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FORMATION, DEVELOPMENT OF SHEEPSKIN AND QUALITY OF SHEEP SKIN OF KAZAKH WOOL MEAT SHEEP AND SOUTH KAZAKH MERINOS

Annotation

Both sheep breeds Kazakh wool meat and South Kazakh merinos have their own age peculiarities in formation of skin structure and its separate components which provide satisfactory physical and technical parameters of semi-finished products and, ultimately, the desired quality of finished products in terms of durability of the leather, its softness, market quality and "output area", accordingly reflected in their morphological characteristics and economically useful productivity, which generally contribute to the formation of certain adaptive qualities of animals to the conditions of their breeding areas.

Keywords: skin, Kazakh wool meat sheep, South Kazakh merinos, productivity, semi-finished product

Introduction

Questions to study patterns of development of productive-biological characteristics of sheep and identification of the nature of formation of the most important properties of economically useful animals are very closely linked to food production and providing industry with raw materials for the production of high quality products for the consumer.

In this regard, the study of the histological structure of the skin of sheep is relevant and has great scientific and practical importance in ensuring internal and external markets, consumer goods of increased demand. The relevance of this work is also explained by the fact that the age-structure formation of the skin and its individual elements, determine physical and technical properties of the half finished products and ultimately determine the quality of finished products in terms of the durability of the leather, its softness, its presentation, etc.

Skin performs multiple functions related to the activity of the whole organism. In particular the laying of hair follicles occurs in the skin tab, which then forms hair side. Therefore, the quantity and quality of wool largely depends on the structure and function of the skin, the derivative which it is [1].

Improving the quality of the skin, the formation of quantitative and qualitative characteristics in sheep productivity largely depends on the scrutiny of the skin, structure and functions of the relevant structures of the skin. Consequently, the study of sheep skin goes far beyond the interest of the morphology and becomes important in practical sheep breeding.

New breeds and types of sheep created in Kazakhstan are grown taking into account the specific geographical and natural feeding conditions of the regions for which they were created, where paratypic factors had a main influence on the type and productivity of animals.

In connection with everything which was mentioned above, the animals bred in different conditions should be characterized by certain adaptive qualities, respectively reflected in their morphological indicators and economically useful productivity.

The objective of research - a comparative study of the performance of the skin and quality of sheepskins of Kazakh wool meat sheep and South Kazakh merinos.

Data for study and methods of research Animals of abovementioned breeds have double productivity both meat and wool. They successfully combine high fleece quality, precocity and meat productivity, have a strong constitution, strong, well-developed bones, correct forms of build, hardy and well adapted to the specific conditions of their breeding areas

in southern Kazakhstan. Besides wool and meat products from these sheep also fur sheepskin can be obtained.

We have studied the age-related change of the histological structure of the skin and its layers of wool meat sheep breed and South Kazakh merinos.

Study of the development of the skin of abovementioned sheep was performed according to the method of Diamidova N.A. and other scientists [2]:

1. Ablution after fixation;

2. Dehydration in spirits of increasing concentration (50 º C and 60 º C) for 4-6 hours, at 70 º C, 80 º C, and 90 º C for 8-12 hours, and in the two portions of 96 º C alcohol for 12-24 hours;

3. Alcohol –chloroform treatment (2- 3h);

4. Immersion in pure chloroform (2-3 shifts for 1 ½ hours);

5. Impregnation in chloroform and paraffin at 37 º C for 3-6 hrs. At 56 º C for 1.5 hour;

6. Paraffin impregnation (in three portions for 1 – 1.5 hours);

7. Paraffin treatment.

Taking skin samples of studied sheep breeds was carried out by biopsy in newborns: 1; 2; 4.5; 7.5; 12 and 18 month animals. The side was a topographical plot of sampling. Histological preparations were prepared in conventional manner. Staining was performed with hematoxylin of Erlich and eosin counterstaining; Veyger's hematoxylin and then van Gieson's picrofucsin.

Isolated piece of skin from the foetus of early ages was placed in the fixative solution in a ratio of not less than 20, and each into a separate bowl. The skin sample of the foetus covered with hair and all subsequent ages animals of extra uterine period foetus were attached with plant needles to the cortical plate flesh side up and were sunk down in the fixative solution in the same ratio of 1 cm^2 skin to 20-25 cm^3 fixative.

