

**SKIN IN THE KIDS OF THE IMPROVED BALKAN CAPRIC BREED: ITS
HISTOMORPHOLOGICAL CHARACTERISTICS IN DORSAL, VENTRAL
AND LEG AREAS**

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**Islah edilmiş Balkan keçisi oğlaklarında deri: Sırt, karıncaltı ve bacak
bölgelerinde derinin histomorfolojik özellikleri.**

Summary: *Skin in the kids of the improved Balkan capric breed: its
histomorphologic characteristics in dorsal, ventral and leg areas*

*Skin in the kids of the improved Balkan capric breed is the thickest in
dorsal area being the most tender in ventral area. The epidermal surface is
very horny, especially in dorsal and leg skin. Within the stratum reticulare of
dorsal area the skin collagen fibres are rough forming a dense network while
the elastic fibres are more tender and more dense within the stratum papillare
and near the hair follicles, the skin glands and the walls of blood vessels. The
stratum papillare in the skin of leg area as to the density of fibrillar elements
can be divided in two parts: a part of a crisp constitution below the epidermis,
and the other more dense part toward the stratum reticulare.*

Özet: *Islah edilmiş Balkan keçisi oğlaklarında deri, sırt bölgesinde enkalın
durumdadır; en ince olduğu bölge ise karıncaltıdır. Epidermis yüzeyi, özellikle
sırt ve bacaklarda fazla kornifiye olmuştur. Sırt bölgesinde derinin stratum
reticulare'si kaba kollagen iplikler içerir ve bunlar sıkı bir keçe örgüsü oluşturur-
lar. Buna karşılık, çok daha ince olan elastik iplikler ise stratum papillare'de*

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ve bunun içindeki kıl folliküllerine, deri bezlerine ve kan damarlarına yakın olan bölgelerde yoğunlaşmışlardır. Bacak bölgesi derisinde stratum papillare, ipliksel oluşumların yoğunluğu bakımından iki kısma ayrılabilir: Bu oluşumlar epidermisin altında seyrek ve incedir; stratum reticulare'ye doğru ise hem sıklaşır, hem de kalınlaşırlar.

Introduction

In previous papers some authors such as Karasek and Dehlert (6, 7) compared the histochemical constitution of porcine and human skin. Monteiro-Riviers (16) compared young porcine and human skin. Mc Even Jankinson and Lloyd (9) made a histochemical comparison of bovine and sheep skin describing their similarities and differences. The skin in swine, bovines and sheep was investigated by Marcarian and Calhoun (10), Lloyd et al. (8), Meyer et al. (11), Warren et al. (19) and Galatik et al. (1). Rusan (16) investigated histomorphologic and chemical composition of skin in domestic Simmental bovines kept intensively and extensively. He stated that there were some differences as to the thickness of skin, of collagen and elastic fibres as well as of each skin stratum. Analogue findings in bovine skins from the extensive and intensive breeding were described by Rusan and Hraste (17). Tanyolaç et al. (18) investigated the changes occurred during a year period within the skin of the Turkish Angora goats aged from 1 to 9 years. They noted that the thickness of the skin was not the same whole year round. It was rather identical in the age ranging from 2 to 9 years depending on the quantity of fat tissue within the subcutis although it was always thinner within the lateral parts of the body. The authors did not define the discernible boundary between cutis and subcutis.

Hraste et al. (4) described histomorphologic, stereologic and physicochemical properties of porcine skins proceeding from the extensive and intensive breeding. In the investigated samples some minor differences in histomorphologic constitution were observed. The investigations of physicochemical and stereologic properties showed much more differences. On the basis of the obtained results the authors stated that the skins proceeding from pigs kept extensively were more profitable in leather industry.

Hraste et al. (3) investigated histomorphologic and stereologic constitution of raw and tanned skins of crossbred Simmental bovines kept intensively and extensively. The authors stated that there were

some differences in skin constitution of the investigated animals depending on the way of their keeping, thickness of the skin and presence of collagen and elastic fibres within the skin before and after tanning.

Mihelic et al. (12) described the histomorphologic constitution of kid skin in the Sana and Togemburg capric breeds. They stated that between the papillary and the reticular layers and between the cutis and the subcutis there was a visible boundary formed by a more dense net of elastic fibres running parallelly with the skin surface. There were also some differences in the constitution of skin in various body regions.

