

## **Weight development and growth intensity of lambs from the Middle Rhodopean and Karakachan breeds**

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### **Abstract**

Todorov, P., Odzhakova, Ts. & Staykova, G. (2023). Weight development and growth intensity of lambs from the Middle Rhodopean and Karakachan breeds. *Bulg. J. Agric. Sci.*, 29 (3), 514–518

Subject of the study were 130 ewes at second lactation from the Middle Rhodopean and Karakachan breeds, with their offspring reared in the Middle Rhodopean region. The aim of the present study was to investigate weight development and growth intensity of lambs from both breeds by periods from birth to weaning. The research was conducted in two farms with Karakachan sheep and Middle Rhodopean sheep in 2020. The weight development of lambs at birth, at 10, at 30 and at 70 days and the achieved growth for the respective periods was monitored. It was found that the average live birth weight of female lambs from the Karakachan breed was 2.801 kg, and that of males was 3.009 kg. The highest average live weight of 3.834 kg was found in male lambs from the Karakachan breed, reared at the farm of the Research Centre of Stockbreeding and Agriculture. The average live weight at birth of female lambs from the Middle Rhodopean breed was 3.739 kg, and of males – 3.968 kg. The highest average live weight of 4.266 kg was found in male lambs from the Middle Rhodopean breed in the farm in Borino village. Male and female lambs from the Middle Rhodopean breed were born with a significantly higher live weight, compared to lambs from the Karakachan breed. Male lambs from the Karakachan breed in the period up to 30 days had the greatest average daily gain – 0.246 kg. The highest average daily gain (0.339 kg) was achieved by female lambs from the Middle Rhodopean breed in the period up to 30 days.

*Keywords:* Karakachan sheep breed; Middle Rhodopean sheep breed; live weight; average daily gain; growth intensity

### **Introduction**

In recent years, there has been a heightened interest in local breeds in animal husbandry. The possibilities to preserve the existing genetic resources in line with the European trends in the sector and increased demand for ecologically clean and healthy production are the main reasons for this.

The study and analysis of productive characteristics of lambs from the aboriginal breeds will give us important guidelines for their breeding. The local breeds are distinguished by relatively low productivity, but the realized production is clean, of high quality and unique taste.

The Middle Rhodopean sheep breed is a typical representative of the local breeds with a combined purpose (meat, milk and wool), reared extensively in the highland pastures and foothills of the Rhodopes. The first information about these sheep comes from Dechev (1905), who established the average live weight of ewes – 25 kg, rams – 40 kg, 1-year-old ewes – 23 kg., wool production – 1850 g from rams and 950 g from ewes. Marinov (1973), in his scientific works made extensive studies on the growth, body forms and meat-producing qualities of the Middle Rhodopean sheep. Odjakova (2014), Odjakova et al. (2019), Vasilev et al. (2000), studied growth intensity, milk yield and exterior

measurements in Middle Rhodopean sheep.

The Karakachan sheep breed is reared mainly in the mountainous and semi-mountainous regions of Bulgaria, mainly in the southwestern and southern regions of the country (Staykova et al., 2015).

Live weight is the main productive characteristic, an indicator of their development and physiological status. The dynamics of live weight determines the possibilities for realizing a certain level of productivity. The weight of sheep depends on a number of factors, including breed, sex, age, year of birth and production, type of birth, breeding technology, etc. (Odjakova et al., 2010; Odzakova et al., 2020, 2021; Staikova & Stancheva, 2009; Vuchuov et al., 2008; 2020).

Popova et al. (2007a, 2015), Slavova & Staykova (2021), found that from 40% to 80% of the income in sheep farming in the different productive areas is from the sale of lambs. In meat and indigenous sheep farming, the main income is generated from the sale of lambs for meat. Staikova (2005) found that 69.34% of the relative share of income of a farm with Karakachan sheep was derived from meat income. The sale of lambs immediately after weaning is a traditional practice, and opportunities to create growth during this period are important for the economic survival of farms.

