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The Composition And Quality Of Wool Tuva Yaks.

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ABSTRACT

In the global market, demand for products from natural down and wool continues to rise. In this regard, scientific studies on the quality of yak down and its use in the development of products are very relevant. In the Republic of Tyva, yaks are bred from ancient times and at present there are gene pool farms selling breeding yaks to other regions of Russia, but the wool productivity and quality of yaks of the Tuvan population has not been studied enough. We studied the hair samples of males and females of 1.5 and 3 years old, taken from two parts of the body according to the composition, length and diameter of the wool fibers. The results of the study showed that yak wool contains from 64.7 to 72.3% of downy fibers, valuable for the processing industry, the composition of yak wool depends on age and sex, the largest proportion of down in wool of young animals, down from the body is 1.5- In terms of their quality, summer yaks correspond to the 58th, 3-year-olds - and the 50th quality of sheep wool, which meets the requirements for the production of wool products.

Keywords: yak, yak breeding, wool, wool composition, down, down products, quality.

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INTRODUCTION

In dealing with the problems of increasing the efficiency of livestock raising, increasing the production of various types of agricultural products in the Republic of Tyva, yak culture occupies an important place, which here is a traditional branch of animal husbandry. Vast territories at high altitude have such a complex combination of climatic and fodder conditions that it is difficult to keep cattle, sheep and horses on them. These lands are well mastered domestic yaks. They are exceptionally well adapted to the specific conditions of highlands, which are characterized by low partial pressure and temperature, poor low-growing vegetation.

Being adapted to live in the harsh conditions of the highlands, the yaks are noticeably superior to all other types of farm animals in their economic biological properties. With minimal labor costs and funds for their maintenance, yaks receive various products in the form of meat, milk, wool, leather products [6].

In Tyva, there are gene farms for the conservation and breeding of yar breed Sarlyk. They implement tribal yaks in other regions of Russia. The interest in yaks is caused by the fact that their breeding makes it possible to make the most of the natural riches of the high mountain steppes and deserts, and makes it possible to get more products from each hectare of land.

Since ancient times, in many countries where yaks are bred, their wool is widely used in everyday life. Since ancient times and now Tuvans from coarse long yak hair weave ropes, belts, knit socks from down. As Epstein H. writes. Tibetans and Sherpas make blankets, pack bags and even canopies from them, and knit clothes from down [7].

Currently, the global market demand for products from natural down and wool is increasing. In this regard, scientific studies on the quality of yak down and its use in the development of products are very relevant.

Mongolian scientists have studied the quality of yak wool when shearing and combing, and have developed standards for wool. As a result of studies of length, fineness, strength, grease, moisture, they found that the average thickness of yak down was 21.3 microns, awn 29.87, long hair - 72.8, down length 39.7 mm, awn - 17.8 mm, long hair - 86.6 mm, strength 8-11 cn / tex, grease coat in wool contains 2.8-3.8% [1,2,3].

Yak downy hair is soft and smooth, can have different colors, including shades of gray, brown, feathery pattern, etc. Yarn from down of yaks strong. Products from it are more heat-shielding and durable compared to products made from goat down [1].

As D. Miller characterizes "... this hair is like cashmere. From one yak you can get from 300 to 700 g of fluff. After combing the yak, luxurious fluffy fiber is obtained, from which you can get excellent yarn for knitting" [8].

The wool productivity of the yaks of the Tuva population has not been studied enough. The composition of wool, the length and diameter of wool fibers that are important for light industry are not determined.

In the present work, the goal has been set - to study the composition and linear characteristics of the hair of Tuvian yaks in the context of gender and age groups.

To achieve the goal, the following tasks were solved:

1. To establish the composition and ratio of different types of fibers in the wool of Tuvian yaks;
2. To determine the length and diameter of wool fibers of different types.

MATERIAL AND METHODS

The material of the research was the wool samples of males and females of two ages - 1.5 and 3 years. Samples of wool were taken from two parts of the body: the side (the trunk) and the belly (the fur of the fringe).

The work was performed according to the scheme below (Table 1).

Table 1: Scheme of experience

Gender and Age Group	Age, years	n	Studied parameters
Males	1,5	15	The composition of wool, the ratio of awn: down, natural and true length, thickness of wool fibers
	3	15	
Females	1,5	15	
	3	15	

The composition of wool was studied by counting method. The natural length of the wool was measured in the sample, centimeter ruler with an accuracy of 1 mm, without stretching the fiber. The true length was determined using a Metefem FM-04 instrument. The diameter of the fibers was determined by a microscopic method using a Carlzeiss spectrometer and a Micro-Microscope 2 microscope using an eyepiece micrometer. Biometric data processing was performed according to N. A. Plokhinsky (1970) using the MS Excel computer program.

RESULTS AND DISCUSSION

Certain differences were found between animals of different sex and age in the composition of the fur of the body and belly. From the data in Table 2, it can be seen that, in general, yaks have torso with more fluff, fringe wool, on the contrary, more awn.