In his histomorphologic description of skins in goats of various breeds Ropac(15) discussed the existence of boundaries between the subcutis and the cutis and between the strata papillare and reticulare. This author also noted a different thickness of goat skins in various breeds and in different body regions.

Material and Methods

The 2 cm samples of skin from dorsal, ventral and leg areas were taken from 10 kids of the improved Balkan capric breed. Immediately after the sacrifice the animal samples were put into the 10 % formalin solution being dehydrated in the alcohols of increasing gradations and being mounted in paraffin. Then the 8 μ m thick paraffin slices were made and divided in two groups. One group was stained with hematoxylin and eosin after Majer (Svob, 1974) and the second group was stained by differential staining procedure for the appearance of connective tissue fibres by means of acid orcein and by Giemsa's method after Pincus (Svob, 1974).

Results

Within the samples of skin from dorsal area one could see rather a thick epidermis, its surface being very horny. The stratum papillare was medium thick and well developed without manifesting connective tissue papillae. Within the papillary layer there were some hair follicles along which, a bit deeper, well developed sebaceous glands were ranged (Fig. 1). Mm. arrectores pilorum were ranged along the hair follicles. Elastic fibres were tender forming a network below the epidermis parallelly with the skin surface, although some of them were vertical to the basal epidermal layer to which they were adhering. The distribution of elastic fibres was more dense around the hair follicles

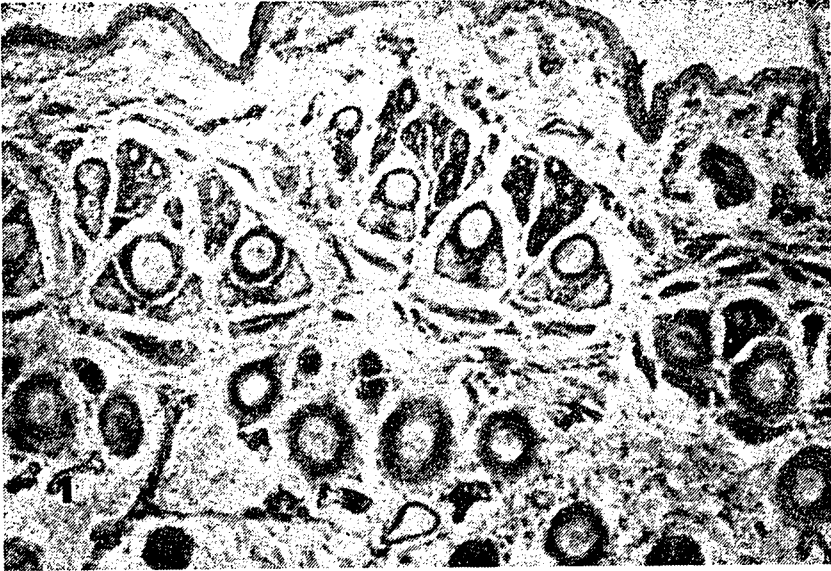


Figure 1. Skin from dorsal area stained with hematoxylin and eosin. x 40.
Şekil 1. Sırt bölgesinde deri, H-E., x 40.

and where the papillary layer of the corium passed into the reticular one forming thus a boundary between these two layers (Fig. 2). Collagen fibres were distributed within a dense net of elastic fibres. Some rough collagen fibres forming a dense network were dominant within the reticular layer of the corium (Fig. 3). Within a net of collagen fibres there were some tender elastic fibres generally around the hair bulb together with sebaceous glands, blood vessels and sweat glands. The nuclei of fibrocytes and fibroblasts could be seen among the fibres (Fig. 4). Where cutis passed into subcutis the elastic fibres were extending parallelly with skin surface and they were more dense.

The sections of the skin from ventral area showed a relatively thick epidermis; its surface being very horny. The papillary layer of the corium was wide and of crisp constitution with visible sebaceous glands, hair follicles and mm. arrectores pillorum. Elastic fibres were tender, parallel with the skin surface and more dense around the hair follicles (Fig. 5). Within a fine net of elastic fibres some rough collagen fibres appeared. Some rougher collagen fibres dominated within the reticular layer of the corium and among them there were some tender elastic fibres especially around hair bulbs, sebaceous and sweat glands.