The aim of the present study was to investigate the weight development and growth intensity of lambs from the Middle Rhodopean and Karakachan breeds, reared in the Rhodope region.

## Material and Methods

The study was carried out in 2020. Subject of the study were 67 ewes from the Karakachan breed and 63 ewes of the Middle Rhodopean breed in their second lactation, clinically healthy and in good general condition. Sheep were reared extensively from May to September, and in barns from October to April. The offspring from both breeds was 112. The

weight development of male and female lambs at birth at 10, 30 and 70 days, and the achieved growth for the respective periods until weaning were monitored.

Statistical processing of the data was performed using the variational statistics method with Excel 2016.

## Results and Discussion

The live weight data of Karakachan lambs at birth, at 10, at 30 and at 70 days is presented in Table 1.

Male lambs of the Karakachan breed were born with a higher live weight than females (by 7.4%), but the difference was not statistically significant. The obtained data on live weight at birth were analogous to the results obtained by Kafedjiev (1997) – 3.03 kg. The values of the coefficient of variation for the live weight index of female lambs ranged from 15.03% to 22.70%, and for males from 13.50% to 23.05%, which indicates a high degree of uniformity in the studied sample.

The average daily gain of male lambs on the 10<sup>th</sup> day was 0.246 kg and was not significantly different from that of female lambs – 0.223 kg. The difference between the two groups in terms of live weight at 30 days was 1.057 kg and represents 12.5%, at  $P \leq 0.05$ . The difference between the two groups at 30 days in terms of average daily gain was 13.5%, and the same was not mathematically proven. Highly significant differences were found between live weights and average daily gain at 70 days ( $P \leq 0.001$ ) in males versus female Karakachan lambs.

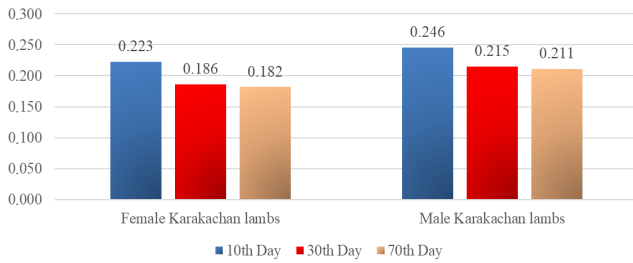
The growth intensity can be traced by means of the changes in the average daily gain of the offspring during the individual periods (Figure 1).

Male lambs from the Karakachan breed had a higher average daily gain, compared to females during all studied periods. The obtained data corresponds with that of Genkovski (2002) -7.89% higher growth intensity of male Karakachan

**Table 1. Live weight of Karakachan lambs at birth, at 10, 30 and 70 days**

Traits	Breed/Group								Signifi- cance
	Karakachan females				Karakachan males				
	n	$\bar{x}$	$\pm Sx$	C	n	$\bar{x}$	$\pm Sx$	C	
Live weight at birth, kg	26	2.801	0.116	21.11	35	3.009	0.117	23.05	–
Live weight at 10 days, kg	26	5.031	0.224	22.70	35	5.466	0.174	18.88	–
Average daily gain up to the 10 <sup>th</sup> day, kg/day	26	0.223	0.026	59.38	35	0.246	0.018	42.90	–
Live weight at 30 days, kg	26	8.392	0.358	21.73	35	9.449	0.303	19.00	*
Average daily gain from birth to 30 <sup>th</sup> day, kg/day	26	0.186	0.015	40.16	35	0.215	0.011	30.29	–
Live weight at 70 days, kg	26	15.546	0.458	15.03	35	17.769	0.405	13.50	***
Average daily gain from birth to 70 <sup>th</sup> day, kg/day	26	0.182	0.007	19.36	35	0.211	0.006	16.83	***

\* –  $P \leq 0.05$ , \*\* –  $P \leq 0.01$ , \*\*\*-  $P \leq 0.001$



**Fig. 1. Dynamics of the average daily gain on the 10, 30 and 70 day in female and male lambs from the Karakachan breed**

lambs, compared to that of females. The obtained data on growth intensity corresponds to the data obtained by Staykova (2005) – 0.216 kg/day and are higher than the data, obtained by Nedelchev & Stoyanov (2004) – 0.180 kg/day.

