

ISSN 2224-526X

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

ҚАЗАҚ ҰЛТТЫҚ АГРАРЛЫҚ УНИВЕРСИТЕТИ

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ
АГРАРНЫЙ УНИВЕРСИТЕТ

NEWS

OF THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

KAZAKH NATIONAL
AGRARIAN UNIVERSITY

АГРАРЛЫҚ ҒЫЛЫМДАР СЕРИЯСЫ



СЕРИЯ АГРАРНЫХ НАУК



SERIES OF AGRICULTURAL SCIENCES

4 (46)

ШІЛДЕ – ТАМЫЗ 2018 ж.

ИЮЛЬ – АВГУСТ 2018 г.

JULY – AUGUST 2018

2011 ЖЫЛДЫҢ ҚАҢТАР АЙЫНАН ШЫҒА БАСТАҒАН

ИЗДАЕТСЯ С ЯНВАРЯ 2011 ГОДА

PUBLISHED SINCE JANUARY 2011

ЖЫЛЫНА 6 РЕТ ШЫҒАДЫ

ВЫХОДИТ 6 РАЗ В ГОД

PUBLISHED 6 TIMES A YEAR

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Известия Национальной академии наук Республики Казахстан. Серия аграрных наук.

ISSN 2224-526X

Собственник: ООО «Национальная академия наук Республики Казахстан» (г. Алматы)

Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан № 10895-Ж, выданное 30.04.2010 г.

Периодичность 6 раз в год

Тираж: 300 экземпляров

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219-220, тел. 272-13-19, 272-13-18

<http://nauka-nanrk.kz/agricultural.kz>

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News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Agrarian Sciences.

ISSN 2224-526X

Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)

The certificate of registration of a periodic printed publication in the Committee of Information and Archives of the Ministry of Culture and Information of the Republic of Kazakhstan N 10895-Ж, issued 30.04.2010

Periodicity: 6 times a year

Circulation: 300 copies

Editorial address: 28, Shevchenko str., of.219-220, Almaty, 050010, tel. 272-13-19, 272-13-18,

<http://nauka-nanrk.kz/> agricultural.kz

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Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

NEWS

OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN

SERIES OF AGRICULTURAL SCIENCES

ISSN 2224-526X

Volume 4, Number 46 (2018), 56 – 61

UDC 636.082.1

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**CHARACTERISTICS OF THE HAIR OF THE BULLS
MEAT OF GEREฟอร์ด AND KAZAKH WHITE-BREED BREEDS
IN THE CONDITIONS OF SOUTH BALKHASH**

Abstract. The article presents data on the hair cover of gobies in winter and summer, obtained by purebred breeding: Kazakh white-headed (KB), Hereford (GF), and their crosses F1 ♂ Hereford White (♀ Kazakh White-headed) breeds. Animals of all experimental groups had well-developed hair follicles. By the winter, the young grew thick with hair, which contained enough fluff, which is one of the signs of the adaptive plasticity of the organism when environmental factors change in different seasons of the year.

In winter, the animals of Kazakh white-headed breed, having thicker skin, in comparison with Hereford breed, grow a longer and thicker hair with a high content of fluff. In winter, in the process of adaptation of animals, the mass and length of the hair increases significantly, the fur structure contains more fluff. This confirms the good adaptability of cattle to the temperate climate, which is characterized by snowy, but not very severe winters.

Keywords: kazakh white-headed, Hereford, cross-breeds, herd, breed, awn, cover, hair.

Introduction. A significant role in the fitness of animals to environmental conditions is played by the hair covering, which protects the animal's organism from changes in heat transfer. The protective role of the hair cover from heat loss is also in the presence of a heat-insulating layer of air in its thickness, which inhibits the heat transfer and cooling of the skin. The hairline is a hereditary trait and has characteristic features depending on the natural and climatic conditions of the animal breeding zone and the season of the year [1].

