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Changes in the Microanatomic Dimensions of the Femu in Chicken Postnatal Ontogenesis

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Abstract: The dynamics of changes in the microanatomical dimensions of the femur of laying hens in postnatal ontogenesis was studied. It was established that the thickness of the proximal and distal epiphyses of the femur, dorsal and plantar compact substances increase up to 168 days, the thickness of the proximal and distal articular cartilages, the height and width of the medullary cavity increase up to 120 days of postnatal ontogenesis.

Keywords: chicken, femur, proximal epiphysis, distal epiphysis, proximal articular cartilage, distal articular cartilage, dorsal compact substance, plantar compact substance, bone marrow cavity, postnatal ontogenesis, growth factor.

Enter. Today, the role of the poultry industry in providing the population with high-quality, especially nutritious food products is incomparable. In order to establish effective and rational use of quality poultry meat and egg products on a scientific basis, first of all, it is important to deeply study the biological characteristics of poultry, to know the physiological capabilities of their organism. In addition to performing the basic and mechanical function of the body, bones also play an important vital role in the normal metabolism of mineral substances.

Optimizing their nutrition on a scientific basis, taking into account the fact that during the process of egg formation in laying hens, the rapid release of the main mineral substances in the bones into the blood, which in turn affects the morphofunctional indicators of the bones, remains one of the urgent issues.

According to the researchers, there is a correlation between the live weight of laying hens and the quality indicators of eggs, which is clearly reflected in the weight of egg protein and the weight of the outer dense membrane in the later stages of development of chickens separated by live weight at 28 days, the live weight of mother hens and the quality of eggs of her offspring there is a correlation between the indicators [4].

The histoarchitectonics of bone tissue changes continuously during postnatal ontogeny, and this state indicates that the bone undergoes active reconstruction processes in connection with the change in the function performed by the bone in a specific period of time. It was also noted that the bending strength of all bones increases with the age of chickens [6].

According to some researchers, the health of poultry growth, feed conversion, bone system development, legs and immune system condition is related to the availability of calcium in poultry [7].

Special medullary bone tissue is formed in the medullary cavity of tubular bones during egg-laying period in laying hens. The weight of the medullary tissue is 10-12% of the total weight of the skeleton. This tissue is a mobile source of calcium that is used directly in the formation of the egg shell [2].

In birds, the femur is hollow and surrounded by a wall of unequal thickness in cross-section, slightly elongated in the dorsolateral-craniomedial direction. The condition of the medullary bone serves as an indicator of calcium supply during the egg-laying period, because the calcium used by the bird for the formation of the egg shell is stored in advance in the medullary bone. When the calcium reserve in the medullary bone is insufficient, the resorption of the bone compact substance begins and this has a negative effect on the bone [3].

The anatomical structure, physiology, histology, and classification of chicken skeletal bones are highlighted, the influence of external environmental factors on the indicators of bone growth and linear dimensions of all sections of the skeleton is determined [1].

Scientific studies on the characteristics of changes in the microanatomical structures of the stylopodial bones of chicks during postnatal ontogenesis were conducted, and it was found that the absolute indicators of the thickness of the proximal and distal epiphysis of the humerus increase rapidly up to their 14th day [5, 10-33].

The purpose of the study is to study the morphometric characteristics of the femur at different physiological stages of postnatal ontogeny of laying hens.

Research materials and methods. Scientific research work was carried out in the laboratory of the department of animal anatomy, histology and pathological anatomy of SamDVMChBU. 1, 16, 35, 85, 120, 168, 280, 420 and 570-day-old hens belonging to the "Dekarb" cross were taken as research objects. Microanatomical dimensions of bones were obtained according to generally accepted morphometric methods.

Numerical data of morphometric indicators obtained as a result of the research were processed with the methods of variation statistics using Microsoft Excel computer programs.

To determine the dynamics of change of morphometric dimensions depending on age, the growth coefficient was calculated. The growth factor was determined by dividing the indicators of the bones of older chickens by the corresponding indicators of younger chickens, and the entire examined period of postnatal ontogeny was determined by the formula developed by K.B. Svechin.

The obtained results and its discussion. The absolute index of the thickness of the proximal epiphysis of the femur increased slightly from the first day of postnatal development to the 35th day of chickens, from 0.43±0.01 cm to 0.61±0.01 cm by the 16th day (K=1.41; $p<0.03$), reaching 0.98±0.01 cm (K=1.6) in 35 days, and this condition continued until 168 days and increased to 1.95±0.02 cm. This index of the bone is almost unchanged in the young after 280 days, the growth coefficient increases up to 4.34 times from one day of postnatal ontogenesis to 570 days, the absolute index of the thickness of the distal epiphysis is equal to 0.31±0.01 cm in 1-day-old chicks, up to 168 days of postnatal ontogeny. gradually up to 0.49±0.01 cm (K=1.58; $r<0.03$) by 16 days, 0.75±0.01 cm by 35 days (K=1.53; r<0, 03), increasing to 1.76 ± 0.04 cm (K=1.08) at 168 days and not significantly changing this indicator in later youth, the growth coefficient increased up to 5.35 times during the period from the first day of postnatal ontogenesis to 570 days done.

The absolute indicator of the thickness of the dorsal compact substance of the femur was equal to 0.067±0.0022 cm on the first day of postnatal development of chickens, and on the next 16 days - up to 0.075±0.0024 cm (K=1.11), on 120 days - 0.177±0.0081 cm (K=1.32), increasing to 0.193±0.003 cm (K=1.09; $p<0.03$) at 168 days, slightly slowing down this process from 280 days, growth coefficient from one day to 570 days of postnatal ontogeny increase up to 2.76 times, the index of the thickness of the plantar compact substance is 0.095±0.0029 cm in 1-day-old chicks, and it increases slightly faster up to 120 days and reaches 0.194±0.0042 cm (K=1.25), this process is stopped at 168 days a slight slowing down (0.210±0.0053 cm; K=1.08) and an insignificant decrease compared to 168 days old was observed in the next young.

In chickens, the absolute index of the thickness of the proximal joint of the femur is 0.013±0.0022 cm on the first day of postnatal ontogenesis, and it gradually increases up to 120 days and reaches

0.023±0.0004 cm (K=1.15). It was observed that it imperceptibly decreased to 0.017±0.0005 cm in 570 days, and the distal joint showed similar dynamics.

The absolute index of the height of the medullary cavity of the femur of chickens is 2.13±0.03 cm on the first day of postnatal ontogenesis, and it increases rapidly until 168 days and reaches 5.43±0.04 cm, and this process slows down in the later young, the width of the medullary cavity It was found that the index increases slightly from the 1st day to the 120th day of postnatal ontogenesis, that is, this index is equal to 0.096±0.0037 cm in 1-day-old chicks and reaches 0.339±0.0102 cm in 120-day-old chicks.

The conclusion: it was observed that the absolute index of the thickness of the proximal and distal epiphysis of the femur increases rapidly until the 168th day of the postnatal ontogeny of chickens and does not change significantly until the next 570 days.

- it was found that the absolute index of the thickness of the proximal and distal femur of chickens increases up to the 120th day of postnatal ontogeny and gradually decreases from the 168th day;
- it was observed that the absolute index of the height and width of the femoral cavity increases gradually from the first day of the postnatal ontogeny of chickens, and the rate of growth of these indicators becomes high in the period of their sexual maturity, i.e. up to 120 days.

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