Fixative liquids are used depending on the objectives of the study. Fixative which is used to detect the general characteristics of the structure of the skin was 10 % formalin. In mentioned above fixative, object was kept for 24 hours after that it was transferred into 5% formalin, where it can be kept safe for a long time.

After fixation, the skin with the hair was oriented to obtain the desired direction of roots and glands. A section was cut out of a length 2 cm, a width of no thicker than 0.3 - 0.5 cm on a fixed sample of skin. The direction of hair is taken into account and the position of roots is controlled under a magnifying glass, where sections of the skin of adult Karakul sheep and cattle leather are shown in pictures 3, 4, 5.

It is difficult in this respect to prepare a cut off (a microscopic section) from the foetus skin of early age and fine-wool sheep. In such cases, the cuts have to be controlled under the microscope and direction of a block on the microtome needed to be changed.

For preparations of foetus skin they were covered by celloidin + paraffin.

Foetus skin covered with hair, and especially skin from animals after birth is recommended to take through gelatin, to freeze using carbon dioxide and to prepare cuts on a freezing microtome. Speed processing through gelatin, leaving out dehydration through alcohols of increasing content, preserves the true location and integrity of the tissue elements, which are greatly distorted when processing through alcohols and gives incomparably incorrect data when measuring. However, for purposes of studying cytological elements in the skin of animals of all ages it is absolutely necessary to use a fill of celloidin + paraffin wax and one paraffin wax that provides preparation of thin sections of 6-8 microns and identifying the finest structures inside cells. When cutting on a freezing microtome the thickness of sections is not less than 15-20 microns.

The process of getting paraffin and gelatinous units ready for cutting microtomes, passed the preliminary preparation. After fixing in solutions of Zenker and Gelli and the subsequent removal of mercuric chloride in alcohol solution with iodine, the skin was conducted through the

spirits of increasing concentration, in a mixture of celloidin with ether and then the paraffin was poured. Time delay in separate mixtures did not exceed 6 hours, except for a mixture of chloroform with paraffin, where it was kept up to 12-24 hours.

The study of morphological changes in the structure and evolution of the skin was produced by describing separate structures and elements and the determination of their quantitative indicators. With this purpose vertical and horizontal sections were used. The measurements were performed with the help of micrometrology line which was placed inside the eye-glass. Before the measurements the price of one division of the eyepiece micrometer was set, which was achieved by comparison with divisions of object micrometer [4, 6].

The thickness of the skin and its layers were determined on the vertical sections. On histological preparations diameter bundles of collagen fibers was studied, angle weave between themselves, which gave the opportunity to consider the impact of link types on trademark properties and characteristics of sheepskin. Bundles of collagen fibers, their sizes and link types, which were formed by the interweaving of these fibers, influenced on such trademark properties of fur sheepskin, like the strength of the leather on the gap, elasticity, firmness and others.

Research results

When creating breeds Kazakh wool meat sheep and South Kazakh merinos much attention was paid to the study of the basic economic-useful signs that were formed in a particular environment. In the analysis of growth and development of these type sheep in the leading breeding farms it was established that live weight of adult sheep (Kazakh wool meat sheep breeds and South Kazakh merinos) amounted to an average of 97.8 – 98.8 kg and 92.0 – 108.4 kg, females breeding group – 56.6 – 60.6 and 53.8 – 57.9 kg and yearling ewe of 1.5 years old – 41.7 – 48.9 and 40.3 – 43.4 kg, respectively [5].

As can be seen from these data, Kazakh wool meat sheep breed have a better precocity. Yearling ewes of Kazakh wool meat sheep breed by 18 months of age reach almost 80.6% whereas their counterparts of South Kazakh merinos breed – 74.9% of weight of the adult animals.

It is known that the thickness of the skin is closely connected with many of the characteristics of the organism, but above all it depends on the overall development of the animal, its productivity, and hence with breeding feature. It varies depending on the age and the conditions of animals [3].

