

## Change Dynamics of Morphometric Indicators of Hind Leg Bone in Postnatal Ontogeny of Chickens

*Hudaynazarova Nilufar Eshmuratovna (PhD)<sup>1</sup>, Botyrova Shohista Abdikakharovna<sup>2</sup>*

**Summary:** The dynamics of changes in the linear dimensions of the free tubular bones of the hind limb of egg-bearing chickens in postnatal ontogenesis has been studied. It has been established that the absolute parameters of the linear dimensions of the free tubular bones of the hind limb increase intensively from the first day of postnatal ontogenesis to 35 days of age, and this process continues until the physiological maturity of chickens, that is, up to 168 days of age, while the intensity of growth from 280 days to 570 days of age slows down due to increased the process of their egg-laying.

**Keywords:** chickens, egg directions, femur, tibial bone, set, length, width, thickness, postnatal ontogenesis, growth factor, morphometric, absolute index.

**Enter.** In addition to performing the basic and mechanical function of the body, bones are also of vital importance for the normal exchange of mineral substances. Bones are one of the main organs that provide the exchange of calcium, phosphorus and many other macro- and microelements in the body. The strength of the bone is primarily related to the amount of the above elements, it is formed under the influence of many factors during the postnatal development of birds and exhibits certain characteristics. Especially in laying hens, during the egg formation process, rapid release of the main mineral salts contained in the bones into the blood, in turn, affects the morphofunctional parameters of the bones.

Mineral substances play an important role in all metabolic functions of the body. They are part of tissues and body fluids, directly participate in the synthesis of complex organic compounds necessary for good growth and development of animals and birds [1,7, 8].

Most of the calcium compound and its free ions react with the acid residue of phosphoric acid in the small intestine. Then they form water-insoluble compounds with palmitic, stearic and oleic fatty acids. Micelles have easy access to the cell membrane and transfer calcium to the bloodstream, where the fat cells are separated and participate in the process of resynthesis in the wall of the small intestine [9].

The biochemical and morphological specialization of the bones and muscles of the legs are interdependent, the concentration of ascorbic acid in the place where the muscle fibers are formed has been proven in studies [10].

The hind limb skeleton of birds exhibits a number of distinctive features. Unlike mammals, the pelvis and iliac bones are not fused, leaving the pelvis wide open, and the avian pelvis is firmly fused with the vertebral column. The free skeleton of the hind leg differs in that the femur is short and oblique, with a head and hump at its proximal end, a bulge and a coil for the knee cap at the distal end [2, 3, 5].

It has been found that the ossification of long bones in the chicken embryo is uneven, the ossification process starts from the central point of the bone diaphysis, and the edge point of the bone always remains in a curved position to ensure the further growth process [4].

When studying the characteristics of bone formation during the embryonic development of chicks, it was found that the femur increased 5 times between the thirteenth and twentieth days of incubation, and the maximum bone length was 31.6 mm on average on the twentieth day. is noted [6].

<sup>1</sup> Samarkand State University of Veterinary Medicine, Livestock and Biotechnology

<sup>2</sup> Samarkand State University of Veterinary Medicine, Livestock and Biotechnology



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 were taken as research objects. The chickens were slaughtered, bled, and the wing and leg bones were removed from the body and weighed on an analytical scale. Linear dimensions and weights of bones were obtained according to generally accepted morphometric methods.

Numerical data of morphometric indicators obtained as a result of the research were processed using 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 ontogenesis was determined by the formula developed by K.B. Svechin:

The obtained results and its discussion. As a result of the research, it was found that the linear dimensions of the free tubular bones of the hind legs of chickens in the egg direction at different physiological stages of postnatal ontogenesis show specific dynamics of change.

Linear dimensions of the femur. The absolute index of femur length increased from  $2.9 \pm 0.05$  cm to  $3.53 \pm 0.05$  cm ( $K=1.22$ ;  $p<0.03$ ) from the first day of postnatal ontogeny of chickens to the 16th day. until the next 168 days, this indicator gradually increases, that is, at 35 days - by  $4.28 \pm 0.04$  cm ( $K=1.21$ ), at 85 days - by  $6.15 \pm 0.11$  cm ( $K=1.43$ ), in 120 days -  $8.71 \pm 0.2$  cm ( $K=1.41$ ), in 168 days -  $9.18 \pm 0.23$  cm ( $p<0.03$ ). This bone index remained almost unchanged at the next studied stages of postnatal development, at 280 days -  $9.1 \pm 0.2$  cm ( $K=0.99$ ), at 420 days -  $9.02 \pm 0.17$  cm, It was observed that it was  $8.93 \pm 0.15$  cm in 570 days. It was found that the growth coefficient of the absolute index of femur length increases up to 3.07 times from one day to 570 days of postnatal ontogeny of chickens.

The absolute index of the femur width of chickens increases rapidly from the first day of postnatal ontogenesis to the 16th day, from  $0.26 \pm 0.01$  cm to  $0.31 \pm 0.01$  cm, or its growth coefficient reaches 1.19 times during this period. to continue the process up to 168 days, that is, at 35 days - up to  $0.42 \pm 0.01$  cm ( $K=1.35$ ;  $p<0.03$ ), at 85 days -  $0.53 \pm 0.02$  cm ( $K=1.26$ ), in 120 days - up to  $0.71 \pm 0.02$  cm ( $K=1.34$ ), in 168 days - up to  $0.77 \pm 0.02$  cm. This size of the bone increases until the next 570 days of postnatal development, compared to 168 days, at 280 days - by  $0.79 \pm 0.01$  cm, at 420 days - by  $0.82 \pm 0.01$  cm, at 570 days - by  $0.85 \pm 0.02$  cm ( $K=1.07$ ;  $p<0.04$ ) was noted. It was observed that the growth coefficient of the absolute width of the femur reaches 3.26 times from the first day of postnatal ontogenesis to 570 days.