The ability of animals to adapt to changes in environmental conditions and at the same time not to reduce productivity is largely related to the nature of their skin-hair cover [2].

The hair covering protecting the animal organism from excessive heat transfer, in the process of adaptation of animals to environmental conditions plays an important role. Its protective functions, in addition to protecting against heat loss, are also in the presence of a heat-insulating layer of air in its thicker, inhibiting heat transfer and cooling the body.

The hair covering of animals fulfills a heat-regulating role, has pedigree features and varies depending on the conditions of detention and the season of the year.

The hair covering is a derivative of the skin and has the closest relationship with its structure and function. When adapting animals to low temperature conditions, especially in winter, the hairline plays an important role in regulating heat exchange between the body and the environment, and protects against wetting when it rains and snow. In the process of adaptation of animals to low-temperature conditions in winter, a change in the structure of the hair cover takes place [3].

Materials and methods of research. The experience was conducted in LLP "Agrofirma" Dinara-Ranch ", Balkhash district, Almaty region. The object of the study was the offspring obtained from purebred Kazakh white-headed, Hereford breeds and their hybrids (F1 ♂ Hereford White × Kazakh Kazakh).

In our studies, we studied the nature of the hair of the bull calves in order to identify the adaptive ability of animals of different genotypes to the conditions of the sharply continental climate during the

winter and summer periods. In the experiment on comparative study of bulls of Hereford (GF), Kazakh white-headed (CB) breeds and their hybrids (F1 ♂ Hereford White, ♀ Kazakh white-headed), the animals were kept in winter in cold premises with free-range walking into yards and in summer in pastures.

The hair cover was studied according to the method of EA Arzumanyan. (1957) into 3 animals from each group in summer and winter, by taking hair samples at the midpoint of the last rib from the area of 1 cm² of skin. The mass, density, structure, length and thickness were determined.

In this case, the features of the hair cover in animals of different breeds were revealed.

Results of the research. One of the indicators characterizing the adaptive abilities of animals to habitat conditions is the nature of the molt's course.

The hair cover characterizes the ability of animals to maintain optimal life status and adaptive ability to a particular natural and climatic zone. It also performs a heat insulation role and has characteristic features in animals of the same species. An important indicator that characterizes the fitness of the organism to the effects of environmental factors is a timely and fairly rapid change in the hair cover. In connection with this, a study was conducted, during which the features of hair follicle change in animals of different breeds were studied.

As a result, it was found that moulting among the bull-calves of the three groups took place at the same time, that is, the breed characteristics of the animals, had practically no effect on time and duration. The beginning of the change in the hair cover of the bull-calves took place in the last decade of February, the end - at the end of June, the beginning of July.

Figure 1 shows the sequence of the passage of molting along the sections of the trunk. It should be noted that the change in the hair cover of the bull-calves was in accordance with the biological characteristics of cattle, namely: it began with the reactive or most sensitive zones - the head, neck; further passed to the withers, the sacrum, dropped on the hips; Later moved to the area of the back and waist, on the front of the chest; The latter were shedding their sides, belly and limbs below the elbow and knee joints. A similar sequence of changes in the hair cover is indicated in his studies by V.F. Petrov (1978, 1982).

