Nat. Volatiles & Essent. Oils, 2021; 8(4): 15705-15709

Changes In The Postnatal Ontogenesis Of Historological Indicators Of The Four-Headed Muscle Number Of Hisori Sheep

Mukhtorov Elmurod Abdigulomovich[1] , Dilmurodov Nasriddin Bobokulovich[2]

[1]Samarkand Institute of Veterinary Medicine

[2]Samarkand Institute of Veterinary Medicine

Annotation

Some histological features of the quadriceps muscle of the limb at different physiological stages of postnatal ontogeny of Hisori sheep were studied, and the diameter of the muscle fiber gradually increased from the first 3 days to 60 months of postnatal ontogenesis, regardless of their living conditions, and the highest rate was observed at 60 months. The absolute indicator of muscle fiber area was found to be a physiologically mature stage of postnatal development in animals, i.e., a slight increase during the period up to 18 months, and this process continued without significant change in the next 36 and 60 months. Although the absolute values of muscle fiber diameter and area increased periodically from 3 days to 60 months of postnatal ontogeny, they were found to be higher in animals under adequate conditions than under inadequate conditions.

Keywords: Hisori breed sheep, postnatal ontogeny, adequate conditions, inadequate conditions, organ leg, muscle, growth rate, absolute index, muscle fiber diameter, muscle fiber area.

Introduction. In addition to the fact that the histological characteristics of the fibers that make up muscle tissue depend on their anatomical and topographic location and the scale of movement, they are in many ways influenced by the natural living conditions of organisms, the characteristics of geographical relief. In addition, the main part of meat consumed by humans is transverse muscle tissue, the quality and quantity of which depends primarily on the age and natural living conditions of animals, as well as morphological composition, the dynamics of development of histological structures at different physiological stages of postnatal ontogeny. The study of the laws is also of great scientific and practical importance.

Studies have shown that the highest average daily growth of females and male lambs occurs in the first and second months of their lives. According to the author, the average daily growth of both groups of lambs decreases with age. During the grazing period, ie 4-8 months, the average daily growth decreased by 40% in male lambs and by 35.3% in females. The average live weight gain of male lambs decreased by 40% from 8 to 12 months of age, and that of females decreased by 2.5 times [5].

In order to accurately assess the meat productivity of animals, the histotrophy of the long muscle of the sheep shoulder was studied not only the morphology of muscle fibers, but also their connective tissue layers [6]. The authors found that in the postnatal ontogeny of meat-oriented West Siberian sheep, the long muscle tissue of the shoulder is composed of densely packed and welldifferentiated limited muscle fibers. The muscle fibers have a more oval triangular and rectangular shape in cross section. In the longitudinal section, the muscle fibers wavy together to form a contraction node and show a clear longitudinal line, with a layer of connective tissue visible between the fibers. The oval-shaped core is located along the edges (periphery) of the muscle fiber.

Specific morphological features in the histostructure of muscle tissue of sheep, dogs, rabbits and cats have been studied, and histological studies have shown that there are several common features in the microstructure [2]. That is, muscle tissue is round, oval, and composed of multilayered muscle fibers of the first, second, and third rows connected to each other that perform a carcass function.

The main factor in the growth of fibroblasts is insulin-type growth factor 1 and a strong stimulator of nerve growth factor proliferation and myoblast addition in vitro [9].

Skeletal muscle tissue includes epimesias, perimesis, and endomesia, which are composed of dense connective tissue in addition to muscle fibers. The connective tissue is composed of amorphous basic substance protective fibers. The composition, structure, and mechanical properties of the extracellular effluent determine the efficiency of regeneration. Continuous flow variation is critical to the functional recovery of tissue [10].

The extracellular cast consists of many components. Some of them are composed of structural proteins such as collagen, elastins, which form fibrillar and reticular structures. Adhesive proteins such as fibronectin, laminin, fibulin bind structural proteins on the cell surface with transmembrane proteins. The cast forms a three-dimensional carcass through which the cell interacts with the entire surface [11, 12, 13].

In embryonic histogenesis, the formation of leukocytes occurs with generalized fibroblasts of the mesenchymal aorta as a result of divergent specialization [7, 8]. According to the authors, leukocytes go through the stages of promioblast, myoblast, specialized and specialized myocytes.

The laws of formation of sheep muscles of different breeds and the factors influencing these processes have been studied. According to the authors, the morphofunctional classification of muscles is based on a number of structural and biochemical parameters, namely tissue ratio, diameter of muscle fibers, amino acid composition. At different stages of postnatal ontogenesis, it was found that the live weight of sheep differed between breeds, ie the weight of 4-month-old Romanov lambs was 32.4 and 26.6% lower than that of Kuybishev and Texel breeds, respectively.

It is emphasized that the balance between proliferation, differentiation and aggregation must not be disturbed during myogenesis in order for the complete structure of the muscle to be properly formed [14].

