

# INFLUENCE OF SOME FACTORS ON FERTILITY AND WEIGHT OF SHEEP AND BODY WEIGHT DEVELOPMENT OF LAMBS

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**Abstract:** The research included a total of 921 lambs, 474 ewes and 8 sjenicke sheep rams from 4 different farms. The aim of the research was to examine the influence of the farm, cultivation technology and the influence of rams within the farm on production indicators. Statistical analysis showed that the body weight of lambs at birth ranged from 3.37 to 4.03 kg (average 3.68 kg), at 30 days from 11.51 to 12.41 kg (average 12.07 kg) and from 90 days from 27.82 to 29 kg (average 28.65 kg). A statistically highly significant influence of the farm was determined ( $P < 0.01$ ) on the body weight of lambs in all three control periods, as well as on the body weight of sheep and on the fertility of sheep. The influence of the ram on the body weight of the lambs at birth was statistically very significant within the farm ( $P < 0.01$ ). When it comes to the percentage share of birth type by farm, farm 1 had the most singletons (59.13%) both within the farm and in comparison between other farms, while there were fewer twins (40.87%), and triplets were not identified. On the other farms, the percentage of twins was the highest, and triplets were also present, while on farm 4 there were also quadruplets, lambs born as quadruplets (3.28%).

**Key words:** ram, the farm, reproductive performances, lambs

## Introduction

Both genetic and non-genetic (environmental) factors in farm animals affect reproductive traits. These factors can be categorized as factors relating to the animal's environment, related to its genotype. The effect of the ram is an important factor affecting the fertility of sheep, the timely introduction of a ram into a group of sheep promotes the detection of ewes in estrus in time, which aims to reduce the number of infertility in sheep (*Adjibode et al., 2017*). Productivity of sheep is determined by the fertility of the herd, and the success of sheep production mostly

depends on it (*García-Chávez et al., 2020*). Economically important traits on which the success of production also depends are the body weight of lambs measured at different age stages (*Petrović et al., 2012*). The average across breed weight at breeding had a positive effect on fertility and prolificacy (*Gaskins et al., 2005*). The number of reared lambs per ewe is a very good indicator of production success, which is influenced by both genetic and environmental factors (*Adjibode et al., 2017*). Numerous authors state that the degree of mortality, the vitality of the lambs, as well as the final weight (weighing weight) depends on the weight of the lambs at birth. (*Cloete et al., 2001; Zapasnikiene, 2002; Berhan and Arendonk, 2006; Petrovic et al., 2009; Bancheva et al., 2022*).

Ewe productivity and growth of lambs from birth to weaning are indicators of flock profitability (*Garcia-Chavez et al., 2020*). A larger number of lambs obtained per sheep has a positive effect on the production of lamb meat, which is what sheep production is mainly based on (*Assan, 2020*).

In general, a well-balanced meal improves the productivity of animals, this factor not only depends on whether the male and female sheep will be in breeding condition, but this factor also has a significant impact on the health of the animals, because only healthy animals can express their potential.

The aim of the research was to determine the fertility results of sheep and the movement of body mass of lambs in the period from birth to weaning, depending on the influence of the farm and the ram.

## Material and Methods

The examination of the reproductive and production characteristics of the parent flocks of the Sienica sheep was carried out on four private farms in the area of the Kolubar district. The research included a total of 921 lambs, 474 ewes and 8 barnyard sheep rams.

The number of heads per farm was: 128 adult sheep, 230 lambs and 2 rams (farm no. 1), 113 adult sheep, 217 lambs and 2 rams (farm no. 2), 123 adult sheep, 230 lambs and 2 rams (farm no.3) and 110 adult sheep, 244 lambs and 2 rams (farm no.4).

Heads were mated and lambled in the period from 2017 to 2018. During the research, the influence of the farm on the body mass of sheep and on the mass of lambs during the lactation period was analyzed.

The influence of the ram was measured through the mass of lambs at birth.

Statistical analysis of the obtained experimental data was performed using the statistical package Statistica for windows 7 (Stat. Soft. Inc.). The equality of variances of the analyzed treatments was tested using Levene's test. The influence of the farm (F) on the fertility and body weight of sheep and the weight of lambs from birth to weaning was investigated using the variance analysis method (one-

factor analysis). Also, the influence of the father on body weight of lambs at birth was tested within each farm using the analysis of variance method. Differences between the mean values of the investigated treatments were analyzed using Fisher's LSD test, T-test and HSD test. All analyzes were performed at a significance level of 0.05 and 0.01, and the obtained results are presented as means  $\pm$  standard deviation ( $\bar{x} \pm SD$ ).

## Results and Discussion

Table 1 shows the determined values of body weight and fertility of sheep on the investigated farms.