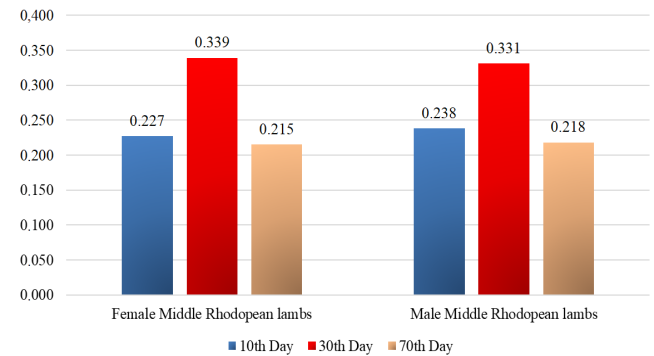
Live weight data of lambs from the Middle Rhodopean breed during the study period are shown in Table 2. Male lambs were born with 0.229 kg higher live weight than female lambs, the difference of 5.77% was not statistically significant. Odjakova (2014) obtained similar results for live weight of lambs in a study of three farms in the middle Rhodopes and found average live weights for female lambs at birth ranging from 2.860 – 3.760 kg and for males from 3.590 – 4.130 kg. The obtained data were higher in value than the results, established by Marinov (1973) and Vasilev et al. (2000), 2.694 kg and 3.034 kg respectively, which was due to the improved feeding and rearing conditions of the animals.

The female lambs of the Middle Rhodopean breed grew intensively and reached the live weight of the males in the period up to 30 days. Marinov (1973) and Vasilev et al. (2000), obtained the following results for live weight of 30 day-old lambs of the same breed – 6.899 kg and 7.820 kg, respectively, which was 50.4% and 43.72% lower live weight, compared to the results obtained for lambs from the Middle Rhodopean breed. The high weight at 30 days in the

examined female and male lambs of the Middle Rhodopean breed was due to the application of improved breeding technology and feeding conditions. The results, obtained at 70<sup>th</sup> day at weaning of the lambs from the Middle Rhodopean breed were close to the results, obtained by Odjakova (2014), who found that the live weight after weaning varied from 19.390 to 21.110 kg. Marinov (1973) and Vasilev et al. (2000), established 12.950 and 15.430 kg live weight at weaning of Middle Rhodopean lambs, respectively. The values of the coefficient of variation for the live weight trait of female lambs ranged from 11.02% to 26.11%, and for males from 7.37% to 17.83%.

Average daily gain (Figure 2) of lambs from the Middle Rhodopean breed increased from birth to the 30<sup>th</sup> day in both groups, then decreased in the final period until weaning. The obtained data on the average daily gain on the 70<sup>th</sup> day (0.218 kg) were higher than the results, obtained by Marinov (1973) – 0.160 kg and were close to those, obtained by Odjakova (2014).

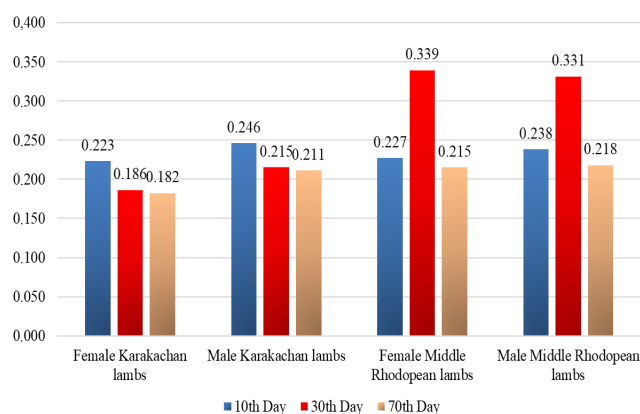
The values for the average daily gain trait in female lambs from the Middle Rhodopean breed until weaning ranged from 0.195 – 0.212 kg/day, and in males ranged from 0.228 – 0.244 kg/day.