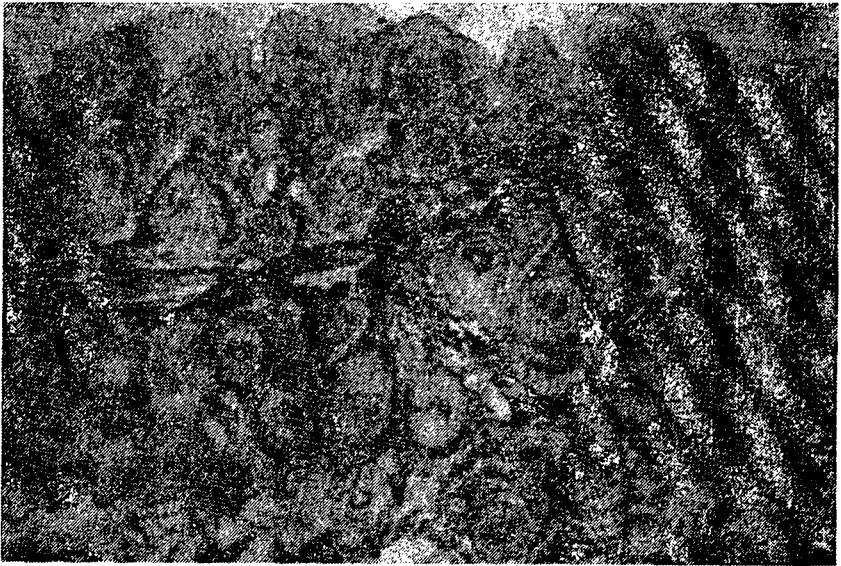


Figure 2. Skin from dorsal area stained after Pinkus. x 40.
Şekil 2. Sırt bölgesinde deri. Pinkus'a göre boyanmış. x 40.

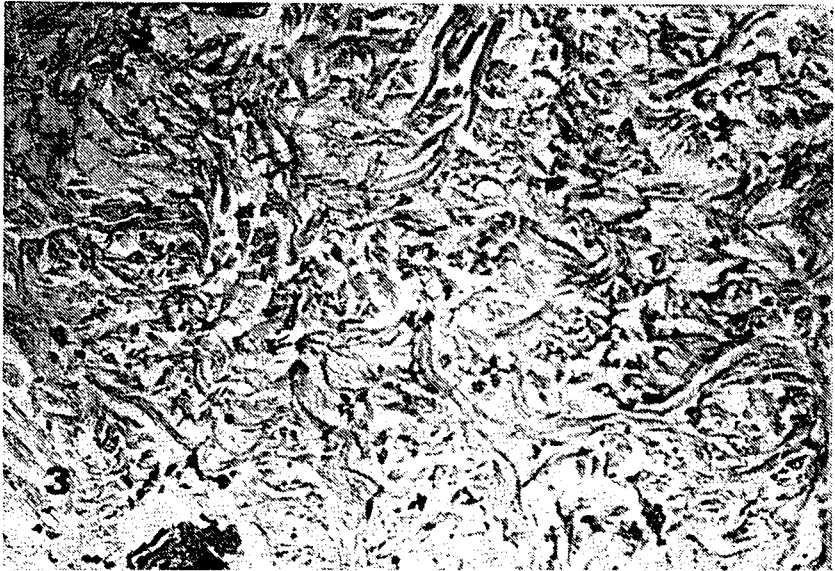


Figure 3. Reticular layer of the skin from dorsal area stained with hematoxylin and eosin.
x 100.

Şekil 3. Sırt bölgesinde derinin retiküler katmanı. H.-E., x 100.

