

## MORPHOMETRIC CHARACTERISTICS OF THE SKIN OF YOUNG HORSES

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**Summary.** The thickness of the skin in different parts of the horse's body was studied and the morphometric parameters and the technique for measuring the thickness of the skin at different points of the body were determined. It was revealed that the skin of the dorsal side of the horse's body is the thickest, and the ventral side of the skin of the head, neck and abdominal part is thin. It has been found that the thickness of the skin is different in different colors, for example, in a blue foal, the thinnest part is the inside of the thigh, and the thickest is the soft heel of the hoof.

**Key words.** horse, skin, biopsy, histological specimen, neck, torso points, thickness, morphometric, karabayir, medial, caudal, cranial.

**Intraduction:** Horse skin provides an anatomical and physiological barrier between the external and internal environment; helps thermoregulation; feels heat, cold, pain, itching, touch and pressure; and provides pigmentation. Despite the frequent occurrence of skin diseases in horses, equine dermatology has not been sufficiently studied. It is known in the literature that the thickness of horse skin varies along the body, but changes in different breeds and young people have not been determined, even changes in the color of the horse. It is known in the literature that the thickness of horse skin varies along the body, but changes in different breeds and young people have not been determined, even changes in the color of the horse. Knowledge of skin thickness is important for skin grafting and skin disease treatment. Data on skin thickness in horses plays an important role in the "grafting" and healing of equine skin during the treatment of large wounds in the forelegs and hind legs, allowing for faster healing and better functional and cosmetic results. However, the results of skin grafting depend on the technique used and the location of the skin wound. In addition to the obtained results, the thickness of the grafts (tissues to be transplanted) has an important effect.

Ulcers are among the most common medical conditions affecting horses and have a significant economic impact on the horse industry. Wound healing in horses differs from other animal species and often results in delayed healing and extensive scarring, compromising functional and aesthetic outcomes. To date, there is no conventional method that has been objectively proven to accelerate healing or successfully prevent complications associated with secondary treatment. (Lui Kamus 2019)

Assessment of the physiological capabilities of horses is one of the urgent problems of breeding. Clinical and biochemical blood parameters underlying muscle activity and all physiological functions of the body were studied in order to determine these laws. Age-related changes in physiological functions occurring in the body of an animal are inextricably linked with gradual changes in the nature of metabolism, and it has been determined that assimilation processes prevail in the body of horses from 2 to 5 years of age. (Alekseev, 1989).

Regardless of the cause of skin wounds in horses, the overall goal in treating any wound is to heal the wound as quickly as possible and achieve the most functional and cosmetically attractive result possible. (Patricia J. 2019)

In horses, the coordinating mechanism of activity control by the cardiovascular system has been determined, and this indicator is related to the development and adaptation of the organism to external environmental conditions, as a result of the joint activity of various functional systems, homeostasis, and replacement it is noted that it manifests itself in a hidden mechanism based on. By evaluating the degree of tension of the coordination system of the body in this way, it is possible to determine the optimal periods of training horses. (Verbovik, 2006).

The level of exercise in sports horses was comparatively studied, and it was observed that the heart rate was significantly higher in horses that were used to intense exercise than in horses that were moving normally, and in well-trained animals, these indicators were slightly decreased at rest. (Shestpkova, 2009).

Some researchers have analyzed the growth indicators of the body of the best sports horses participating in all types of equestrian sports, comparing them to standard stallions. The typical physiological and biochemical characteristics at the final stage of preparation have become a decisive selection criterion for sports horses to participate in important competitions. (Laskov, 1989).

According to the authors, the use of genetic monitoring makes it possible to monitor changes in the genetic status of the population of thoroughbred horses and to take measures to prevent its negative consequences. (Xarlamova, 2015).

Although there is a correlation between the thickness of the skin and the thickness of the skin layers at some anatomical points, the acquisition of data on the horse's skin is individually sampled by the method of sequential adjustment of the dermatome. There is a lack of scientific data on skin thickness in horses and practical methods of estimating this thickness for grafting procedures. Therefore, the purpose of this study is to map the skin thickness of "Karabayir" horses by age and color and determine the correlation between skin folds and skin thickness. There is scientific information about the thickness of the skin in humans, but it is known that the knowledge about the thickness of the skin in horses, especially "Karabayir" horses, is not complete. The thickness of the skin on the body of horses is different, but the dimensions of the skin of different horse breeds, especially "Karabayir" horses, are unknown.

**Research object and methods.** Taking into account the stages of sexual and physiological development of horses during this research, it is planned to take samples from 28 anatomical points of the body skin of 3 3-year-old "Karabayr" horses of different colors. The thickness of these samples was then determined using a digital caliper under a magnifying glass. In addition, histological preparations were prepared from the samples and microscopic measurements of the skin layers were also carried out. The thickness of the obtained skin samples was measured with a digital caliper, and histological preparations were prepared in the laboratory of histology and pathomorphology of the Samarkand State Veterinary Medicine University of Animal Husbandry and Biotechnology. It showed that the difference between the obtained samples and histopreparations is not significant.

**Sampling and measurement techniques.** For this research, skin samples were taken from 3-year-old "Qarabayr" horses of different colors (blue, dark, black). The average weight of horses was 160-170 ( $\pm 10$ ) kg.

Inspections were carried out within 4-5 hours after sampling. Anatomical sampling sites on the left and right sides of the body were performed in a standardized manner. The sampling site was removed from the wool and the skin was mechanically processed, the skin was lifted with rat-toothed forceps, and the thickness of this layer was measured with a micrometer. After these measurements, a 5 mm to 10 mm skin sample was taken near the area where the skin thickness was measured. Samples were taken from non-clamped areas, as layers cause slight skin compression during measurement. Samples were taken from non-clamped areas, as layers cause slight skin compression during measurement.