**Table 1. Influence of the farm on body weight (BW) and fertility of sheep**

	N	BW sheep $\bar{x} \pm SD$	CV (%)	N	Fertility $\bar{x} \pm SD$	CV (%)
The farm 1	182	66.18 <sup>C</sup> $\pm$ 3.65	5.52	182	1.25 <sup>cB</sup> $\pm$ 0.44	35.20
The farm 2	162	66.03 <sup>C</sup> $\pm$ 4.52	5.88	162	1.41 <sup>bA</sup> $\pm$ 0.54	38.30
The farm 3	144	76.81 <sup>A</sup> $\pm$ 2.62	3.97	144	1.51 <sup>abA</sup> $\pm$ 0.59	39.07
The farm 4	155	69.18 <sup>B</sup> $\pm$ 3.19	4.61	155	1.57 <sup>aA</sup> $\pm$ 0.66	42.04

a,b,c - means marked with lowercase letters are statistically significantly different at the 0.05 level  
A,B,C - means marked with lowercase letters are statistically significantly different at the 0.01 level.

From the results shown in Table 1, it can be seen that the body weight of the female gilts varied significantly across the observed farms ( $P < 0.01$ ).

The highest average body weight of 76.81 kg was determined in the sheep on farm 2, while sheep from farm 3 had the lowest body weight, which was 66.03 kg on average. Fertility of ewes expressed through litter size, i.e. the average number of lambs per ewe, was also significantly influenced by the farm ( $P < 0.01$ ).

Females from farms 3 and 4 where estrus synchronization was applied had more litters (1.51 and 1.57 respectively) compared to females from farms 1 and 2 (1.25 and 1.41) that were mated naturally, without the use of exogenous hormones to induce estrus. Ewes of different farms have different management practices and this may have an impact on fertility after AI (*Santolaria et al., 2011*). Ewes that are well fed have a higher body weight, and the potential to give birth to lambs with a higher initial body weight (*Koritiaki et al., 2013*).

Table 2 shows the average mean values with their standard deviation for the three measured characteristics, the body weight of the lambs at birth, at the age of 30 days and at the age of 90 days, depending on the farm.

**Table 2. The influence of the farm on the body weight (BW) of lambs from birth to 90 days of age**

	N	BW of lambs at birth $\bar{X} \pm SD$	CV (%)	N	BW lambs at 30 days $\bar{X} \pm SD$	CV (%)	N	BW lambs at 90 days $\bar{X} \pm SD$	CV (%)
The farm 1	230	3.64 <sup>B</sup> ± 0.61	16.76	230	12.18 <sup>B</sup> ± 0.98	8.05	230	28.85 <sup>A</sup> ± 1.81	6.27
The farm 2	217	3.37 <sup>C</sup> ± 0.61	18.10	217	11.51 <sup>C</sup> ± 0.71	6.17	217	27.82 <sup>B</sup> ± 1.86	6.69
The farm 3	230	4.03 <sup>A</sup> ± 0.66	16.38	230	12.41 <sup>A</sup> ± 0.97	7.82	230	29.00 <sup>A</sup> ± 2.01	6.93
The farm 4	244	3.68 <sup>B</sup> ± 0.70	19.02	244	12.12 <sup>B</sup> ± 1.07	8.83	244	28.85 <sup>A</sup> ± 2.06	7.14

A,B,C - means marked with lowercase letters are statistically significantly different at the 0.01 level

From the attached results shown in Table 2, the effect of farm on lamb body mass in all three control measurements was highly significant ( $P < 0.01$ ). The highest values of body weight of lambs were found on farm No. 3, and they averaged 4.03 kg at birth, 12.41 kg at the age of 30 days and 29 kg at the age of 90 days, while the lowest average body weights were lambs on farm No. 2 (3.37 kg, 11.51 kg and 27.82 kg respectively).

The influence of ram on body weight of lambs at birth within farms is shown in table 3.

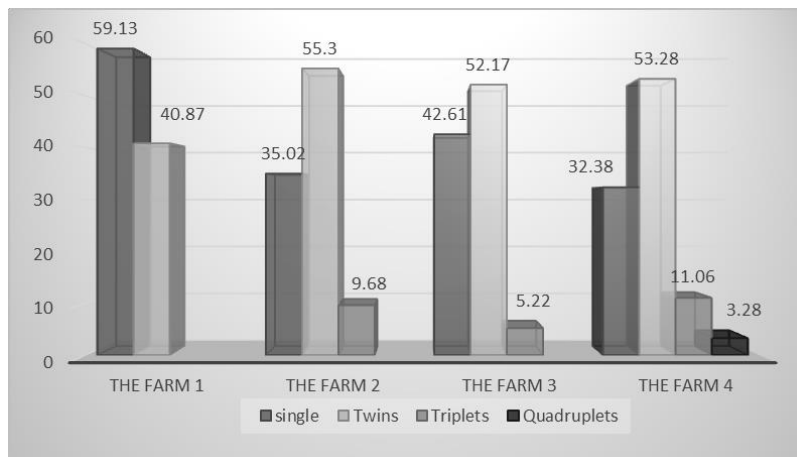
**Table 3. Influence of ram on body weight (BW) of lambs at birth**