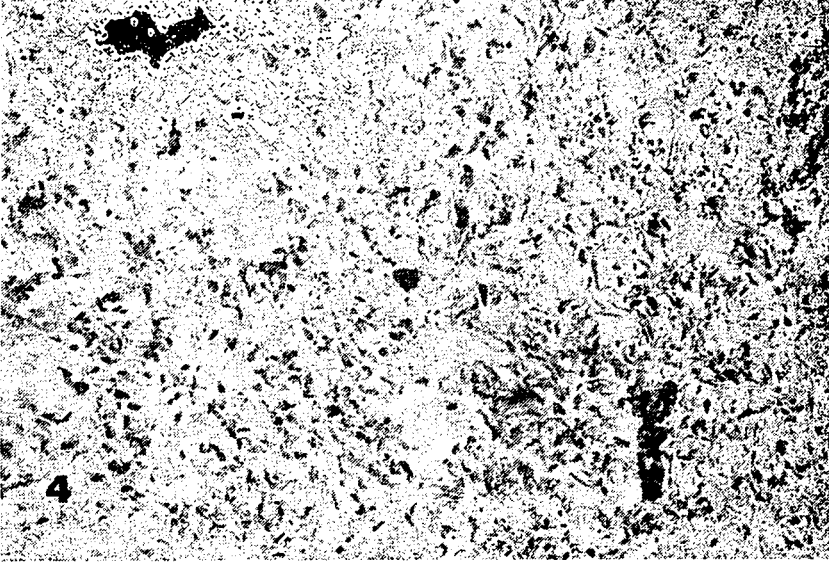


Figure 4. Reticular layer of the skin from dorsal area with visible fibrocyte and fibroblast nuclei stained with hematoxylin and eosin. x 100.

Şekil 4. Sırt bölgesinde derinin retiküler katmanı. Fibrosit ve fibroblast'ların çekirdekleri görülmekte. x 100.

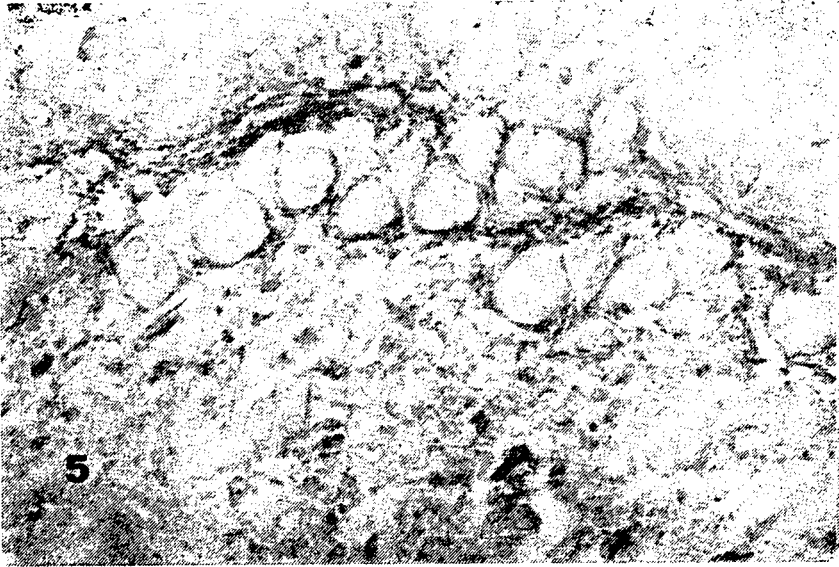


Figure 5. Skin from ventral area with the boundary between the papillary and the reticular layers stained after Pinkus. x 40.

Şekil 5. Karın bölgesinde derinin papillar katmanından retiküler katmanına geçiş alanı. Pinkus'a göre boyanmış. x 40.

Within a net of collagen and elastic fibres some hair bulbs as well as some fibrocyte and fibroblast nuclei could be seen. The boundary between subcutis and cutis was rather clear and it was formed by elastic fibres ranged parallelly with the skin surface.

In the samples of skin taken from leg area a thick epithelium with horny surface was noted. The stratum papillare was wide and according to density of fibre elements it could be divided in two parts. The part below the epidermis was crisp while the other part toward the reticular layer was more dense; its fibres being thicker (Fig. 6). In the papillary layer there were some sebaceous glands along the hair follicles connected by mm. arrectores pilorum. The reticular layer was thick and formed by bundles of rough collagen fibres and by few elastic ones. Some fibrocyte and fibroblast nuclei as well as the hair bulbs and sweat glands could be seen among the bundles of fibres.

