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INCREASING LIVESTOCK PRODUCTION AND IMPROVING ITS QUALITY IN WESTERN AZERBAIJAN

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УВЕЛИЧЕНИЕ ПРОИЗВОДСТВА ЖИВОТНОВОДЧЕСКОЙ ПРОДУКЦИИ И ПОВЫШЕНИЕ ЕЕ КАЧЕСТВА НА ЗАПАДЕ АЗЕРБАЙДЖАНА

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Abstract. The article discusses ways to improve the quality and production of livestock products in the western zone of the “Gapanli” rural farm located in the Shamkir region. From the research work we conducted, it became clear that the skins of fine-wooled sheep are superior to those of coarse-wooled sheep in terms of area, but on the contrary, the thickness of the skin is lower in fine-wooled sheep. Since the strength of the skin is related to its thickness and density, the strength of the skins of coarse-wooled sheep is superior to that of fine-wooled ones. The purpose of the experiment is to discuss the physical-mechanical and technological properties of sheep with different wool compositions. The study of the physical-mechanical and technological properties of wool showed that the quality of wool depends largely on the histological cleaning of wool hairs. The research work was conducted in the “Gapanli” rural farm located in the Shamkir region. The study of imprecise semi-finished products also showed that such indicators pass even thin threads due to their properties. It is possible to obtain precise, soft and light clothing material from thin wool. The study of the commercial quality of sheep wool and skins has shown that it is very important to accurately determine the production quality of wool and skins.

Аннотация. Рассматриваются способы повышения качества и продуктивности животноводческой продукции в западной зоне сельского хозяйства «Гапанли», расположенного в Шамкирской области. В ходе проведенных исследований стало ясно, что шкуры тонкошерстных овец по площади превосходят шкуры грубошерстных, но, наоборот, толщина шкуры у тонкошерстных овец меньше. Поскольку прочность шкуры связана с ее толщиной и плотностью, прочность шкур грубошерстных овец выше, чем у тонкошерстных. Цель эксперимента – изучение физико-механических и технологических свойств овец с различным составом шерсти. Изучение физико-механических и технологических свойств шерсти показало, что качество шерсти во многом зависит от гистологической очистки шерсти. Исследование проводилось в сельском хозяйстве «Гапанли», расположенном в Шамкирской области. Изучение некондиционных полуфабрикатов также показало, что такие показатели проходят даже через тонкие нити из-за их свойств. Из тонкой шерсти можно получить точный, мягкий и легкий материал для одежды. Исследование товарного качества овечьей шерсти и шкур показало, что очень важно точно определять качество продукции из шерсти и шкур.

Keywords: sheep, rams, wool, skin, meat products.

Ключевые слова: овцы, бараны, шерсть, шкура, мясная продукция.

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Sheep breeding is the second most important branch of animal husbandry in Azerbaijan after cattle breeding, and it satisfies the population's demand for meat, milk, wool, leather, fur, and other sheep products. Our people value sheep products more highly than other livestock products and use them more frequently. Since sheep products are widely used as food, the rapid growth of sheep is of great importance in increasing meat production, improving its quality, and reducing its cost. The consistent improvement of the productivity of existing sheep breeds and their hybrids is of great importance in increasing productivity and improving the quality of products [1, 2].

Azerbaijan has been famous for its widely developed sheep breeding since ancient times. The natural and climatic conditions of the republic, along with extensive summer and winter pastures, have created the basis for the development of sheep breeding. Sheep breeding stands out from other branches of animal husbandry due to its diverse products. At a time when the demand for light industrial products is increasing year by year, sheep farming is still irreplaceable as a source of raw materials for the wool processing industry [5].

The great potential of sheep to adapt to various conditions of keeping and feeding is their most important feature. That is why sheep are widespread all over the world. Since sheep have variability and good adaptability, it has become possible to create new breeds and types and to breed them in different ecological zones. Despite the fact that domesticated sheep are exposed to sharp biological and physiological changes under the influence of various extreme ecological conditions, they have largely preserved their valuable species characteristics and their ability to adapt to grazing conditions [9, 10].

The durability of a fur product is also determined by the resistance of the wool cover to friction during use. The durability of a fur product also depends on the method of use, the quality and properties of the wool cover, and many other factors. Therefore, correctly determining the quality of fur is associated with a number of difficulties. During the production of fur skins, the main requirement is the strength of the bond between the wool cover and the skin part [11, 12].