**Fig. 2. Dynamics of the average daily gain at 10, 30 and 70 days in female and male lambs from the Middle Rhodopean breed**

**Table 2. Live weight of Middle Rhodopean lambs at birth, at 10, 30 and 70 days**

Traits	Breed / Group								Significance
	Middle Rhodopean females				Middle Rhodopean males				
	n	$\bar{x}$	$\pm Sx$	C	n	$\bar{x}$	$\pm Sx$	C	
Live weight at birth, kg	23	3.739	0.086	11.02	28	3.968	0.118	15.69	–
Live weight at 10 days, kg	23	6.013	0.327	26.11	28	6.350	0.214	17.83	–
Average daily gain up to the 10 <sup>th</sup> day, kg/day	23	0.227	0.031	65.59	28	0.238	0.013	28.31	–
Live weight at 30 days, kg	23	13.896	0.636	21.96	28	13.900	0.324	12.34	–
Average daily gain from birth to 30 <sup>th</sup> day, kg/day	23	0.339	0.021	29.13	28	0.331	0.010	15.26	–
Live weight at 70 days, kg	23	18.761	0.491	12.56	28	19.257	0.268	7.37	–
Average daily gain from birth to 70 <sup>th</sup> day, kg/day	23	0.215	0.007	15.54	28	0.218	0.004	8.51	–



**Fig. 3. Comparative assessment of the dynamics of the average daily gain at 10, 30 and 70 days in both breeds**

A comparative assessment of the weight development of female and male lambs of both breeds at birth, at 10, at 30 and at 70 days is presented in Figure 3.

Male and female lambs from the Middle Rhodopean breed were born with higher live weight ( $P \leq 0.001$ ), compared to lambs from the Karakachan breed. The values for the coefficients of variation in the Karakachan lambs were 23.05% for the male animals, and 21.11% for the female animals and indicated a higher variability, compared to that of the Middle Rhodopean lambs. The analysis of the results on the 10<sup>th</sup> day indicate that the Karakachan lambs exhibited a higher growth intensity and reduced the difference in live weight, compared to the Middle Rhodopean lambs. The average daily gain of male Karakachan lambs was 3.4% higher than the average daily gain of Middle Rhodopean lambs. We observed a multidirectional trend in the average daily gain of the lambs from both breeds during the second studied period up to 30 days, when a significantly higher intensity of growth was found in the lambs from the Middle Rhodopean breed ( $P \leq 0.001$ ). Female Middle Rhodopean lambs achieved 0.339 kg average daily gain in contrast to Karakachan lambs, which reached 0.186 kg average daily gain for the same period, the difference is 44.35%. The difference between the male lambs from the Middle Rhodopean and Karakachan breeds in the second study period (35.05%) had great significance ( $P \leq 0.001$ ). Therefore, Middle Rhodopean lambs grew intensively in the second period until the 30<sup>th</sup> day, after which their growth slowed down until the 70<sup>th</sup> day, when the average daily gain between the two breeds at 70 days was almost equalized, with a difference of only 3.23%. (Figure 3).

## Conclusions

The average live weight at birth of female lambs from the Karakachan breed was 2.801 kg, and of males – 3.009 kg. The highest average live weight (3.834 kg) was established in male lambs from the Karakachan breed in the farm of the Research Center for Stockbreeding and Agriculture.

Average live weight at birth of female lambs from the Middle Rhodopean breed was 3.739 kg, and of male lambs – 3.968 kg. The highest average live weight (4.266 kg) was established in male lambs of the Middle Rhodopean breed in the farm in Borino village.

Male and female lambs from the Middle Rhodopean breed were born with significantly higher live weight, compared to the lambs from the Karakachan breed.

The highest average daily gain of 0.246 kg was established in male lambs from the Karakachan breed in period up to 30 days. The highest average daily gain (0.339 kg) was established in female lambs from the Middle Rhodopean breed during the 30-day period.

