



Original Contribution

STUDY OF THE HISTOLOGICAL STRUCTURE OF THE SKIN OF LAMBS FROM ABORIGINAL BREEDS IN BULGARIA

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ABSTRACT

Ten (10) lambs, aged four (4) months, were used for the study. They were taken from each of the following breeds: Native Karnobat, Karakachan and Rodopa Sheep. Biopsy samples of skins were taken from the flank of these animals. The total thickness of skin and its layers, depth and width of hair bulbs, width of primary and secondary fibre roots and sizes of skin glands were obtained. The lambs of Karakachan Breed had the biggest total skin thickness and layer thickness (3309,2 μm) while the lambs of Native Karnobat Breed had the smallest (2531 μm). Measurements from the Rhodopa Sheep were in the median position. Lambs of the Rhodopa sheep had skin structure in which the primary and secondary follicles were sequestered deeply in the dermis while these follicles were not so deep in skins from the Native Karnobat Breed lambs. Lambs of the Karakachan breed had the largest-sized fat and sweat glands.

Key words: Skin, Structure, Sheep, Aboriginal breeds

INTRODUCTION

The preservation of the aboriginal sheep breeds in Bulgaria is of exceptional importance both for ecological balance and as a source of genetic variety.

Due to long time selection and good feeding opportunities the aboriginal sheep have undergone considerable changes. It is necessary to provide investigations of their biological specializations and productive traits.

Investigations of aboriginal sheep in Bulgaria have already been carried out by many workers (2-11).

The objective of this study was to look into the histological structure of the skin of lambs from some aboriginal sheep breeds. This structure undoubtedly represents some complex elements of their biological specialization and productive trait.

MATERIALS AND METHODS

The study involved 30 lambs of 4 months old and they were from the following breeds: Native Karnobat, Karakachan and Rodopa

Sheep. Ten (10) lambs were taken from each breed.

Biopsy samples of skin were taken from each animal's flank. They were processed by classic paraffin method of Diomidova et al. (1). The total thickness of skin and its layers, depth and width of hair bulbs, width of primary and secondary fiber roots and sizes of skin glands were measured.

RESULTS AND DISCUSSION

All values discussed here can be seen on **Table 1**.

The total skin thickness varied from 2531 μm in the lambs of Native Karnobat Breed through 3309 μm in the Karakachan Breed and the differences among the three groups were highly significant ($p < 0.001$).

With regard to the epidermis thickness the difference of the groups is minor – 2,7 μm . The animals of Native Karnobat Breed are with significantly smallest epidermis thickness ($p < 0.001$).

The relative share of the papillary layer compared to the total skin thickness of the studied breed was between 62,11 and 66,98%. The skins from the Karakachan and Rhodopa breeds showed the thickest papillary layer,

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3309,2 and 3004,1 μ m, respectively, while those from the Native Karnobat breed had the

smallest value for this parameter– 1609,7 μ m.

Table 1. Histology of the skin, μ m

Parameters	Native karnobat breed			Rodopa offspring			Karakachan breed		
	n	$\bar{x} \pm Sx$	C	n	$\bar{x} \pm Sx$	C	n	$\bar{x} \pm Sx$	C
Total thickness of the skin	435	2531,0 $\pm$ 17,53	14,5	150	3004,1 $\pm$ 50,27	18,3	179	3309,2 $\pm$ 30,50	12,3
Epidermis depth	435	18,8 $\pm$ 0,20	22,1	150	20,9 $\pm$ 0,36	21,4	179	21,5 $\pm$ 0,30	18,9
Papillary layer depth	435	1609,7 $\pm$ 11,75	15,2	150	2012,3 $\pm$ 29,85	18,2	179	2055,3 $\pm$ 22,36	14,6
Reticular layer depth	435	892,9 $\pm$ 10,00	23,4	150	932,1 $\pm$ 24,24	28,5	179	1221,6 $\pm$ 18,03	19,8
Deepness of primary hair bulbs	580	1491,5 $\pm$ 9,92	16,0	200	2018,8 $\pm$ 23,36	16,4	200	1972,0 $\pm$ 17,81	12,8
Deepness of secondary hair bulbs	580	1018,2 $\pm$ 8,38	19,8	200	1293,2 $\pm$ 17,51	19,2	200	1272,6 $\pm$ 19,84	22,1
Diameter of primary hair bulbs	580	97,7 $\pm$ 0,76	18,6	200	136,7 $\pm$ 1,63	16,9	200	127,7 $\pm$ 2,53	28,0
Diameter of secondary hair bulbs	580	60,4 $\pm$ 0,35	14,1	200	71,3 $\pm$ 0,73	14,4	200	70,2 $\pm$ 1,20	24,1
Width of primary fibre roots	400	33,4 $\pm$ 0,32	19,4	240	39,7 $\pm$ 0,50	19,5	240	49,5 $\pm$ 0,59	18,3
Width of secondary fibre roots	800	22,0 $\pm$ 0,13	17,1	480	26,4 $\pm$ 0,26	21,6	480	26,9 $\pm$ 0,24	19,6
Length of the fat glands	435	208,6 $\pm$ 2,79	27,9	150	230,5 $\pm$ 5,63	29,3	180	250,8 $\pm$ 5,90	31,5
Width of the fat glands	435	67,9 $\pm$ 0,90	27,6	50	69,4 $\pm$ 1,46	25,7	180	77,6 $\pm$ 1,55	26,7
Width of secretion compartment of sweat glands	435	77,0 $\pm$ 1,19	32,3	150	74,4 $\pm$ 1,82	29,9	180	80,2 $\pm$ 1,86	31,1