Special attention is paid to the hair cover of skins for fur, because in fur products, the hairy side of the skin is sewn to the top and the muscle side to the lining. The wool of the fur skin must be of the same type. Therefore, sheepskins with fine and semi-fine wool are mainly used for fur. It is possible to dye white fur skin in different colors [13].

The main condition for preserving the quality of commercial skins and semi-finished products is the preservation of their natural properties throughout all processing stages. The qualitative and quantitative variability in the composition of the skin begins in the embryonic period of the lamb and continues until the sheep is slaughtered. Therefore, the method of raising sheep, feeding, feeding conditions, and sex have their own effect on the fur quality of the skin. The quality of fur-leather semi-finished products mainly depends on the character and properties of the wool cover on the skin [3, 4].

Sheep farming, which provides the population with valuable food products and high-quality raw materials for industry, occupies a very important place in the agricultural economy. The income from sheep farming depends on the level of commodity production, productivity, breed, quantity and quality of the produced product, and the ecological characteristics of the region [9].

For the past 15 years, purposeful selection and breeding work have not been carried out on the sheep farms of the republic to increase the genetic potential of the herd and improve the marketable quality of various types of sheep farming products obtained from them. Fine wool sheep farming, which was established with great effort in the republic and its western region, is almost at the stage of liquidation. Another reason for this is that the textile industry in Azerbaijan is in a state of paralysis. Light industrial enterprises that use fine and semi-fine wool are not operating. Therefore, interest in

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this type of wool has decreased, and as a result, fine wool sheep farming is in danger of liquidation [7].

Various types of sheepskin are supplied in our republic to meet the needs of light industry. However, unfortunately, these skins are still not used for their intended purpose. The planned supply, purchase, sale, and primary processing of these skins have not been properly organized [8].

Since ancient times, sheep wool and skins have been used very successfully in Azerbaijan as consumer goods. High-quality blankets and mattresses, and a variety of clothing items are made from sheep wool. Commodity products made from sheep wool are much superior to other textile fibers in terms of biological value [6].

Very valuable skins, furs, and fur skins are obtained from the skins of sheep with different wool coats raised in our republic, among which the skins of Balbas, Lezgi, Shirvan, and Tush sheep breeds are more valuable in terms of commercial value [10].

Materials and Methods

The research work was conducted at the "Gapanli" rural farm located in the Shamkir region. The territory of the Shamkir region belongs to the Ganja-Gazakh zone. The area is dry, flat, and has warm winters. The average annual temperature is 13–14°C. The coldest month is January, and the hottest is August. In July–August, the temperature reaches 25–30°C. The spring period is very dry. The annual precipitation reaches 250–350 mm. In the spring period, the air humidity is 70–75%, and in the summer period it is 55–57%, with some days when it drops to 25–40%. The Gapanli farm is located in the Shamkir region, and the main area for sheep breeding is Jeyranchol. Experience and theory confirm that the thinner the wool fiber, the more scales it has per 1 mm, and such wool curls better. Our research shows that as the fineness of fine and coarse wool increases, the number of twisting (bending) cycles per cm increases. In this regard, wool yarn obtained from the same mass but of different fineness has different strengths. Fine wools are better twisted and curled; the unevenness in the fabric obtained from them is lower than in the fabric obtained from coarse wool. As a result, the fabric is smoother, lighter, and shinier. Semi-finished leather products with a fine wool coating have a lower true density and higher porosity than those from coarse wool.

Results of the study and discussions

Scientific research has been conducted for a long time at the "Gapanli" rural farm of Shamkir district, which is located in the western region of our republic and is the largest breeding sheep farm in the republic. Currently, more than 4,500 heads of fine-wooled, wool-oriented Azerbaijani mountain merino and brown-haired goat breeds are bred on the farm. The main activity of the farm is to breed breeding animals for farms in the mountainous and foothill regions of our republic and sell them to these farms. The main goal of conducting scientific research at the "Gapanli" rural farm is to study the physical-mechanical, chemical and technological properties of the wool and skins of the sheep raised here, as well as to determine their real and potential productivity, identify existing shortcomings in the process of production, procurement and processing of products, and develop ways to improve them. The above-mentioned properties of sheep wool have been studied by a number of prominent domestic and foreign scientists: academicians: F. A.Melikov, R. M. Mehdiyev, K. B. Agalarov, G. G. Abdullayev, V. V. Kalinin, G. R. Litovchenko and others, and they note that these properties of wool are influenced to one degree or another by breed, sex, age, feeding and storage conditions, and seasons of the year [1, 2].