## References

- Dechev, V. (1905). Pasturage in the Middle Rhodopeans. *Oralo*, 21, (Bg).
- Genkovski, D. (2002). Comparative characterization of sheep of different breeds, cultivated in the conditions of Central Stara Planina, Dissertation, Bulgarian Academy of Sciences, Sofia, Bulgaria.
- Kafedjiev, V. (1997). Phenotypic and Genetic parameters of some basic produce trains in Karakachan sheep. Sources of specific effect. *Bulg. J. Agric. Sci.*, 3, 187-192.
- Marinov, Y. (1973). Study on Srednorhodopska sheep and their crosses with Tsigai rams. Dissertation, Bulgarian Academy of Sciences, Sofia, Bulgaria, (Bg).
- Nedelchev, D. & Stoyanov, B. (2004). Breeding program for preservation of the Karakachan and Coppered sheep. Collection Breeding Programs, Bioselena, Karlovo, 58-85, (Bg).
- Odjakova, Ts. (2014). Productivity characteristics of Srednorhodopska local sheep. *Bulgarian Journal of Animal Husbandry*, 41 (1-2), 30-32, (Bg).
- Odjakova, Ts., Popova, Y., Laleva, S., Slavova, P. & Dimova, V. (2010). Economic efficiency in the sheep flock of Karakachan sheep breed. *Bulgarian Journal of Animal Husbandry*, 48 (3), 24-27, (Bg).
- Odjakova, Ts., Todorov, P. & Zgurova, A. (2019). Monitoring and trends for development of Srednorhodopska sheep. Proceedings of the 12th International Symposium Modern Trends in Livestock Production, 382-390.
- Odjakova, Ts., Staykova, G., Todorov, P. & Zgurova, A. (2020). Breeding program for the Karakachan sheep breed. Smolyan, Bulgaria, 21, (Bg).
- Odzhakova, Ts., Staikova, G. & Todorov, P. (2021). Character-

- istics of Karakachan sheep breed reared under different conditions. *Scientific Papers. Series D. Animal Science*, 64 (1), 63-68.
- Popova, J., Laleva, S., Slavova, P., Krastanov, J. & Stanev, S.** (2007a). Economic efficiency of dairy and meat-producing sheep farms in the intensive regions of the country, "Sheep Breeding in Bulgaria and in Europe". Collection of Scientific Reports, 245-249, (Bg).
- Popova, Y., Laleva, S., Taneva, M., Krastanov, J. & Slavova, P.** (2015). Effectiveness of the breeding of race Mouton Charolais in Bulgaria. III Symposium of Livestock Production with International Participation, Makedonia, 115-118.
- Slavova, S. & Staikova, G.** (2021). Economic aspect of breeding Karakachan sheep in the lowlands. *Bulgarian Journal of Animal Husbandry*, 58 (5), 24- 31, (Bg).
- Staikova, G. & Stancheva, N.** (2009). Effect of some factors on the live weight in sheep at different ages from the northeast Bulgarian fine fleece breed–shumen type. *Bulg. J. Agric. Sci.*, 15(4), 365-372.
- Staykova, G.** (2005). Study on the value of the productive traits in sheep from the Karakachan breed and the Copper-Red Shumen strain. Dissertation, Sofia, Bulgaria.
- Staykova, G., Stancheva, N. & Dimitrova, I.** (2015). Karakachan sheep breed. *Bulgarian Journal of Animal Husbandry*, 52(5), 81-89, (Bg).
- Vasilev, D., Dimov, D. & Odjakova, Ts.** (2000). Dynamics of productive ability of Srednororopska native sheep. *Macedonian Agricultural Review*, 47(1-2), 65-69, (Mk).
- Vuchkov, A.** (2020). Carcass traits of lambs from Karakachan sheep, slaughtered at weaning at 90 days of age. *KNOWLEDGE International Journal*, 4, 831-836.
- Vuchkov, A. & Dimov, D.** (2008). Study on live weight and growth rates of weaned lambs of the White Maritsa sheep breed. *Bulgarian Journal of Animal Husbandry*, 45 (4), 41-45, (Bg).

Received: January, 04, 2023; Approved: January, 19, 2023; Published: June, 2023