

## **Productive indices of sheep breeds and varieties reared in the conditions of Central Balkan mountains\*\***

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\*\* Original scientific paper – Originalni naučni rad

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**Main productive indicators (live weight, wool-yield, wool length, economic fertility, biological fertility) at different ages of sheep from Karakachanska breed and Local Sredno Staroplaninsko and Tetevensko varieties were examined.**

**The results showed that the sheep from Tetevensko variety indicated the highest values of live weight from the birth to 3.5 years of age, and the lowest – those from Karakachanska breed.**

**The highest value of mean daily growth was examined from the birth to 3-months age in all groups of the study. It was highest for Tetevensko variety – 0.240 kg and for Karakachanska breed – the lowest, 0.217 kg, respectively.**

**The highest wool-yield in all groups was at 18-months age – Karakachanska breed – 3.65 kg, Sredno Staroplaninsko variety – 3.42 kg, Tetevensko variety – 3.75 kg and with age it decreased.**

**The sheep from Karakachanska breed at 18-months age were with the longest wool – 28.15 cm, and with the shortest one from Tetevensko variety at 4.5-years of age– 13.03 cm. With age it decreased insignificantly in all groups.**

**The sheep from Tetevensko variety, followed by those from Local Sredno Staroplaninsko variety, indicated the highest values of economic and biological fertility.**

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**Key words:** live weight; wool yield; wool length; economic fertility; biological fertility

## Introduction

Sudden change in the technology of rearing local breeds and varieties has happened in the last 3-4 decades. From typical nomadic way of rearing in all the year they have changed into pasture-shed. In this way they have had better conditions of nutrition and rearing. As a result of this the main productive indices – live weight, wool-yield and fertility were increased.

Main productive indices of Karakachanska breed were examined in the years from the beginning of last century till nowadays from: *Aleksieva (1979)*, *Balevska (1970)*, *Genkovski (2003)*, *Savov (1964)* and *Hlebarov (1942)*.

The main productive indices - live weight, wool-yield, wool-length and fertility of Karakachanska breed, Local Sredno Staroplaninsko and Tetevensko varieties to be examined were the aim of this study. These sheep were reared in Central Balkan Mountains in the new conditions of market economy.

## Materials and methods

The study was performed on sheep from Karakachanska breed, reared at the Experimental Base of the Research Institute of Mountain Stockbreeding and Agriculture-Troyan, from Tetevensko variety, reared at the private sector in the region of Teteven – the village of Ribaritsa and from Local Srednostaroplaninsko variety, reared in Apriltsi.

The number of the animals was different and depended on the concrete conditions of the herds in different years. The following productive indices – live weight, average daily growth, wool-yield, natural wool length and fertility were examined. The results were processed using statistical variation techniques.

## Results and discussion

Table 1 lists the data of average live weight of female sheep from the birth to 3.5-years of age. From those data it is observed that Karakachanska breed female lambs had the lowest value - 3.40 kg and the highest – those from Tetevensko variety – 4.50 kg. The value of the live weight of Srednostaroplaninsko variety was between the other two – 4.10 kg. The differences between the groups in comparison with Karakachanska breed were mathematically proved –  $P < 0.001$ .

**Table 1. Live weight of animals of local breeds and varieties from birth to 3.5 years of age****Tabela 1. Telesna masa ovaca lokalnih rasa i varijeteta od rođenja do uzrasta od 3,5 godine**

Breeds/ Rase	Age/Uzrast											
	At birth/na rođenju			3 months/meseca			6 months/meseci			9 months/meseci		
	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C
<i>Karakachanska breed</i>												
	92	3.4±0.1 8	4.67	85	23.0±0.6 2	10.52	34	28.0±0.6 2	9.70	32	35.5±0.7 9	9.39
<i>Local Srednostaroplaninsko variety</i>												
	68	4.1±0.40	6.12	65	24.0±0.6 5	8.25	40	32.0±0.7 5	10.10	36	33.0±1.1 0	14.1 1
<i>Tetevensko variety</i>												
	40	4.5±0.45	5.15	40	26.1±0.5 2	6.14	24	35.3±0.6 4	8.16	24	37.5±0.8 5	7.15
<i>Karakachanska breed</i>												
Breeds / Rase	Age/Uzrast											
	12 months/meseci			18 months/meseci			2.5 years/godine			3.5 years/godine		
	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C
<i>Karakachanska breed</i>												
	30	37.5±1.1 4	10.5 8	30	39.5±1.1 1	7.62	26	42.5±0.5 6	9.15	24	44.5±0.6 5	8.15
<i>Local Srednostaroplaninsko variety</i>												
	20	38.0±1.2 5	7.25	30	44.0±0.8 5	4.25	30	46.0±0.6 3	7.15	28	46.8±0.5 8	6.25
<i>Tetevensko variety</i>												
	22	40.2±0.8 5	7.85	20	45.0±0.6 3	6.15	18	48.5±0.5 0	7.88	18	48.4±0.6 4	5.16