According to the authors, the regeneration of muscle fibers after injury occurs at the expense of myostellitocytes. The process of division of myosatellitocytes takes place in the asymmetric type. Activation of myosatellitocytes is characterized by ultrastructural changes. In such cells, the nucleus is bright, one or two nuclei, mainly euchromatin, the size and diameter of the cytoplasm is increased, there is a slightly developed endoplasmic reticulum, the number of mitochondria and ribosomes is increased. These cells are type II myosatellitocytes [1, 3].

Method and materials of inspection. Adequate - Boysun district of Surkhandarya region, "Boysun Terakli" farm and inadequate - Sariosiyo district, "Surkhan Hisor sheep" farm, Uzun district "D Ruzibadal Shohrukh" farms . For scientific studies, the quadriceps muscles of the leg limbs of animals in the 3-day, 3, 6, 12, 18, 36, and 60-month stages of postnatal ontogeny were obtained.

Sonnig was taken from a quadriceps muscle measuring 0.5 x 0.5 x 0.2 cm, fixed in neutral formalin, dehydrated in alcohol, concentrated in ether, and solidified in a block. Histological incision was performed at HM 304E Semi-automated microtome. The histological preparation was stained with hemotoxylin and eosin, and the dimensions were taken under a microscope MB 200 (lens 20x10 eyepiece and lens 40x10 eyepiece).

All numerical data obtained as a result of scientific research were mathematically processed by the method of EK Merkureva.

To determine the dynamics of change in the diameter and area of muscle fibers depending on age, the growth factor was determined using a formula developed by K.B. Svechin.

Mathematical-statistical analysis was performed on a computer's Microsoft Excel spreadsheet using Student and Fisher criteria.

The results obtained and its discussion. As a result of scientific studies, it was observed that the histological dimensions of the quadriceps muscle of sheep of adequate and inadequate natural conditions in the herd show the anatomical and topographic status at different physiological stages of postnatal development, the scope of its function and the dynamics of changes in natural habitats.

The absolute value of the diameter of quadriceps muscle fibers in the number of sheep bred in adequate natural conditions increased rapidly from 3 days to 3 months of postnatal ontogeny, from 6.43 ± 0.24 μm to 12.92 ± 0.88 μm (K = 2.0). ; r <0.04). This increase in muscle size was almost constant in the later stages of postnatal development, ie at 6 months - 17.16 ± 0.65 μm (K = 1.32; r <0.04), at 12 months - 19.9 ± 0, 53 μm (K = 1.15), at 18 months - 23.74 ± 0.2 μm (K = 1.19; r <0.01), at 36 months - 25.5 ± 0.6 μm (K = 1.04), and at 60 months it reached 28.38 ± 0.88 μm (K = 1.11; r <0.04). The absolute rate of increase in muscle diameter was found to increase to 4.41 times during the studied stages of sheep postnatal development.

The absolute value of muscle fiber diameter is an increase in its growth rate from 6.28 ± 0.1 μm to 11.98 ± 0.44 μm or 1.9 times from the first 3 days to 3 months of postnatal ontogeny of sheep in inadequate natural conditions. continuation of the condition (18.08 ± 0.45; K = 1.5; r <0.02) almost unchanged at 12 months (18.2 ± 0.35 μm), the gradual passage of this process in the later stages, ie at 18 months 21.58 ± 0.36 μm (K = 1.18; r <0.02), at 36 months 23.8 ± 0.37 μm (K = 1.1; r <0.02), at 60 months 26.16 ± 0.88 μm (K = 1.09; r <0.03). It was observed that the growth rate of this muscle fiber was 4.16 times during the period from 3 days to 60 months of postnatal ontogeny.

Although the diameter of the quadriceps muscle fiber and the absolute area of the fiber area increased in both regions from the first day of postnatal ontogeny to 60 months, this figure was higher in adequate conditions than in inadequate conditions.

The absolute value of Sonnig's quadriceps muscle fiber area was 203.6 ± 2.55 μm2 in the first 3 days of adequate postnatal ontogeny of sheep with adequate care and increased slightly until 18 months of development, ie 224.16 ± 3 in 3 months. 22 μm2 (K = 1.1; p <0.02), at 6 months 250.52 ± 4.23 μm2 (K = 1.11), at 12 months 299.44 ± 4.15 μm2 (K = 1 , 19; p <0.02), reaches 379.9 ± 5.58 μm2 (K = 1.15; p <0.02) at 18 months, and increases almost steadily over the next 36 and 60 months (respectively). : 411.42 ± 5.37 μm2, K = 1.09; 479.4 ± 6.72 μm2, K = 1.16, r <0.02). It was noted that the growth factor of the muscle fiber area index reached 2.35 times during the studied period of postnatal ontogeny.