Table 1 - Total thickness of the skin in sheep breeds Kazakh wool meat and South Kazakh merinos

Breed Kazakh wool meat sheep breed		Breed South Kazakh merinos	
The General age of the animal	skin thickness, microns	the General Age of the animal	skin thickness, microns
At birth	1673.60±8.96	At birth	1170.08±7.14
1 month	1812.10±1.62	1 month	1485.61±1.21
2 month	1947.60±4.73	2 month	1769.63±5.19
4,5 month	2055.20±5.06	4,5 month	1787.00±6.27
7,5 month	2151.60±8.42	7,5 month	1975.84±0.45
12 month	2249.20±6.32	12 month	1963.80±0.74
18 month	2301.40±6.66	18 month	2034.21±8.15

As can be seen from table 1, the intensive growth of total thickness of the skin occurs in both sheep breeds from birth up to 4.5 months of life lambs, that is, until padding lambs from mothers. The skin of South Kazakh merinos lambs thickens more intensively up to 2 months.

Their thickening of the skin during this period amounted to 45-51%, while in the remaining 16 months - only on 20-23%.

Such intense increase in the thickness of the skin in the first 2 months of life postnatal ontogenesis in lambs of breed South Kazakh merinos is due to the fact that according to biological laws in this period of life as the overall growth and development of individual organs and differentiation of tissues as the entire body of the animal takes place as a whole.

As for the lambs Kazakh wool meat breed, their intensive growth of the thickness of the skin may also occur in nursing period, but in somewhat less intense pace. The total thickness of the skin of 4.5 months old lambs compared to the newborn increased 1.4 times.

After the padding from mother, when lambs are from 4.5 to 7.5 months, it is interesting to note that lambs of breed South Kazakh merinos experience a noticeable increase in the total thickness of the skin to 200 microns. For the same period lambs of breed Kazakh wool meat sheep experience an increase in the total thickness of the skin up to 100 microns. This fact, in our view, is due to the fact that lambs of breed South Kazakh merinos survived the critical transition period from dairy nutrition to plant food more successfully than lambs of breed Kazakh wool meat sheep.

In the subsequent age period until lambs reach 18 months, increase of the thickness of the skin in both breeds of sheep is moderate; it made up - 2301 microns for sheep breed of Kazakh wool meat sheep, and the sheep South Kazakh merinos breed - 2034 microns.

Our research confirms that the change of thickness of the skin, in particular with advancing age, depends on breed animals.

The thickness of the epidermis, as the outer layer of the skin is also associated with the natural features. Malpighian layer in it consists of 2-3 rows of epidermal cells and it is better developed in sheep of breed Kazakh wool meat. The thickness of the epidermis of lambs breed Kazakh wool meat at birth is 16.62 microns, while the lambs of South Kazakh merinos breed - 15.21 microns. The thickness of the epidermis from birth up to 4.5 months of age was getting thick and at the age of 4.5 months was 20.90 microns for lambs of Kazakh wool meat sheep breed, and the lambs of South Kazakh merinos – 19.68 microns.

At the age of 18 month thickness of the epidermis in sheep is 22.72 and 21.56 microns respectively.

As shown above, the thickness of the epidermis of the skin depends on breed and productivity of animals. Semi-fine-fleeced sheep of wool meat breed have slightly thicker epidermis of the skin than the fine-fleeced sheep of South Kazakhstan merinos breed.

Commercial value of the finished products is determined by such parameters as output area, weight sheepskin, thickness, flexibility, elasticity and firmness of the leather, fineness, smoothness and the thickness of coat, and the presence of defects, bringing economic damage due to possible incomplete use of fur raw material and semi-finished products.

Improving the quality of fur and fur raw materials - this is a problem that should be solved by joint action of scientists, specialists and workers of sheep breeding and processing enterprises, through systematic and methodical work with all the points and levels system of production, storing and processing of raw materials to the finished product.

One of the most important indicators for the fur industry is the size fur sheepskin and "output of area", which generally reflect commodity properties of sheepskin.

The output area of untreated sheepskin of Kazakh wool meat sheep made up 68.9 dm^2, and the sheep of South Kazakh merinos – 87.6 dm^2. The area of fur semi-finished products varies from 62.8 dm^2 to 69.6 dm^2, with an average index of 65.7 dm^2 in sheep breed South Kazakh merinos. In the process of sheepskin dressing the shrinkage of sheepskin of South Kazakh merinos was 20.6 - 29%.

Thus, the "output area" ranged 70.6 – 79.4% and made up on average 75.0%.