Linear dimensions of the tibia. The absolute indicator of the length of the tibia of chickens increased rapidly from the first day of postnatal ontogenesis to the 85th day, from  $3.62 \pm 0.03$  cm to  $3.75 \pm 0.07$  cm ( $p<0.03$ ) at 16 days, at 35 days - 5 up to  $3.3 \pm 0.08$  cm ( $K=1.41$ ;  $p<0.02$ ), at 85 days -  $7.93 \pm 0.09$  cm or the growth coefficient compared to younger age up to 1.49 times, 120 and at 168 days, the continuation of this condition was determined (respectively:  $12.3 \pm 0.28$  cm,  $K=1.55$ ;  $12.9 \pm 0.15$  cm,  $K=1.04$ ). This bone index remained almost unchanged in the later stages of development, at 280 days - by  $12.7 \pm 0.15$  cm, at 420 days - by  $12.5 \pm 0.14$  cm, at 570 days - by  $12.4 \pm 0.13$  cm was observed to be equal to It was noted that the coefficient of growth of the absolute indicator of the length of the tibia increased up to 3.42 times from the first day of postnatal development of chickens to the period of 570 days.

The absolute indicator of the width of the tibia increased from  $0.21 \pm 0.01$  cm to  $0.22 \pm 0.01$  cm ( $K=1.04$ ;  $p<0.04$ ) from 1 day to 16 days of postnatal ontogeny of chickens, until the next 168 days and this indicator gradually increases and in 35 days -  $0.33 \pm 0.01$  cm ( $K=1.5$ ), in 85 days -  $0.42 \pm 0.01$  cm ( $K=1.27$ ), at 120 days -  $0.65 \pm 0.01$  cm ( $K=1.54$ ;  $p<0.02$ ), and at 168 days -  $0.66 \pm 0.02$  cm. The absolute index of bone width on the 280th day of postnatal development - up to  $0.68 \pm 0.02$  cm, on the 420th day - up to  $0.69 \pm 0.02$  cm, on the 570th day -  $0.72 \pm 0.01$  cm ( $K=1.05$ ), and its growth coefficient was observed to increase by 3.43 times from 1 day to 570 days.



Linear dimensions of the femur. The absolute index of the length of the long bone of chickens from the first day of postnatal ontogenesis to the 35th day increased rapidly compared to other ages, from  $2.49 \pm 0.02$  cm to  $2.56 \pm 0.11$  cm at the 16th day, and from  $3.63 \pm 0$  at the 35th day. .06 cm or increased to 1.41 times compared to younger age, and the growth of this indicator continued gradually until 168 days, and at 85 days -  $5.51 \pm 0.14$  cm ( $K=1.51$ ;  $p<0.03$ ), in 120 days -  $8.85 \pm 0.12$  cm ( $K=1.6$ ;  $p<0.02$ ), and in 168 days -  $9.28 \pm 0.09$  cm. This bone index remained almost unchanged in the higher stages of postnatal ontogenesis, at 280 days - by  $9.17 \pm 0.18$  cm ( $K=0.98$ ), at 420 days - by  $9.08 \pm 0.13$  cm, at 570 days - It was noted to be equal to  $8.91 \pm 0.11$  cm. During the period from the 1st day to the 570th day of the postnatal ontogeny of chickens, the growth coefficient of the absolute index of the length of the femur was observed to increase by 3.57 times.

The absolute index of the width of the femur increased from  $0.26 \pm 0.01$  cm to  $0.28 \pm 0.01$  cm ( $K=1.07$ ;  $p<0.04$ ) from the first day of postnatal ontogeny of chickens to 16 months of age. the gradual continuation of this process until day 35, that is, at 35 days - up to  $0.43 \pm 0.01$  cm ( $K=1.52$ ;  $p<0.02$ ), at 85 days -  $0.53 \pm 0.02$  cm ( $K=1.24$ ), increase to  $0.71 \pm 0.01$  cm ( $K=1.33$ ) in 120 days, to  $0.71 \pm 0.02$  cm in 168 days, in older chickens this increase it was observed that the index remained unchanged, equal to  $0.71 \pm 0.01$  cm in 280 days,  $0.72 \pm 0.01$  cm in 420 days, and  $0.72 \pm 0.01$  cm in 570 days. It was noted that the coefficient of growth of the absolute index of the width of the long bone increased up to 2.77 times during the period from one day to 570 days of postnatal ontogeny of chickens.

### In conclusion:

- in the direction of the egg, the linear dimensions of the free tubular bones of the hind legs of chickens are observed to increase rapidly from the first day of postnatal ontogenesis to 35 days, and this indicator increases steadily and gradually by 168 days when they reach physiological adulthood;
- it was found that the rate of growth of the absolute index of the size of the free tubular bones of the hind leg slows down from the 280th day of postnatal development of chickens to the next 570th day due to the increase in their egg-laying process.

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