The results for average live weight of female lambs at 3-months of age (at weaning) showed insignificant differences between the groups. The lambs from Tetevensko variety had the highest value – 26.10 kg, followed by Local Srednostaroplaninsko variety – 24.0 kg. The lambs from Karakachanska breed had the lowest value – 23.0 kg. The differences between the groups in comparison with Tetevensko variety were mathematically proved –  $P < 0.001$ .

The weaned lambs from Tetevensko variety at 6 months were heavier with 7.3 kg in comparison with those from Karakachanska breed and with 3.3 kg than Staroplaninsko variety. The differences between the indicated groups were mathematically proved –  $P < 0.001$ .

At 9 months the live weight between the groups varied within the limits of 33.0 kg of Srednostaroplaninsko variety to 37.5 kg of Tetevensko variety.

From the analysis of the received results for the mean live weight of the animals, aged from 12 months to 3.5 years, we can conclude that they have comparatively high values for the indices. This was confirmed by the percentage proportion of ewe lamb (18-months of age) live weight to that of 3.5-years aged. For Srednostaroplaninsko variety it reached the value of 94.01 %, for Tetevensko variety – 92.97 %, and for Karakachanska breed – 88.76 %. At these ages in all groups there was a trend of reaching a high value of live weight for Tetevensko variety, followed by Srednostaroplaninsko variety. The animals from Karakachanska breed were with the lowest value of live weight. These data were lower than the ones determined by *Genkovski (2003)*.

The values of average daily growth in different breed group and ages were shown in Table 2. To the weaning (3 months), the highest value of mean daily growth 0.240 kg was reached by the female lambs from Tetevensko variety, followed by those from Srednostaroplaninsko variety – 0.221 kg. With age, the mean daily growth decreased in all groups. Its value was the lowest at 6-9 months of age and it was within the limits of 0.001 kg for Karakachanska breed to 0.024 kg – for Tetevensko variety. This was normal because of the fact that this was a period of transferring from shed rearing to pasture one.

**Table 2. Growth of animals to 18 months of age**  
**Tabela 2. Porast ovaca do uzrasta od 18 meseci**

Breeds/Rase	To 3 months/do 3 meseca		3-6 months/meseci		6-9 months/meseci		9-12 months/meseci		12-18 months/meseci	
	Growth in general/porast	Mean daily growth/Srednji dnevni porast	Growth in general/porast	Mean daily growth/Srednji dnevni porast	Growth in general/porast	Mean daily growth/Srednji dnevni porast	Growth in general/porast	Mean daily growth/Srednji dnevni porast	Growth in general/porast	Mean daily growth/Srednji dnevni porast
<i>Karakachanska breed</i>	19.6	0.217	5.00	0.055	5.00	0.001	4.00	0.044	2.00	0.022
<i>Local Srednostaroplaninsko variety</i>	19.9	0.221	8.00	0.088	1.00	0.011	5.00	0.055	6.00	0.066
<i>Tetevensko variety</i>	21.6	0.240	9.20	0.102	2.20	0.024	2.70	0.030	4.80	0.053

The highly expressed trend of high average daily growth to 9-months of age showed that the biological potential in all the three groups was realized till reaching of that age. The animals reached 77 % of live weight for those completed their growth (2.5-years aged).

The determined average values of wool clip for the local breeds and varieties, reared in the conditions of Central Balkan Mountains, for different

ages were shown in Table 3. From the results it was observed that at 18-months aged the groups were with nearly equal absolute values: 3.750 kg for Tetevensko variety, 3.650 kg – for Karakachanska breed and 3.420 kg for Local Srednostaroplaninsko variety. For Karakachanska breed, the indicated values were significantly higher than those announced from some authors in the past (*Savov, 1964; Hlebarov, 1940*). The differences between the groups in comparison with Karakachanska breed were mathematically proved with  $P < 0.001$ .