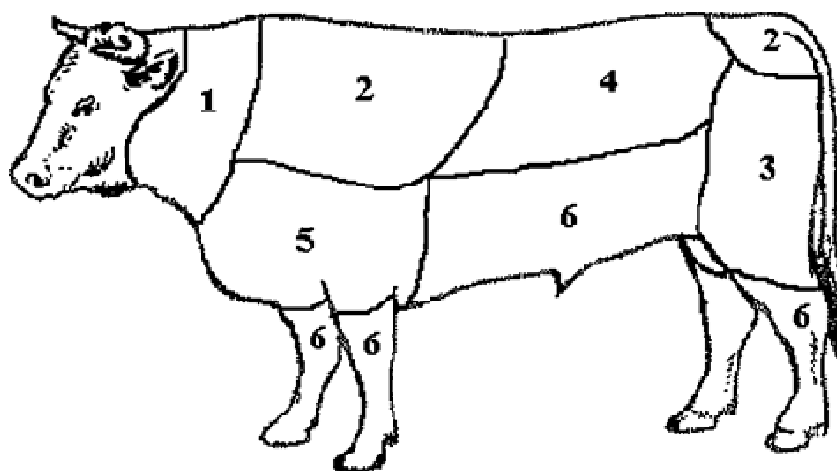


Figure 1 – Scheme of the sequence of the passage of molting along the sections of the trunk

If we consider the periods of passage of molting in each part of the trunk, then the following was observed. Hair loss on the muzzle, neck - February, March; withers, shoulder blades, sacrum - March; the back of the trunk, hips, back, waist - April; sides, belly, limbs - May. That is, the moulting took place at a sufficiently high rate, which, most likely, is due not only to the prolonged presence of animals outside the premises, but also to the general good condition of the young.

The bulls of all groups have a well-marked seasonal change in the nature of the hairline. Moulting of animals passed in usual terms for the zone of the Southern Balkhash region. Complete physiological molting of bull-calves was completed in early July. There were no intergroup differences in hair change.

Thus, in the course of the studies, there was no difference in moulting passage in bull-calves of different genotype. This in this case can be explained by the similarity of the conditions of keeping animals, as well as their adaptability to specific climatic conditions.

Systematic observations of moulting among the bull-calves made it possible to establish that molting of Kazakh white-headed, Hereford breeds and their hybrids, molting ended July 5-10.

There were no significant differences in the nature and duration of molting between the animals of the experimental groups.

The obtained data testify to the significant effect of the season on the indices of development of the hair cover (table 1). Galls of Kazakh white-headed, Hereford breeds and their hybrids had almost identical pronounced seasonality of hair properties.

Table 1 – Indicators of calves' hair cover by seasons ($\bar{x} \pm S_x$), (n - 3)

Index	Breed					
	GF		KB		F ₁	
	Winter					
	$\bar{X} \pm m_x$	C_v	$\bar{X} \pm m_x$	C_v	$\bar{X} \pm m_x$	C_v
mass, mg	81.2±0.30	0.37	79.3±0.91	1.14	79.1±0.95	1.20
length, mm	28.70±0.31	1.06	28.6±0.23	0.81	28.5±0.25	0.88
density, pcs	1782.7±0.95	0.05	1781.3±0.59	0.03	1781.9±0.12	0.01
	Summer					
	$\bar{X} \pm m_x$	C_v	$\bar{X} \pm m_x$	C_v	$\bar{X} \pm m_x$	C_v
mass, mg	21.82±0.05	0.24	21.78±0.09	0.41	21.81±0.07	0.30
length, mm	12.27±0.07	0.59	12.25±0.05	0.40	12.24±0.03	0.26
density, pcs	1060.7±5.10	0.48	1064.0±3.06	0.29	1061.7±3.75	0.35

In the summer, the hairline is much rarer, lighter and shorter, in its structure, the hair coat predominates, mainly due to a reduction in the specific weight of the fluff. This improves the heat exchange of the animal and the environment, mainly by improving skin evaporation reduction. By the onset of the winter period there was an active growth of the hairline, which is associated with the protective function of the body from unfavorable environmental conditions and the manifestation of its adaptive plasticity when these conditions change.

In winter, the mass of hair from 1 cm² of the skin surface compared to the summer period was higher by 57.4-59.4 mg ($P > 0.95$), the advantage along the length was 16.2-16.4 mm and the density was 721 - 718 pcs (figure 2).