The physico-mechanical, technological properties, and commercial quality of sheep leather products have been studied by I. Maul, P. A. Balshakov, A. F. Kostylev, Y. G. Shkutko, and others, in

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addition to the above-mentioned scientific researchers, and a number of interesting and valuable proposals have been put forward [4].

A sufficient number of sheep with different wool coats are bred in various types of farms in the western zone of Azerbaijan. However, despite this, each person in the republic receives 1.5 meters of wool per year, which is a very low indicator compared to the norm of 5 meters. In terms of quality, wool and leather products still do not fully meet the needs of the industry. Therefore, investigating and revealing the reasons that create this backlog and eliminating the causes that create it are the most urgent issues of the day. Taking this into account, we have studied the commercial quality of wool and leather products of sheep with different types of wool grown in the western region of Azerbaijan, and have developed a system of measures to eliminate the factors affecting quality and tried to implement them in farms. For this purpose, we studied the industrial grade of wool, as well as the wool and leather properties of these sheep. Industrial sorting of wool and its resulting indicators characterize its commercial value. In this regard, we have studied the industrial sorting of sheep wool in the main farms located in the western region of the republic; the composition of the varieties is shown in Table 1.

Table 1

WOOL GRADE COMPOSİTİON, %

Age and gender group	*For kindness*				*By length*		*By color*		
	Grade I	*Grade II*	*Grade III*	*Grade IV*	*Hardware*	*Combed*	*White*	*Light gray*	*Colored*
The ram is a breeder	45	22	20	13	47	43	35	30	35
Mother sheep	36	26	24	14	65	35	25	50	25
Male tog	65	16	10	9	33	67	45	40	15
Female tog	60	21	10	9	35	65	45	40	15

From the figures in Table 1, it is clear that the wool of these sheep is not of good quality due to its varietal composition. Consumer goods with high commodity value cannot be made from this wool. This is due to the fact that, in addition to the hairs, the percentage of worsted wool in the wool of older animals is low. During the research, we also found that wool is divided into four types according to its quality, cleanliness, fineness of wool fibers, number of curls, etc.: 1. Fine wool — wool with a length of 5–10 cm, fineness of 60 microns and above, and cleanliness of 35–45%, consisting of homogeneous wool fibers sheared from various fine-wooled breeds of sheep and fine-wooled hybrids. 2. Semi-fine wool — wool consisting of homogeneous wool fibers, with a fineness of 50–58 microns and a pure yield of 45–55%, sheared from semi-fine wool breeds and hybrids. 3. Semi-coarse wool — wool with a pure yield of 50–65%, with a higher content of kemp and transitional hair compared to coarse wool, produced from hybrids of coarse wool breeds of sheep. 4. Coarse wool — wool consisting of mixed wool fibers (kemp, transitional hair, and mohair), sheared from coarse wool breeds of sheep with a pure yield of 65–75%. The physical and mechanical properties of the wool of sheep with different wool coats are given in Table 2.

Table 2 shows that the strength of wool decreases depending on its fineness. At the same time, the tensile coefficient of fine wool prevails over that of coarse wool, which indicates the technological value of wool. The properties of the skins of sheep bred in the region are given in Table 3. Thus, the skins of fine-wooled sheep are superior to those of coarse-wooled sheep in terms of area, but conversely, the thickness of the skin is lower in fine-wooled sheep. Since the strength of the skin is related to its thickness and density, the strength of the skins of coarse-wooled sheep is superior to that of fine-wooled ones.