**Table 3. Wool-yield of sheep from the local breeds and varieties in ages**  
**Tabela 3. prinos vune ovaca lokalnih rasa i varijeteta različitog uzrasta**

Breeds/ rase	Age/uzrast											
	18 months/meseci			2.5 years/godine			3.5 years/godine			4.5 years/godine		
	n	$\bar{x} \pm Sx$	C	n	$\bar{x} \pm Sx$	C	n	$\bar{x} \pm Sx$	C	n	$\bar{x} \pm Sx$	C
<i>Karakachanska breed</i>												
	38	3.65±0.2 2	4.11	35	3.50±0.1 8	4.50	32	3.52±0.1 1	3.50	30	3.28±0.1 6	2.25
<i>Local Srednostaroplaninsko variety</i>												
	32	3.42±0.0 9	4.25	31	2.95±0.0 8	2.25	27	3.15±0.0 7	4.45	25	3.05±0.1 1	3.25
<i>Tetevensko variety</i>												
	18	3.75±0.0 8	7.15	18	3.45±0.1 2	3.85	16	3.60±0.0 6	3.25	16	3.25±0.0 8	3.16

At the rest ages (2.5, 3.5 and 4.5 years) significant differences in the breed groups were not observed. The variation of this indicator was within very narrow limits – from 3.05 % for Local Srednostariplaninsko variety at 4.5 years aged to 3.85 % for Tetevensko variety at 2.5 years aged. With ages the variation coefficients decreased. The variation in the groups was not high and it was within permanent limits.

The average values of the measured in classification natural wool length of the included in the study breeds and varieties are reported in Table 4. It is observed from the data in the table that the animals from Karakachanska breed at 18-months age were with the longest wool – 28.15 cm. This was so because this indicator was genetically dependant and it was a subject of selection. In the varieties the ones from Tetevensko exceeded those from Srednostaroplaninsko with 0.37 cm. The differences between the groups in comparison with Tetevensko variety were mathematically proved –  $P < 0.001$ .

**Table 4. Natural wool length of sheep in breeds, varieties and ages**  
**Tabela 4. Prirodna dužina vune kod ovaca različitih rasa, varijeteta i uzrasta**

Breeds/ Rase	Age/Uzrast											
	18 months/meseci			2.5 years/godine			3.5 years/godine			4.5 years/godine		
	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C	n	$\bar{x} \pm S\bar{x}$	C
<i>Karakachanska breed</i>												
	38	28.15±0. 14	10.1 5	35	25.03±0. 18	9.45	32	24.26±0. 23	11.0 3	30	23.20±0. 25	12.1 4
<i>Local Srednostaroplaninsko variety</i>												
	32	14.25±0. 15	14.1 4	31	13.42±0. 21	14.4 3	27	12.85±0. 16	9.14	25	12.42±0. 14	15.0 5
<i>Tetevensko variety</i>												
	18	14.85±0. 16	11.2 3	18	14.03±0. 16	12.2 2	16	13.48±0. 21	14.0 4	16	13.03±0. 18	14.4 2

At 2.5 years of age in all groups decrease of the average values was observed. At this age, again the longest was the wool from Karakachanska breed – 25.30 cm. This decrease was with 2.85 cm, and in the varieties it was with 0.82 for Tetevensko variety and with 0.83 for Staroplaninsko variety, respectively. There was a trend that with ages, the values of wool length was decreasing and they were lowest at the age of 4.5 years, in all groups. The variation in the groups was low and it varied in permanent limits in the corresponding group. The differences between the groups were mathematically proved –  $P < 0.001$ .

The data of the average values of economic and biological fertility are indicated in Table 5. From the gained results it is obvious that the economic fertility was within the limits from 93.75 % at third lamb for Tetevensko variety to 100 % at second lamb for the same variety. At first lamb it was the lowest for all the groups and varied from 94.73 % for Karakachanska breed to 96.87 % - for Local Srednostaroplaninsko variety. With getting the animals older, the economic fertility was increasing and it reached the following values: for Karakachanska breed – 94.28 % and 100 % for Tetevensko variety. For the Srednostaroplaninsko variety the differences between second and third lamb were not significant – 96.17 % and 96.29 %, respectively. In the groups the differences were insignificant, at first lamb it was 2.1 %, at second one – 5.72 % and at third one – 2.54 %.