**The obtained results and their analysis.** The results of the research showed that 3 heads of 3-year-old horses, 3 different colors (blue, dark, black) were taken for skin thickness samples. The results showed that the thinnest area in the blue collared dogs was the inner thigh. From 1.45 mm, and the thickest part, the soft heel of the hind hoof, up to 3.94 mm, in red-colored horses, the thinnest part is the inner part of the thigh, which is 1.48 mm, and the thickest part is the soft heel of the hind hoof, which is up to 3.97 mm, in black horses, the thickness of the skin in the medial part of the thigh was 1.52 mm, and the thickest part of the soft heel of the hind hoof was 4.02 mm. In red horses, the

thinnest part is the inner part of the thigh, which is 1.48 mm, and the thickest part is the soft heel of the hind hoof, which is 3.97 mm. the soft heel part of the hind hoof was 4.02 mm. In addition, it was found that the skin of the lower back is the thickest, and the skin of the head, neck, chest and lower abdomen is the thinnest. It was observed that the skin of the legs becomes thicker towards the distal side in horses of all three colors, it is 2.84 mm on average, and there is no big difference in the skin thickness of the front and hind legs.

Information about the thickness of the skin is important for optimal wound management in the treatment of skin diseases and grafting (transplantation).

Samples were taken from anatomical points with an average skin thickness of 1.34 mm to 4.02 mm in young horses. The area with the thinnest skin is the medial part of the thigh area ( $1.45 \pm 0.10$  mm), and the thickest skin is the base of the hoof skin of the front and hind legs ( $4.02 \pm 0.20$  mm), which is 2.7 times thicker. The thickness of the skin was cut from the back towards the abdomen. In addition, the skin on the lateral side of the forefoot and hindfoot was found to be thicker than the skin on the medial side (Table 1).

Table 1

## Anatomical skin sampling points and results of three-year-old horses

No	Sample received fields	Blue horse skin thickness mm (+/-)	Skin thickness of fair horses in mm (+/-)	Thickness of skin of black horses in mm (+/-)
	<b>Chief</b>	<b>1.34</b>	<b>1.45</b>	<b>1.36</b>
1	The medial angle of the eye is average	1.34	1.46	1.48
2	Large chewing ( m.masseter) muscle center	1.53	1.54	1.57
	<b>Neck</b>	<b>1.80</b>	<b>1.90</b>	<b>1.81</b>
3	C1- C2 neck lateral part of the spine	1.83	1.86	1.89
4	C5- C6 neck lateral part of the spine	1.92	1.93	1.96
	<b>Dorsal part of the body</b>	<b>2.98</b>	<b>3.12</b>	<b>3.21</b>
5	Lateral part of the crescent moon	2.97	3.05	3.10
6	Lateral of L5-L6 lumbar spine	3.36	3.48	3.57
7	Hello on the surface	3.20	3.44	3.56
8	Kuymych part	2.40	2.54	2.62
	<b>Lateral (side) part of the body</b>	<b>2.31</b>	<b>2.42</b>	<b>2.34</b>
9	Shovel caudal limit	1.90	1.95	2.00
10	15-16 ribs opposite	2.60	2.68	2.75
11	The last one 10 cm from the rib behind	2.65	2.67	2.68
	<b>Ventral part of the body</b>	<b>1.78</b>	<b>1.89</b>	<b>1.79</b>
12	Blue crack muscles from the center	1.70	1.74	1.80
13	Don't worry previous part	1.84	1.85	1.90
14	Don't worry back part	2.35	2.44	2.53
15	Your navel previous part	1.86	1.88	1.92

16	Your navel back part	1.85	1.92	2.00
17	Inner thigh part	1.45	1.48	1.52
	<b>Front end leg</b>	<b>2.69</b>	<b>2.79</b>	<b>2.70</b>
18	Lateral part of the wrist	2.11	2.31	2.11
19	Medial part of the wrist	1.96	2.00	2.08
20	Bracelet part	2.75	2.86	2.75
21	Palm part	2.96	2.98	3.05
22	Hoof skin basis	3.92	3.96	3.98
	<b>Back leg</b>	<b>2.79</b>	<b>2.85</b>	<b>2.94</b>
23	Half share and half curtain muscle part	2.38	2.44	2.52
24	The lateral part of the calf	2.46	2.46	2.65
25	The medial part of the calf	2.10	2.15	2.20
26	Compensation part	2.70	2.76	2.86
27	Palm part	3.17	3.35	3.44
28	Hoof skin basis	3.94	3.97	4.02

#### Summary:

- showed that the variation between the thickness of the skin layer and histological examinations was not significant;
- skin thickness ranges from 1.45 mm on the inner thigh to 4.02 mm on the distal soft heel of the hind leg;
- In a three-year-old horse, it was found that the skin of the dorsal part of the body is the thickest, and the skin of the ventral part of the head, neck and belly is thin;
- the thickness of the skin is different in different colors, for example, in blue horses, the thinnest place is the inner part of the thigh, From 1.45 mm, and the thickest part is the soft heel of the hoof up to 3.94 mm, From 1.45 mm, and the thickest part is the soft heel of the hoof up to 3.94 mm, in black horses, the thickness of the skin in the medial part of the thigh was 1.52 mm, and the thickest part of the soft heel of the hoof was 4.02 mm. It can be seen that the skin of black horses is distinguished by its thickness and durability.
- the thickness of the skin of the feet is on average 2.85 mm, and the thickness of the skin becomes thicker towards the distal side.;
- there was no significant difference in the thickness of the skin of the front and back legs;
- knowledge of skin thickness helps in skin grafting (transplantation) and wound healing.

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