Some intergroup differences in the indices of the hair cover were revealed. Bulls of Kazakh white-headed breed differed the largest mass of hair from 1 cm² of skin in winter. Their hair was thicker and longer. These indicators were most pronounced in gobies of Kazakh white-headed. By weight of hair from a unit of area, the Kazakh white-headed breed exceeded the peer crosses by 2.1 mg ($P < 0.95$), Hereford exceeded by 1.9 mg ($P < 0.95$).

By the length of the hair they had an advantage over the peers of the bulls of the Kazakh white-headed and Hereford breed and exceeded them by 0.2-0.1 mm ($P < 0.95$). In the thickness of the hair the bulls of the Kazakh white-headed breed had a slight advantage over their peers.

In the summer, intergroup differences in weight, length and density of hair per 1 cm² were insignificant and statistically unreliable (figure 3).

In winter, there was a marked decrease in the specific weight of the awn, an increase in the content of downy hair, this provides good thermal insulation against heat loss and cold penetration. A short and sparse scalp, consisting mainly of an osteal hair, contributes to a better heat exchange between the body and the environment during the summer, protects animals from excessive overheating.

The hairline was more coarse with the bull-calves obtained as a result of the introductory crossing with Hereford bulls according to the indices characterizing the quality of the hair cover. Herefords occupied an intermediate position (table 2).



Figure 2 – Hair length in winter



Figure 3 – Length of hair in summer

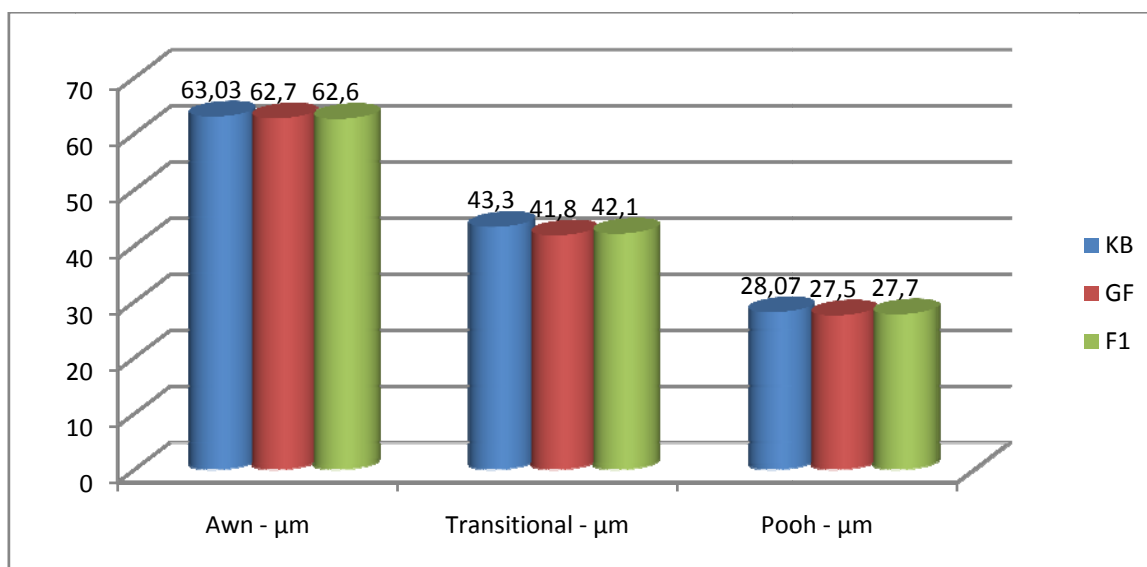
Table 2 – Dynamics of the hairline of bull-calves depending on the season of the year ($\bar{x} \pm S_x$), (n-3)