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Table 2

PROPERTİES OF WOOL

Age and gender group	*Wool strength, grams/force*		*Wool oil, %*		*Morphological composition of wool*		
	Fine wool	*Coarse wool*	*Fine wool*	*Coarse wool*	*Mohair*	*Transition*	*Those who do*
The ram is a breeder	7,52	31,15	17,15	10,5	23,5	38,5	38,0
Mother sheep	6,65	30,40	16,8	9,2	25,8	37,0	37,2
Male tog	8,55	32,20	17,0	9,9	25,5	38,5	36,0
Female tog	8,45	31,25	16,2	9,0	24,0	39,1	36,9

Table 3

PROPERTİES OF THE SKİN

Age and gender group	*Skin area, dm²*		*Skin thickness, mm*		*Skin strength, g/force*		*Skin density*	
	In fine wool	*In coarse wool*	*In fine wool*	*In coarse wool*	*In fine wool*	*In coarse wool*	*In fine wool*	*In coarse wool*
The ram is a breeder	83,5	81,2	2,0	2,3	1,9	2,1	boş	Mobile
Mother sheep	80,4	80,1	1,9	2,1	1,7	1,9	boş	Mobile
Male tog	79,9	79,3	1,5	1,9	1,5	1,7	boş	Mobile
Female tog	78,5	78,3	1,3	1,6	1,4	1,6	boş	Mobile

Thus, since the skins of coarse-wooled sheep are relatively thick, strong, and dense, they possess significant commercial value, making it possible to produce more valuable consumer goods from them. According to the long-term research plan, the fineness, length, density, and technological properties of the wool of sheep with different wool coats raised on the “Gapanli” peasant farm were studied, and a number of proposals were put forward based on the research results. In the current research year, some of the previously unexamined properties of the wool and leather raw materials of these sheep were studied. One of the most economically valuable properties of wool is its curl. The effect of wool fineness and its histological structure on this property was studied.

Table 4

CURLİNG İNDİCATORS DEPENDİNG ON THE FİNENESS OF THE WOOL

Age and sex group of sheep	*Fine woolens*				*Coarse woollens*			
	Wool fineness, μm	*Number of scales in the shell per 1mm*	*The ratio of the engagement to and parallel to the scale*		*Wool fineness, μm*	*Number of scales in the shell per 1mm*	*The ratio of the engagement to and parallel to the scale*	
			P_0=0,110	P_0=0,510			P_0=0,110	P_0=0,510
The ram is a breeder	21,8	9^3	3,54	2.12	45,6	55	1,84	1,25
Mother sheep	20,8	10^6	4,55	2,26	44,8	65,5	2,21	1,36
Male tog	21,3	9^2	3,44	2,04	44,3	66,3	2,38	1,38
Female tog	20,3	10^3	4,30	2,16	44,5	66,9	2,40	1,40

Our research shows that the thinner the wool strand, the more scales it has per 1 mm, and such wool is better twisted. It is also clear from the figures in Table 4 that among the groups, the number of scales attached to each other per 1 mm of the wool of fine-wooled and young animals is greater; since such wool has a greater adhesion force, the thread obtained from it is stronger. We also studied the relationship between the fineness of the wool and twisting (Table 5).

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Table 5

THE EFFECT OF WOOL FİNENESS ON CURLİNG

Age and sex group of sheep	*Fine woolens*		*Coarse wool*	
	Wool fineness, μm	*Number of twists in a 1 cm long woolen thread*	*Wool fineness, μm*	*Number of twists in a 1 cm long woolen thread*
The ram is a breeder	21,8	140	45,6	73
Mother sheep	20,8	146	44,8	75
Male tog	21,3	141	44,3	74
Female tog	20,3	148	44,5	74

As is known, the more twisting cycles per unit length of wool yarn, the stronger the thread obtained from it. Our research shows that as the fineness of fine and coarse wool increases, the number of twisting cycles per 1 cm also increases. In this regard, wool yarn threads obtained from the same mass, but of different fineness, have different strengths. We also studied the linear roughness of the fabric obtained from different types of wool using an electronic device from the Swedish company Uster. On this device, we also determined the thickness and thinness of the fabric in areas of various lengths (combed warp). This can be seen from Table 6.

Table 6

THE EFFECT OF WOOL FİNENESS ON CURLİNG

Groups of sheep	*Fine wool*			*Coarse wool*		
	Very smooth in the same size	*Medium smooth*	*Non-smooth*	*Very smooth in the same size*	*Medium smooth*	*Non-smooth*
The ram is a breeder	2,6	5,3	8,5	3,4	7,7	11,2
Mother sheep	2,7	5,2	8,7	3,7	8,2	12,4
Male tog	3,1	5,7	9,2	3,8	8,8	12,6
Female tog	3,4	5,9	9,9	3,9	9,0	13,0

Based on the data in Table 6, it is clear that the degree of unevenness of fabric obtained from wool of the same length but different fineness varies. Fine wools have better twist and crimp properties; consequently, the unevenness in fabrics made from them is lower than in those made from coarse wool. As a result, the resulting fabric is smoother, lighter, and brighter. Fabrics made from coarse wool are inferior to those made from fine wool in these properties. To study the commercial value of the experimental sheep skins, we analyzed the physical and mechanical properties of the semi-finished products derived from them and determined their potential applications (Table 7).