The absolute value of this muscle fiber area increased from 204.56 ± 2.52 μm2 to 230.4 ± 4.05 μm2 from 3 days to 3 months of postnatal ontogeny of sheep of inadequate natural conditions, or during this period its growth coefficient increased to 1.12 times. this figure increased to 260.04 ± 3.18 μm2 (K = 1.12; r <0.02) at 6 months, and 302.48 ± 3.88 μm2 (K = 1.16; r <0.02) at 12 months. to 373.8 ± 4.58 μm2 (K = 1.23) at 18 months. This muscle index showed 407.8 ± 5.35 μm2 (K = 1.09) in the next 36 months of postnatal development and the highest level in the 60 months at 46 months (469.2 ± 6.31 μm2, K = 1,).

15; r <0.02), the growth rate was found to reach 2.29 times during the period from 3 days to 60 months studied.

Thus, the absolute size of the muscle fiber area shows a peculiar picture at different physiological stages of postnatal development of animals, and it is observed that this indicator is one of the characteristic features, especially during the period up to 18 months.

Conclusions:

- The diameter of the quadriceps muscle fiber of the limbs of Hisori sheep gradually increased from the first 3 days to 60 months of postnatal ontogenesis, regardless of their living conditions, and the highest rate was observed at 60 months;

- The absolute indicator of the area of quadriceps muscle fiber in the number of Hisori sheep was found to be a physiological stage of postnatal development of animals, ie a slight increase during the period up to 18 months, this process will continue without significant changes in the next 36 and 60 months;

- Although the absolute diameter and area of the quadriceps muscle fiber of the number of Hisori sheep periodically increased from 3 days to 60 months of postnatal ontogeny, they were found to be higher in animals with adequate conditions than in inadequate conditions.

References

1. Данилов Р.К. Раневой процесс: гистогенетические основы. – СПб.: ВМедА им. С.В. Кирова, 2008. - 308 с.

2. Малышева Е.С., Овчаренко Н.Д., Мезенцев С.В. Оценка видовой принадлежности мышечной ткани на основе микроструктурного анализа // Вестник Алтайского государственного аграрного университета. Алтай, 2015. № 4 (126).–С. 84-88.

3. Одинцова И.А., Чепурненко М.Н., Комарова А.С. Миосателлитоциты - камбиальный резерв поперечнополосатой мышечной ткани // Гены и клетки.- 2014.- Т.9, №1. –С. 6-14.

4. Панов В.П., Никитченко В.Е., Никитченко Д.В., Золотова А.В., Серегин И.Г. Морфофункциональная характеристика и аллометрический рост мышц овец с разной направленностью продуктивности // Известия ТСХА, вып. 4. М., 2020. –С. 67-79.

5. Пономарева А.И. Биологические и продуктивнқе особенности молодняка овец карачаевской породы в разном возрасте. Дисс…канд. с/х. наук. Черкесск, 2017. 140 с.

6. Созинова И.В., Малофеев Ю.М. Гистологические особенности длиннейшей мышцы спины у овец западно-сибирской мясной породы в постнатальном онтогенезе // Вестник Алтайского государственного аграрного университета. Алтай, 2015. № 7 (129).–С. 120-124.

7. Созыкин, А.А. Морфологические аспекты нормального гистогенеза и реактивных изменений гладкой мышечной ткани миометрия крыс : автореф. дис. ... канд. мед. наук. - Волгоград, 2004. - 27 с.

8. Шурыгина, О.В. Развитие, организация и регенерация мышечной ткани стенки влагалища: автореф. дисс. … д-ра мед. наук. Самара, 2014. - 32 с.

9. Lieber R.L., Vard S.R. Cellular Mechanisms of Tissue Fibrosis. 4. Structural and functional consequences of skeletal muscle fibrosis // Am. J. Physiol. Cell Physiol. – 2013. - Vol. 305, № 3. – P. 241-252.

10. Leppert Ph.C., Jayes F.L., Segars J.H. The Extracellular Matrix Contributes to Mechanotransduction in Uterine Fibroids // Obstet. Gynecol. Int. – 2014. – Vol. 2014. – P. 783289.

11. Eckes B., Nischt R., Krieg T. Cell-matrix interactions in dermal repair and scarring // Fibrogenesis. Tissue. Repair. - 2010. - Vol. 3. - P. 4.

12. Even-Ram S., Yamada K.M. Cell migration in 3D matrix // Curr. Opin. Cell Biol. - 2005. - Vol. 17. - P. 524–532.

13. Friedl P., Volf K. Plasticity of cell migration: a multiscale tuning model // J. Cell Biol. - 2010. - Vol. 188. - P. 11–19.

14. Volf M.T., Daly K.A., Reing J.E., Badylak S.F. Biologic scaffold composed of skeletal muscle extracellular matrix // Biomaterials. – 2012. – Vol. 33, № 10. – P. 2916-2925.