According to the requirements of All Union State Standard (4661-76) the thickness of the leather of wool sheepskin must not exceed 2 mm. In our research, the average thickness of the leather skins of meat and wool sheep breed is equal to – 1.19 mm, and the skins of sheep breed south Kazakh merino – 0.99 mm.

Determination of temperature of shrinking process is one of the methods to control proper execution of technological operations in dressing fur sheepskin. During the study of dressed wool sheepskins shrinkage temperature for wool meat sheep breed was 78.00 C^0 and for sheep breed of South Kazakh merino – 77.40 C^0, that allows to judge about the normal predominate leather of the sheepskin, since according to requirements of standard 4661-76 "dressed wool sheepskin " – shrinkage temperature should be not less than 70 C^0.

The durability of the leather affects the durability of the product. The average strength of leather sheepskin of the breed Kazakh wool meat is equal to 13.4 MPA, while the sheepskin of South Kazakh merinos - 14.5 MPA (according to All Union State Standard 4661-76 it should be not less than 9.8 MPA) [5].

The ability of the sheep skin to stretch determines the safety of products that is to keep the shape of wool sheepskin and, ultimately, operational properties. This ability is characterized by the total elongation at voltage 4.9 MPA. Studied semi-manufactured product of wool sheepskin of sheep breed Kazakh wool meat showed the index of 47.2%, and sheep breed of South Kazakh merinos – 42.4%, and according to the requirements of All Union State Standard it should be not less than 30%.

The average index of moisture in the material skins of sheep breed Kazakh wool meat equal to 12.1%, and in sheep breed South Kazakh merinos this figure is amounted to 12.4%, which corresponds to the requirements of All Union State Standard 4661-76 and does not exceed 14%.

Chromium oxide content indicates the degree of how semi-finished product was tanned, which has an impact on the properties of commodity leather (softness, elasticity). The value of this parameter in the material from skins of sheep breed Kazakh wool meat is equal to – 1.44%, and sheep breed of South Kazakh merinos – 1.42% (with the requirements of All Union State Standard - 0.8 to 1.8 percent).

A large amount of ash makes the semi-finished product heavier, so mass fraction of ash in the leather sheepskin of semi-finished products was normalized as the standard and should be up to 10%, which matches our data.

Discussion of results It is known that in pilar layer of skin dermis morphogenetic processes occur, which are associated with the development of coat, one of the main index of productivity. Therefore, this layer reveals the microscopic complexity in the structure of individual components and their interrelationships and interdependence. Therefore, the study of pilar layer of dermis of skin has a certain importance in the interior assessment of animal [7, 8].

The main increase in the thickness of the skin of studied animal breeds is due to the increase in the thickness of pilar layer of the dermis. Growth of pilar layer is especially intensive in the first 2 months of life and 2 months old lambs of sheep breed Kazakh wool meat makes up about 60% of the total thickness of the skin, and the lambs breed of South Kazakh merinos - 65%.

In subsequent ages increase in the thickness of pilar layer of dermis of the skin is moderate and for 1.5 year old sheep breed of Kazakh wool meat it makes up - 63% of the total thickness of the skin and in sheep breed of South Kazakh merinos – 65.5%, reflecting the corresponding productive direction of the studied species.

Reticular layer of sheep skin of the studied breeds is a dense loose connective tissue consisting of bundles of collagen fibers, forming a three-dimensional net. However, if the relative thickness of the pilar layer of dermis of studied sheep of both breeds

increases depending on age, the relative thickness of reticular layer of derma, on the contrary, has tended to decrease.

It is established that the semi-manufactured product of wool sheepskin of sheep breed Kazakh wool meat contains on average 4.76% of ash, and for sheep breed South Kazakh merinos this indicator was equal to 4.68%, which indicates a good consumer properties of sheepskin for both breeds Kazakh wool meat and South Kazakh merinos.

One of the important parameters is the pH of aqueous extract determining reactivity of tanning chromium compounds and functional groups of collagen. In the studied semi-manufactured product of wool sheepskin of sheep breed Kazakh wool meat pH of aqueous extract made up on average – 6.01 and sheep breed of South Kazakh merinos - 6.08 (according to the requirements of the standard from 4.0 to 7.5).