	Ram (tattoo number)	N	BW of lambs at birth $\bar{X} \pm SD$	CV (%)
The farm 1	190	81	3.32 <sup>A</sup> ± 0.50	15.06
	7263	149	3.82 <sup>B</sup> ± 0.59	15.45
The farm 2	4335	109	3.48 <sup>A</sup> ± 0.52	14.94
	6198	108	3.84 <sup>B</sup> ± 0.64	16.67
The farm 3	727	124	3.83 <sup>A</sup> ± 0.61	15.93
	4308	106	3.42 <sup>B</sup> ± 0.53	15.50
The farm 4	3559	118	3.40 <sup>A</sup> ± 0.52	15.29
	8718	126	3.83 <sup>B</sup> ± 0.61	15.93

A,B - means marked with lowercase letters are statistically significantly different at the 0.01 level.

The highest average body weight of lambs at birth was found in the offspring of ram tattoo number 6198 on farm 2, while lambs of ram tattoo number 192 on farm 1 had the lowest body mass. The analysis showed statistical significance in the differences in lamb body weights between rams within farms ( $P < 0.01$ ). The results of our research agree with the results obtained by (Sánchez-Davila et al., 2015) in Saint Croix hair sheep informed the effect of ram was significant ( $P < 0.01$ ) on litter size and birth weight of lambs.

Graph 1 shows the percentage share of single lambs, twins, triplets and quadruplets by farms.



**Graph 1. Percentage share of singletons, twins, triplets and quadruplets by farms**

From the results shown in graph 1, it can be seen that in the structure of lambs by type of birth on farm 1 there were the most single lambs (59.13%), both within the farm and in comparison with other farms, while there were fewer twins (40.87 %), and triplets have not been determined. On the other farms, the percentage of twins was the highest, and triplets were also present, while on farm 4 there were also quadruplets, i.e. lambs born as quadruplets (3.28%).

## Conclusion

By researching the influence of the farm and the ram on the weight of the lambs in the lactation period (weight at birth, at the age of 30 and 90 days of age), the following results were obtained:

- The influence of the farm on the fertility and mass of the sheep was highly statistically significant ( $P < 0.01$ ).
- The effect of farm on lamb weight from birth to 90 days of age was highly statistically significant ( $P < 0.01$ ).
- The effect of ram on lamb birth weight was statistically highly significant ( $P < 0.01$ ) within each farm.

Successful sheep production in today's conditions requires knowledge of biological, technological, organizational and marketing factors. The application of

the most modern technological achievements and technology is the key to the manifestation of the maximum performance of quality genetics.

## Uticaj nekih faktora na plodnost i masu ovaca i telesnu razvoj jagnjadi

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### Rezime

Istraživanjem je obuhvaćeno ukupno 921 jagnje, 474 ovce i 8 sjeničkih ovnova sa 4 različite farme. Cilj istraživanja je bio da se ispita uticaj farme, tehnologije gajenja i uticaj ovnova u okviru farme na proizvodne pokazatelje. Statistička analiza je pokazala da se telesna masa jagnjadi pri rođenju kretala od 3,37 do 4,03 kg (prosečno 3,68 kg), na 30 dana od 11,51 do 12,41 kg (prosečno 12,07 kg) i od 90 dana od 27,82 do 29 kg (prosečno 3,68 kg)<sup>28</sup>. Utvrđen je statistički visoko značajan uticaj farme ( $P < 0,01$ ) na telesnu masu jagnjadi u sva tri kontrolna perioda, kao i na telesnu masu ovaca i na plodnost ovaca. Uticaj ovnova na telesnu masu jagnjadi na rođenju bio je statistički veoma značajan u okviru svake farme ( $P < 0,01$ ). Kada je reč o procentualnom učešću tipa rođenja po farmama, farma 1 je imala najviše jedinaca (59,13%) kako u okviru farme tako i u poređenju sa ostalim farmama, dok je blizanaca bilo manje (40,87%), a trojke nisu identifikovane. Na ostalim farmama procenat blizanaca je bio veći a bilo je i trojki, dok su na farmi 4 bila i jagnjad rođena kao četvorke (3,28%).

**Ključne reči:** ovan, farma, reproduktivni pokazatelji, jagnjad

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