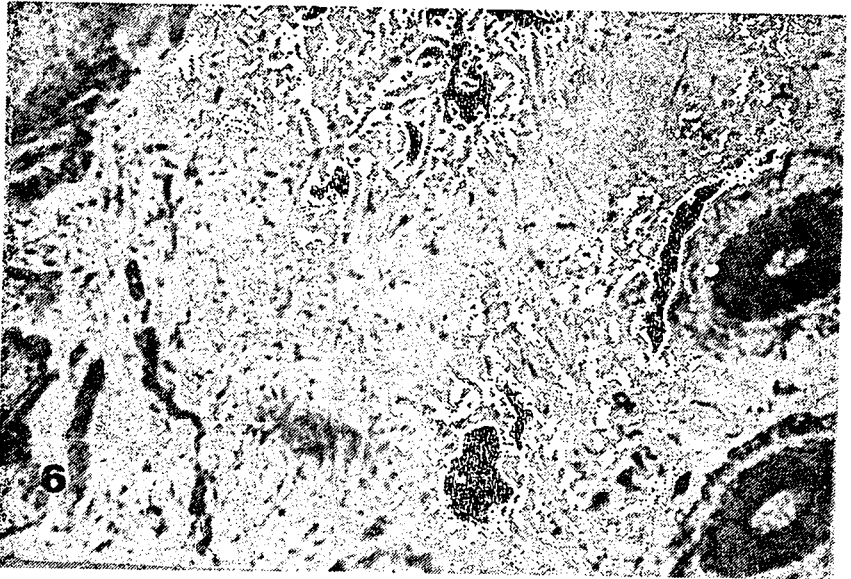


Figure 6. Stratum papillare of the skin from leg area stained with hematoxylin and eosin. x 120.

Şekil 6. Bacak bölgesinde derinin stratum papillare katmanı. H.-E., x 120.

Discussion and Conclusions

Marcarian and Calhoun (10), Warren et al. (19), Galatik et al. (1), Rusan (16), Ropac (15), Mihelic et al. (12) in their papers sta-

ted the differences as to the thickness of skin in different animals and in various parts of the body. Our findings agreed with those of previous authors. In dorsal area the skin epidermis was relatively thin and rather horny on its surface while the papillae were not manifested precisely because of thinness of the epidermis. The papillary layer was well developed and wide. Elastic fibres were more dense around the hair follicles and sebaceous glands forming a network within which few collagen fibres could be seen. A boundary toward the reticular layer was not sharp although elastic fibres were more dense in this area. Collagen fibres were rough, strong and they formed a dense network in the reticular layer. In this layer there were few elastic fibres, especially around the glands, the hair bulbs as well as in the boundary toward the subcutis where they were more dense and parallel with the skin surface. A thinner epidermis, horny on the surface, could be noted in the skin taken from ventral area. No connective tissue papillae could be noted whatsoever. Elastic fibres in the papillary layer formed a network thinner than those within dorsal skin. Collagen fibres were rough and strong in the reticular layer forming a thin network and being more tender than the ones found in dorsal area.

In the skin of leg area the epidermis was thin and very horny without connective tissue papillae. Below the epidermis the stratum papillare was crisp becoming more dense toward the reticular layer. Collagen fibres in the reticular layer were rougher and more dense than those in the ventral area skin, although they were tender forming a more crisp net than the one in the same layer of dorsal skin. Sebaceous glands in the skin of this body area were more dense than those in ventral and dorsal skin.

On the basis of the facts expounded it appears that the skin in dorsal area is the most thick one and that collagen fibres of the reticular layer of the corium are the roughest and the most densely distributed ones. They are most tender in ventral skin where they are forming the most crisp net. Elastic fibres are more dense and more numerous in ventral skin than in other two body areas. Elastic fibres constituted the boundaries between subcutis and cutis as well as between the papillary and the reticular layers. In these areas they are more dense and they are running parallelly with the skin surface. Such location of elastic fibres in the boundary between the reticular and the papillary layers as well as between subcutis and cutis corresponds to the findings of Hraste et al.(4), Rusan and Hraste (17) in

bovine skins, and of Ropac (15) and Mihelic et al. (12) in kid's skin. In the kids of the improved Balkan capric breed the skin is thicker; collagen fibres being rougher and more dense while elastic fibres are more scarce but stronger than in skins of the kids of the Sana and the Togemburg capric breeds(12). Such differences they most probably depend on keeping conditions because the kids were kept extensively being exposed to constant changes of embiental temperature, humidity, sunlight and to other atmospheric contingencies. Such a conclusion corresponds to the findings of Galatik et al.(1), Rusan (16), Hraste et al. (3, 4), Mihelic (13), Ropac (15) in skins of pigs, bovines, goats and kids. Sebaceous and sweat glands are more numerous in the skin from leg area than in other two body areas. The epidermal surface is more horny in those parts that were more exposed to mechanic influences and the corium too is thicker. Our investigations of kids' skin showed an essential influence of the breed and the way of keeping on the histologic constitution and on the thickness of the layers in raw skins, which should be taken in consideration while processing skins into final products.

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