Conclusions The results showed that the lambs of breed South Kazakh merinos at birth had a relative thickness of reticular layer of 43.6%. In the subsequent age periods, this figure is gradually decreasing and for 1.5 year old sheep, the figure is 33.4%.

Approximately the same pattern is observed in the growth of the relative index of reticular layer of derma of the sheep breed Kazakh wool meat.

Age dynamics of total thickness of the skin and its layers of sheep of the studied breeds show that the most intensive increase in the thickness of the skin occurs up to 2 months, and then a moderate increase of skin thickness can be observed. Growth, development and differentiation of total thickness of the skin's layers fully reflect the breed and productive direction of sheep.

In General, physical and mechanical parameters of the sheep skin of the studied breeds meet the requirements of industrial purpose and commercial value of tanned sheepskin while chemical indicators - implementation of technological regime in the process.

Thus, on the basis of the information mentioned above, according to physical-mechanical and chemical properties wool sheepskin of Kazakh wool meat breed and South Kazakh merinos meet the requirements of All Union State Standard 4661-76 "Dressed Wool Sheepskin".

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ҚАЗАҚТЫҢ ЕТТІ-ЖҮНДІ БИЯЗЫЛАУ ЖҮНДІ ЖӘНЕ ОҢТҮСТІК ҚАЗАҚ МЕРИНОСЫ ҚОЙЛАРЫНЫҢ ЖАБЫН ТЕРІСІНІҢ ҚАЛЫПТАСУЫ, ДАМУЫ ЖӘНЕ ҚОЙ ТЕРІСІНІҢ САПАСЫ

Қазақтың етті-жүнді биязылау жүнді (ҚЕБЖ) және оңтүстік қазақ мериносы (ОҚМ) тұқымдары қойларының терісінің ішкі құрылымы мен ондағы әртүрлі құрылымдық элементтерінің қалыптасуының малдың жасына қарай ерекшеліктері олардан алынатын жартылай фабрикаттардың физикалық-техникалық қасиеттерінің қанағаттанарлық деңгейде болуын қаматамасыз етеді. Олардан алынатын дайын өнімнің сапасын сипаттайтын тері ұлпасының мықтылығы, жұмсақтығы, төзімділігі, тауарлық ажары, «ауданының шығымы» сияқты морфологиялық және шаруашылыққа пайдалы селекциялық белгілерінің тиісті көрсеткіштері малдың өсіру аймағына бейімделгіштігінің белгілі бір пайдалы қасиеттерінің қалыптасуына әсер етеді.

Кілт сөздер: тері, қазақтың етті-жүнді биязылау жүнді, оңтүстік қазақ мериносы, селекциялық белгі, жартылай фабрикат.

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ФОРМИРОВАНИЕ, РАЗВИТИЕ КОЖНОГО ПОКРОВА И КАЧЕСТВА ОВЧИН КАЗАХСКИХ МЯСОШЕРСТНЫХ ОВЕЦ И ЮЖНОКАЗАХСКИХ МЕРИНОСОВ

Возрастные особенности формирования структуры кожного покрова и отдельных ее элементов у овец пород мясо-шерстная казахская (МШК) и южноказахский меринос (ЮКМ) обуславливают удовлетворительные физико-технические свойства полуфабрикатов из шкур этих животных. При этом, необходимое качество готовых изделий по показателям прочности кожевой ткани, ее мягкости, износостойкости, товарному виду и «выхода площади», отраженными в их соответствующих морфологических и хозяйственно-полезных селекционных признаках способствуют формированию определенных полезных приспособительных качеств животных к условиям зон их разведения.

Ключевые слова: кожный покров, казахские мясошерстные овцы, южноказахские мериносы, признаки, полуфабрикат.

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БАТЫС ҚАЗАҚСТАН ОБЛЫСЫНДАҒЫ ТҮЙЕЛЕР БРУЦЕЛЛЕЗІ БОЙЫНША ЭПИЗООТИЯЛЫҚ ЖАҒДАЙДЫҢ СИПАТТАМАСЫ

Аңдатпа

Мақалада Батыс Қазақстан облысы бойынша түйелер бурцеллезіне жүргізілген 2011-2013 жылдардағы мониторингілеу жұмыстарының нәтижесі берілген.