**Table 5. Economic and biological fertility in breeds and varieties**  
**Tabela 5. Ekonomska i biološka plodnost ovaca različitih rasa i varijeteta**

Indicators/ Pokazatelji									
Serial lambing/ Jagnjenje po redu	At 1 <sup>st</sup> lambing/ 1. jagnjenje			At 2 <sup>nd</sup> lambing/ 2. jagnjenje			At 3 <sup>rd</sup> lambing/ 3. jagnjenje		
Type of fertility/ Vrsta plodnosti	n	Economic fertility/ Ekonom. plodnost	Biological fertility/ Biol. plodnost	n	Economic fertility/ Ekonom. plodnost	Biological fertility/ Biol. plodnost	n	Economic fertility/ Ekonom. plodnost	Biological fertility/ Biol. plodnost
<b>Breeds</b>									
<i>Karakachanska breed</i>	38	94.73	103.26	35	94.28	106.06	32	93.79	106.25
<i>Local Srednostaroplaninsko variety</i>	32	96.87	106.25	31	96.17	112.90	27	96.29	114.81
<i>Tetevensko variety</i>	18	94.44	111.11	18	100.00	116.66	16	93.75	131.25

The biological fertility in all the three groups was over 100 % and it was within the limits from 103.26 % at first lamb for Karakachanska breed to 131.25 % at third lamb for Tetevensko variety. The highest value of biological fertility between the groups was determined at third lamb and it was within the limits from 106.25 % for Karakachanska breed to 131.25 % for Tetevensko variety. At first lamb the difference between the groups between the lowest and the highest values of biological fertility was 7.89 % and at second – 10.60 %.

The animals from Tetevensko variety had the highest values of biological fertility at all the three ages, and those from Karakachanska breed – the lowest values.

The higher values of the economic and the biological fertility, for both varieties (Tetevensko and Srednodaroplaninsko), can be explained with the better cares regarding to the nutrition and rearing of the animals on the private farms.

## Conclusion

The results of the study of the productive indices of local breeds and varieties, reared in the conditions of Central Balkan Mountains, showed significant variation of the indicators.

The animals from Tetevensko variety was with the highest values of live weight both at birth and at all ages, while the lowest was of those from Karakachanska breed.

Till weaning (3 months of age), the highest values of average daily growth were reported for the female animals from Tetevensko variety – 0.240 kg, followed by those from Srednostaroplanisnko variety – 0.221 kg.

The highest average wool-yield had the animals from Tetevensko variety at 18 months of age, followed by Karakachanska (3.65 kg) at the same age. The lowest was the wool clip in all groups at 4.5-years age.

From the examined local sheep the longest was the wool for those from Karakachanska breed at 18-months age – 28.15 cm. The wool length for those from Tetevensko and Srednostaroplaninsko variety was significantly less – 12.42 cm and 13.03 cm at 4.5-years age, respectively. With ages it decreased insignificantly.

The highest values of both economic and biological fertility were reported for the animals from Tetevensko variety.



# Proizvodni pokazatelji rasa i varijeteta ovaca gajenih u uslovima Centralnih Balkanskih planina

D. GENKOVSKI

## Rezime

Ispitivani su osnovni proizvodni pokazatelji (telesna masa, prinos vune, dužina vune, ekonomska plodnost, biološka plodnost) kod ovaca rase karakačanska i varijeteta lokalna srednje staroplaninska i tetevenska ovca različitog uzrasta.

Rezultati su pokazali da ovce tetevenskog varijeteta/soja imaju najviše vrednosti telesne mase od rođenja do uzrasta od 3,5 godine, a najniže vrednosti ovce karakačanske rase.

Ispitivan je i dnevni porast od rođenja do uzrasta od 3 meseca u svim grupama. Najviša vrednost je utvrđena kod ovaca tetevenskog varijeteta/soja – 0.240 kg a najniža kod ovaca karakačanske rase - 0.217 kg.

Najviša vrednost prinosa vune u svim grupama je bila u uzrastu od 18 meseci – karakačanska rasa – 3.65 kg, srednje staroplaninski varijetet/soj – 3.42 kg, tetevenski varijetet/soj – 3.75 kg i smanjivala se sa povećanjem uzrasta.

Ovce karakačanske rase u uzrastu od 18 meseci su imale najdužu vunu – 28.15 cm, a najkraću ovce tetevenskog varijeteta/soja u uzrastu od 4,5 godine – 13.03 cm. Sa uzrastom se ova vrednost smanjivala u svim grupama ali ne signifikantno.

Ovce tetevenskog varijeteta/soja, zatim ovce lokalnog srednje staroplaninskog varijeteta/soja su imale najviše vrednosti ekonomske i biološke plodnosti.

**Ključne reči:** telesna masa; prinos vune; dužina vune; ekonomska plodnost; biološka plodnost

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