Table 2: Wool composition,%

Gender	Age, years	Wool torso			Wool fringe		
		awn	transitional hair	down	awn	transitional hair	down
Males	1,5	20,0	7,7	72,3	52,2	37,2	10,6
	3	22,5	8,4	69,1	55,8	36,8	7,4
Females	1,5	21,2	9,0	69,5	44,7	37,1	18,2
	3	22,0	14,1	64,7	50,5	37,2	12,3

Detailed analysis shows that the content of the awn and transitional hair in animals is 1.5 years less in the body fur, and there is more fluff than in older animals. The difference between males in the content of the awn is 2.5, between females - 0.8%, transitional hair, respectively, 0.7 and 5.1%. The fluff content in males 1.5 years is 3.2, in females - by 4.8% more compared to 3-year-olds.

In the context of even-aged groups of different sex there are also features. In the wool of the body, in females of 1.5 years, the proportion of spine and transitional hair is greater (by 1.2 and 1.3%, respectively), and lint is smaller (by 2.8%) than in males; in the belly, on the contrary, males have more spines (by 7.5%), less fluff (by 7.6%). In the content of transitional hair in the belly belly, there are no sharp differences between males and females of this group. In the group of 3-year-old animals, there is also a rather noticeable difference between males and females. In the fur of the trunk, the proportion of transitional hair in females is higher by 5.7%, and that of the down is 4.4% lower compared to males. Wool fringe in males contains more awn (by 5.3%), but less transient and downy hair (by 0.4 and 4.9%, respectively).

In general, Tuvan yaks contain transitional hair in the range from 7.7 to 14.1%, and downy from 64.7 to 72.3.

In the wool of the belly (fringe) of the awn contains from 44.7 to 55.8%, which is 2 - 2.6 times more than its content on the body. The values of the specific weight of guard hairs in the sex and age groups under consideration are close, with the exception of females 1.5 years old, in whom it is less than in other groups (44.7%). In the fringe and a lot of transitional fibers. Their content in the fringe is higher compared to their content on the body in the range from 2.6 to 4.3 times. Fringe contains significantly less fluff. Compared to the

body, their share in the fringe is less than 3.8 to 9.0 times. From these data it follows that with age, the content of the spine in the fringe increases, which is apparently due to adaptation processes in a harsh high-mountain climate that contains yaks.

The ratio of an awn:down on the two considered areas of the body has noticeable differences (Table 3). The difference between this index in body hair and fringe is 1.5 years for male neuter men, 3.4 years, for 3-year-olds - 2.97, for females 1.5 years old - 2.8, for 3-year-olds - 2, 86 This suggests that there is several times more fluff (from 2.8 to 3.4) for one spine in the fur of the body than in the wool of the fringe.

Table 3: The ratio of awn: down

Gender	Age, years	Wool torso	Wool fringe
Males	1,5	3,6	0,2
	3	3,1	0,13
Females	1,5	3,2	0,4
	3	3,1	0,24

According to this indicator, age differences are found between animals of the same sex, which make up between the males 1.5 and 3 years old - 0.5, females - 0.1. The difference between animals of different sexes at the age of 1.5 years is 0.4. Males and females of 3 years in terms of awn: fluff have no differences.

The study of the natural and true length of the awn and down in the fur of the body and fringe revealed the following: the natural length of the awl in 1.5-year-old males is 2.0 cm longer than that of the calves, the true length - by 1.0. In animals of 3 years of age, this difference is respectively 5.0 and 4.5 cm. According to the natural and true length of down, 1.5-year-old animals of different sexes do not differ from each other, in 3-year-old males compared to females the natural length of down more than 1.0 cm, true - 0.3 cm (Table 4).

Table 4: Length of wool, cm

Body area	Fiber type	Length indicator	Males		Females	
			Age, years			
			1,5	3	1,5	3
Torso	awn	natural	9,0±1,1	15,0±0,9	7,0±0,7	10,0±0,6
		true	9,5±0,5	16,0±0,3	8,5±0,5	11,5±0,2
	down	natural	3,5±0,2	4,0±0,6	3,5±0,5	3,0±0,3
		true	5,0±0,3	4,5±0,5	5,0±0,6	4,8±0,3
Belly	awn	natural	18,0±0,3	22,0±0,4	10,0±0,6	20,0±0,6
		true	18,5±0,6	21,0±0,5	11,0±0,9	20,5±0,3
	down	natural	5,5±0,3	4,0±0,2	6,0±0,4	3,5±0,2
		true	6,0±0,4	4,5±0,1	6,5±0,5	4,5±0,4

The difference between the true and natural length of wool allows us to judge the waviness of wool fibers. In the wool of the body, in 1.5-year-old males, the true length of the spine was 0.5 times longer than the natural one, 1.5 cm longer in the fluff, and 1.0 and 0.5 cm in the 3-year-old males. In the 1.5-year-old this difference was as follows: for the stem, and for the down of the trunk, 1.5 cm; for 3-year-olds, for the stem, 1.5 cm; for the down, 1.8 cm.