The reticular layer relates to skin strength. In these animals its thickness in lambs of Karakachan breed was 1221,6 μ m, 897,9 μ m in the Native Karnobat and 932,1 μ m in the Rhodopa Sheep. There was a significant difference between the Karakachan breed and the other two ($p < 0.001$). The data showed that the lambs of Karakachan breed had the biggest total skin thickness and layer thickness and the lambs of Native Karnobat breed had the least. The Rhodopa Sheep was in between.

Our results were higher compared to what Tanev and Mihailova obtained in their studies on lambs of Karakachan Breed (10). These confirmed Stankov's earlier study (8) that was to the effect that intensively fattened lambs and weaned lambs had very much increased total skin thickness.

The primary and secondary hair bulbs of the Rhodopa lambs were rooted in the dermis at the following depths 2018,8 μ m and 1293,2 μ m, respectively, while in the Karakachan breed lambs they were in the following order, 1972,0 μ m and 1272,0 μ m. The differences in results between the two breeds were not significant. Finally, these structures occurred in the dermis of the Karnobat breed in the following order, 1491,5 μ m and 1018,2 μ m.

The depth of hair bulbs position and their width express to a great extent the fiber thickness.

The animals of Rhodopa Sheep had the biggest diameter of the primary hair bulbs (136,7 μ m) and the lambs of Native Karnobat breed had the least (97,7 μ m). The differences between among these groups were highly significant ($p > 0,999$).

The secondary hair bulbs diameter of Rhodopa and Karakachan breed lambs was approximately the same (70,2 μm and 71,3 μm); that of the lambs of Native Karnobat breed was smaller by 10 μm . The coefficient of variability for the Native Karnobat breed and Rhodopa Sheep was not high (14,1 – 14,4 μm) which is a precondition for a better evenness of the fiber according to their thickness.

Bigger differences of the width of the secondary hair bulbs had been observed in the animals of Karakachan breed (CV = 24,1%). Bigger thickness of the primary and secondary fiber roots as well as the biggest difference of their size had been observed in the same animals. This explains the big unevenness of the fiber and fleece. Native Karnobat breed lambs had the smallest thickness of the primary and secondary fiber roots and the differences among the rest of the groups were highly significant ($p < 0.001$).

The length of the fat glands varied from 208,6 μm (Native Karnobat breed) to 250,8 μm (Karakachan breed) and the differences among the three groups were significant ($p < 0.001$).

The width of the fat glands was significantly big for Karakachan breed ($p < 0.001$) while the fat glands for Rhodopa and Native Karnobat breed were almost the same. The difference between them was therefore not significant.

The width of secretion compartment of sweat glands varied within narrow limits – from 74,4 μm in the Rhodopa Sheep to 80,2 μm in Karakachan breed. With the exception of Karakachan and Rhodopa breeds the differences of the rest are not significant.

CONCLUSIONS

The lambs of Karakachan Breed had the biggest total skin thickness and layer thickness (3309,2 μm) and the lambs of Native Karnobat Breed had the least (2531 μm). The Rhodopa Sheep occupied a medial position.

The primary and secondary follicles of the lambs of the Rhodopa Sheep were found deep in the dermis while those of lambs of Native Karnobat breed occurred shallowest here.

The biggest size of the fat and sweat glands occurred in lambs of the Karakachan breed.

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