Index	Group					
	KB		GF		F ₁	
	Winter					
	$\bar{X} \pm m_x$	C_v	$\bar{X} \pm m_x$	C_v	$\bar{X} \pm m_x$	C_v
Hairmass, pcs/cm ²	81.2±0.30	0.37	79.3±0.91	1.14	79.1±0.95	1.20
Amount of hair, unit/cm ²	1782.7±0.95	0.05	1781.3±0.59	0.03	1781.9±0.12	0.01
Length, mm	28.7±0.31	1.06	28.6±0.23	0.81	28.5±0.25	0.88
Awn - μm	63.03±0.49	0.78	62.7±0.90	1.44	62.6±0.85	1.36
Transitional - μm	43.3±0.61	1.40	41.8±1.06	2.54	42.1±0.57	1.34
Pooh - μm	28.07±0.38	1.35	27.5±0.25	0.91	27.7±0.17	0.63
Summer						
Hairmass, pcs/cm ²	21.82±0.05	0.24	21.78±0.09	0.41	21.81±0.07	0.30
Amount of hair, unit/cm ²	12.27±0.07	0.59	12.25±0.05	0.40	12.24±0.03	0.26
Length, mm	1060.7±5.10	0.48	1064.0±3.06	0.29	1061.7±3.75	0.35
Awn - μm	65.5±0.76	1.15	64.9±0.20	0.31	65.2±0.42	0.64
Transitional - μm	44.0±0.62	1.42	42.8±0.79	1.85	43.4±0.87	2.01
Pooh - μm	28.4±0.56	1.96	28.07±0.74	2.63	28.1±0.32	1.14

Hair mass, pcs/cm² in winter, varied in the experimental bull-calves from 79.1-81.2, in the summer period from 21.78-21.82. The amount of hair, pcs/cm² in the winter, varied in the experimental bulls from 1781.3-1782.7, in the summer 12.24-12.27. Length, mm in the winter, varied in the experimental bulls 28.5-28.7, in the summer from 1060.7-1064.0. The ost-µm in winter time was in the hybrid bull-calves from 62.6-63.03, in the summer it was from 42.8 to 44.0. Transitional - µm in winter time was in the hybrid bull-calves from 41.8-43.3, in summer it was 42.8-44.0. Pooh - µm in winter time was in the hybrid bull-calves from 27,5-28,07, in the summer time varied from 28,0-28,4.

At the same time, the bulls of the Kazakh white-headed and Hereford breed and hybrids had a favorable ratio of ostevyh and downy hair in the winter and summer periods, which facilitated easier transfer of winter cold in summer and heat in summer.

It was found that the mass of hair in winter with 1 cm² more in Kazakh white-headed breed by 2.4% compared to Hereford breed, and by 2.6% compared to cross-breeding. Pooh is more in the Kazakh white-headed breed of animals than in the Hereford breed and is 2.1%, and the transitional hair tone is higher in the Kazakh white-headed breed than in the Hereford breed, which is 3.5%. Thus, in animals of Kazakh white-headed breeds with thicker skin, in comparison with the Herefordian animals, a longer and dense hair cover grows in winter with a high content of down.



Structure of the hairline of animals of Kazakh white-headed, Hereford breeds and their hybrids in winter

In winter, the hair follicle structure of Kazakh white-headed breed contains more fluff by 21.1% compared to Hereford breed and by 1.4% compared to hybrid animals. The content of awn in the Hereford breed and the crossed animals was approximately the same - 0.6% and 0.7%, respectively.

Conclusion. Thus, the animals of all the experimental groups had a well-developed hair follicle. By the winter, the young grew thick with hair, which contained enough fluff, which is one of the signs of the adaptive plasticity of the organism when environmental factors change in different seasons of the year. Hair mass, pcs/cm² in winter, varied in the experimental bull-calves from 79.1-81.2, in the summer period from 21.78-21.82. The amount of hair, pcs/cm² in the winter, varied in the experimental bulls from 1781.3-1782.7, in the summer 12.24-12.27. Length, mm in winter, varied in the experimental bull-calves of 28.5-28.7, in the summer from 1060.7-1064.0. The ost - µm in winter time was in the hybrid bull-calves from 62.6-63.03, in the summer it was from 42.8 to 44.0. Transitional - µm in winter time was in the hybrid bull-calves from 41.8-43.3, in summer it was 42.8-44.0. Pooh - µm in winter time was in the hybrid bull-calves from 27,5-28,07, in the summer time varied from 28,0-28,4.