In the fur of the fringe, the difference between the true and natural length of the awn in 1.5-year-old males was 0.5 cm, in the heifers -1.0 cm, in 3-year-old animals, respectively 1.0 and 0.5 cm.

The natural length of down fringes in males and tello 1.5 years was less than true by 0.5 cm, in 3-year-old males - by 0.5, tello - by 1.0 cm.

From these data it can be seen that in the difference between the true and natural length of the wool, there is no definite pattern and dependence on gender and age, and it can be assumed that the waviness of the wool fibers is an individual property of animals.

The results of the study of the diameter of different types of wool fibers showed that this parameter has a relationship both with age and with the sex of animals. Wool in males is thicker than in females (with the exception of transitional and down hair in fringe hair), the hair of young animals is thinner than that of adults (tab. 5).

Table 5: Diameter of wool fibers, microns

Gender	Age, years	awn		transitional hair		down	
		M±m	σ	M±m	σ	M±m	σ
Wool torso							
Males	1,5	101,2±0,5	1,5	55,6±0,2	0,7	26,8±0,4	1,2
	3	115,1±0,7	1,9	68,3±1,5	0,9	31,2±0,9	2,0
Females	1,5	93,7±0,4	2,0	50,8±0,5	0,5	24,9±0,3	1,8
	3	100,4±0,9	2,3	65,1±1,2	0,7	29,4±1,1	1,9
Wool fringe							
Males-cuts	1,5	124,3±0,4	0,9	63,5±0,5	0,8	37,5±0,3	1,2
	3	135,2±0,9	1,1	75,4±1,5	0,9	40,3±0,8	1,7
Females	1,5	119,8±0,3	1,8	58,8±0,3	0,5	30,7±0,4	1,6
	3	130,3±1,3	2,1	79,1±1,1	0,7	45,2±0,9	2,0

The difference in the thickness of the trunk hair fibers between males of different ages is: spine 12.9, transitional hair - 12.7, fluff - 4.4%, between females, respectively - 6.7, 14.3 and 4.5%.

Between the same-aged males and females of 1.5 years, the differences in the diameter of the guard fibers of the body are 7.5, transitional - 4.8, and downy - 1.9 microns. For fringe wool fibers, the difference is 4.5; 4.7 and 6.8 microns. In 3-year-old animals, the difference between males and females in the trunk fibers is: spines - 14.7, transitional hair - 3.2, fluff - 1.8 microns. The fringe fibers show a slightly different picture: with the same regularity of spine thickness exceeding in males (4.9 μm), transitional and downy fibers in females are 3.7 and 4.9 μm thicker, respectively.

The data obtained show that when combing young 1.5-year-old yaks, you can get a down corresponding to the 58th, 3-year-olds - to the 50th quality of sheep wool, which is suitable for the production of wool products.

CONCLUSION

- 1) Yak wool contains from 64.7 to 72.3% of downy fibers, valuable for the processing industry;
- 2) The composition of yak hair depends on age and gender;
- 3) The largest share of down in the hair of young animals;
- 4) The down of the torso of 1.5-year-old yaks corresponds in quality to the 58th, 3-year-olds - and the 50th quality of sheep wool, which is suitable for making wool products.

REFERENCES

- [1] Bat Erdene T. Economic and biological features of the Yaks and their importance in the national economy of the Mongolian People's Republic: Author. dis. ... dr. S.-H. Sciences / T. Bat-Erdene. - M.,



1988. - 33 p.
- [2] Davaasambuu, G. Sarlagiyn nooluur / G. Davaasambuu // Sarlag sudalal. - Ulaanbaatar Hot, 2002.- Vol. 2. - p. 54-60.
- [3] Denisov V.F. Domestic yaks and their hybrids / V.F. Denisov. - M., 1958. - p. 62.
- [4] Irgit R.Sh. Yakivodstvo: training. allowance / R.Sh. Irgit, A.E. Lushchenko. - Krasnoyarsk. Publishing house KrasGAU, 2008. - 116 p.
- [5] Nadmid, G. Sarlagiyn nooluur yamaany nooluuraus dutaharguy tuuhiyed / G. Nadmid, S. Sarantseg // Sarlag sudalal. - Ulaanbaatar Hot, 2002.- Vol. 2. - p. 46-50.
- [6] Chysyma R.B. The gene pool of the Tuvian yak: Conservation and rational use. / Ros. Acad. S.-H. sciences. Sib. Region. Separate Tuv Nauch.-issled. Inst. Of se.khoz-va. - Novosibirsk, 2009.-210 p.
- [7] Epstein H. Domestic animals of Nepal / H. Epstein // Holmes and Meier. – N. Y., 1977. – P. 20 – 37.
- [8] Miller, Daniel J. Yaks. / Daniel J. Miller // Rengelds, 1986 - Vol. 8 – No. 3: 115 – 119.