Table 7

THİCKNESS AND DENSİTY OF LEATHER SEMİ-FİNİSHED PRODUCT

Groups of sheep	*Fine wool*		*Coarse wool*	
	Thickness of leather semi-finished product, mm	*Strength of leather semi-finished product in g/force*	*Thickness of leather semi-finished product, mm*	*Strength of leather semi-finished product in g/force*
The ram is a breeder	2,2	1,9	2,6	2,2
Mother sheep	2,0	1,8	2,3	2,0
Male tog	1,9	1,6	2,1	1,8
Female tog	1,8	1,5	2,0	1,7

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Data in Table 7 indicate that the leather semi-finished products from coarse-wooled sheep are superior to those from fine-wooled ones in terms of thickness and strength. Therefore, the leather semi-finished products from coarse-wooled sheep are more suitable for shoe uppers, gloves, and covering materials. The actual density and porosity of the leather semi-finished product depend largely on the properties of its wool cover (Table 8).

Table 8

DENSİTY OF SEMİ-FİNİSHED LEATHER, kg/m^3

Groups of sheep	*Fine wool*			*Coarse wool*		
	Probable density of leather semi-finished product	*Actual density of leather semi-finished product*	*Porosity, %*	*Probable density of leather semi-finished product*	*Actual density of leather semi-finished product*	*Porosity, %*
The ram is a breeder	0,70	1,30	43	0,75	1,45	1,10
Mother sheep	0,68	1,29	42	0,74	1,40	1,10
Male tog	0,67	1,20	43	0,70	1,39	1,90
Female tog	0,65	1,15	43	0,69	1,38	1,80

Thus, our research shows that leather semi-finished products with a fine wool cover have a lower true density and higher porosity than those with coarse wool. This is due to the fact that fine wool covers have 2-3 times more wool fibers per 1 cm² area than coarse wool covers; as a result, the amount of wool fibers that pierce the skin and create porosity is much higher in fine wool leather. It is precisely because of this and the difference in skin density that using coarse wool leather for covering and bedding materials is more economically efficient.

Conclusion

From the research conducted, it can be concluded that, in addition to increasing attention to the strength of the wool of sheep raised in this region, special attention should be paid to the quality of wool fat. Using fine wool for the production of combed (kamvol) and worsted fabrics, and coarse wool for the carpet industry, is more economically efficient. Considering the recent interest of the industry and the population in fur products, it may be more profitable to develop fine and semi-fine wool sheep breeding and use their skin for this purpose. Thus, the following conclusions can be drawn from the scientific research conducted at the “Gapanli” rural farm in the Shamkir region:

1. The wool of the sheep raised on the farm is mainly 70k, 64k, and 60k.

2. The wool of the Bozak sheep with gabayun on the farm is 44–45 μm thick, and a relatively large amount of wool falls into the carding system and a smaller amount into the combed system.

3. The wool of fine-wooled sheep differs from that of gabayun in its histological structure. Since the epidermis of fine wool has more scales in a 1 cm long wool strand than in coarse wool, the thread is denser, and its strength is higher.

4. As the fineness of the wool increases, the number of twisting (bending) cycles per 1 cm also increases. As a result, the strength of the thread obtained from the same mass, but from wool strands of different thicknesses, varies.

5. The degree of unevenness of the fabric obtained from wool of different thicknesses varies. Since fine wools are better twisted, the thread obtained from them is smoother, and therefore the unevenness in the fabric is less than that of coarse wool. Consequently, the fabric is smoother, lighter, and shinier.

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6. Since the thickness and strength of the leather semi-finished products of coarse-wool sheep are superior to those of fine-wool sheep, they can be used for shoe uppers, gloves, and covering materials.

7. Since leather semi-finished products with a fine wool coating have 2–3 times more wool fibers per 1 cm² area than coarse wool, the number of hairs per unit area of the skin is higher, and as a result, the porosity increases. Therefore, such skins are less durable and have less heat-retention capacity, so they cannot be used to make shoe uppers and insoles.

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