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ОҢТҮСТІК БАЛХАШ МАҢЫ ЕТТІ БАҒЫТТАҒЫ ГЕРЕФОРД ЖӘНЕ ҚАЗАҚТЫҢ АҚБАС ТҰҚЫМДАРЫҢ БҰҚАШЫҚТАРЫНЫҢ ТЕРІ ЖАБЫНЫҢ СИПАТАМАСЫ, ӨСІРУ ЖАҒДАЙЛАРЫ

Аннотация. Мақалада қазақтың таза ақбас (КБ) тұқымдары, таза герефорд (ГФ) тұқымдары мен қазақтың ақбас аналық сиыры мен герефорд бұқасын шағыластыру барысында алынған F₁ ұрпағы, бұдан бұқашықтардың қысқы және жазғы кезеңдердегі түкті тері жамылғысы жайлы мәліметтер келтірілген. Экспериментальды топтағы жануарлардың барлығы жақсы дамитын түкті жабынға ие болады. Қысқа қарай жас малда мамық жүні көп, қалың түкті тері жамылғысының түзілуі орта жағдайының әр жыл мерзіміне қарамастан ағзада бейімделушілік қалыптасқан.

Қыс мезгілінде қазақтың ақбас мал тұқымдарында герефорд тұқымдарымен саластырғанда терісі қалың, ұзын және өте тығыз мамықты, қалың талшықты жамылғы қаптайды. Қыс мезгіліне жануардың қалыптасу барысында тірі салмағы және жүнінің ұзындығы артады, түкті жамылғысының құрылысы бойынша мамық жүні өте көп болады. Бұл мүйізді ірі қараның қалың қарлы, суықтығы орташа қысқы орта жағдайына бейімделушілікке төзімділігін көрсетеді.

Тірек сөздер: қазақтың ақбасы, герефорд, бұдан, топтама, тұқым, талшық, жабын, жүн.

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ХАРАКТЕРИСТИКА ВОЛОСЯНОГО ПОКРОВА БЫЧКОВ МЯСНОГО СКОТА ГЕРЕФОРДСКОЙ И КАЗАХСКОЙ БЕЛОГОЛОВОЙ ПОРОДЫ РАЗВОДИМЫХ В УСЛОВИЯХ ЮЖНОГО ПРИБАЛХАШЬЯ

Аннотация. В статье приведены данные волосяного покрова бычков в зимний и летний период, полученных путем чистопородного разведения: казахской белоголовой (КБ), герефордской (ГФ) и их помеси F₁ ♂ герефорды × ♀ казахская белоголовая) пород. Животные всех подопытных групп обладали хорошо развитым волосяным покровом. К зиме молодняк обрастал густым волосом, в котором содержалось достаточно пуха, что является одним из признаков адаптационной пластичности организма при изменении факторов окружающей среды в различные сезоны года.

В зимний период у животных казахской белоголовой породы, имеющих более толстую кожу, по сравнению с герефордской породой, вырастает более длинный и густой волосяной покров с высоким содержанием пуха. В зимний период, в процессе адаптации животных значительно увеличивается масса и длина волос, в структуре волосяного покрова больше содержится пуха. Это подтверждает хорошую адаптационную способность крупного рогатого скота к умеренному климату, который характеризуется снежными, но не очень суровыми зимами.

Ключевые слова: казахская белоголовая, герефордская, помеси, стадо, порода, ость, покров, волос.

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Редактор *М. С. Ахметова, Т. М. Апендиев, Д. С. Аленов*
Верстка на компьютере *Д. Н. Калкабековой*

Подписано в печать 22.05.2018.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
5,4 п.л. Тираж 300. Заказ 4.