}	3.33	3.80	0.250	0.522
	10	4.86^{b}	3.95	5.45	0.617	0.436
	20	6.77^{ab}	6.55	6.85	0.323	0.008^{**}
	40	8.52^{b}	6.95	10.05	0.983	0.234
	60	$9.78.^{a}$	7.89	10.89	0.860	0.517
II group	1	3.68^{a}	2.78	4.23	0.458	0.536
	10	4.76^{b}	4.15	5.65	0.436	0.700
	20	6.11^{ab}	5.35	6.85	0.416	0.050^{*}
	40	8.74^{b}	6.89	10.25	0.865	0.078
	60	10.09^{a}	8.13	11.25	0.938	0.158

min-minimum weight, max-maximum weight, $\bar{X}$ −arithmetic mean, sd-standard deviation, a,b = values in the same column with different superscripts are significantly different, p-statistical probability (*p <0.01 ** p <0.05)

The presented table shows that the mass of lambs at birth was almost identical in both examined groups. During the first measurement performed on the tenth day, the weight of the examined groups of lambs remained in the same proportion, i.e. with identical differences (10.00 g), while the measurements performed on the twentieth day showed statistical significance ($P < 0.05$) ($P < 0.01$).

The daily increments in lambs were constantly increasing in the examined groups. The body weights of lambs measured in the observed period showed that the nutrition and the rearing system had an impact on the shown daily and total growth.

Table 3 shows the results of the daily increments of the two groups of lambs and the total increments for the observed period (1-60 days).

Table 3. Total and daily growth of lambs for the observed period of 1-60 days. (Author)

Lambs	*Growth*	*Day measurement*				
		1	10	20	40	60
I group	*Total/kg*	-	1.300	3.210	4.736	7.396
	Daily/kg	-	0.130^{*}	0.191	0.166	0.266
II group	*Total/kg*	-	1.086	2.986	5.260	8.850
	Daily/kg	-	0.108	0.190	0.227^{**}	0.359^{**}

p-statistical probability* p<0.01 ** p<0.05

Differences between the groups occurred during the first measurement, on the tenth day, and in the course of the second measurement, on the twentieth day, in favour of the first group that suckled at will. However, after the stated period, when the digestive tract, primarily the gastrointestinal system, reached a certain level of physiological development, the daily and total growth was higher in the group of lambs that suckled once and consumed concentrated food and hay at will.

Similar studies and obtained results were presented in the works of Santos Silva et al. (2002) who studied the effects of a genotype and dietary system on meat quality and lambs´ weight at slaughter. Similar results, the impact of the ram genotype on the mass of lambs, were obtained by Maksimović et al. (2016). Also, Zechariah et al. (2013) examined the effects of rearing systems on the fattening and slaughter properties of lambs. The authors concluded that

the breeding system in combination with the influences of a genotype, diet, sex, and age affected the meat yield and quality. Finally, an intensive breeding system mostly has an advantage over the traditional one in terms of yield traits and meat quality.

CONCLUSION

Serbia has rather favourable natural conditions for the development of sheep production, even though it lags behind other countries, both in terms of its potential and the results it achieves. The largest part of the sheep population is Pramenka, whose body weight of lambs is about 3.5 kg at birth, or about 12 kg at the age of 60 days.

The fastest way to increase lamb meat production is to resort to sheep crossbreeding methods. In addition to the genotype, the method of cultivation and nutrition play a decisive role. Group (II) of lambs that suckled at will and were exposed once to concentrated food and hay showed lower increments in the second half of the experiment (from 40 to 60 days) compared to group (I) of lambs that suckled once and was fed concentrated food and consumed hay at will. The first group of lambs (I) in the period between 1 and 60 days achieved a total gain of 12.51 kg. The second group of lambs (II) in the period between 1 and 60 days achieved a total gain of 11.39 kg. The results indicate that the transition of lambs after lambing in the shortest period possible from milk to a diet of concentrated food is a sure way of achieving better growth in young heads. The reasons should be sought in the faster development of the digestive tract and resorption of food.

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