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Change of Morphometric Indicators of Wing Free Bones During Postnatal Ontogenesis of Egg-Layer Chicken

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Abstract:
The dynamics of changes in the linear dimensions of the free bones of the wing (forelimb) of egg hens in postnatal ontogenesis was studied. The absolute indices of the linear dimensions of the free bones of the wing accelerate from the first day of postnatal ontogenesis to 16 days of age, and this state continues until the period of physiological maturity of chickens, that is, up to 168 days of age, while the growth rate from 280 days to 570 days of age slows down due to the intensification of the process of their egg production.
Key words: *birds, chickens, wings, bone, humerus, radius, ulna, postnatal ontogenesis, absolute index, length, width, thickness, growth factor.*

Introduction

Providing the population with quality food products remains one of the urgent issues of the present time. In this regard, the place of poultry farming is incomparable, and it is considered one of the most effective and promising branches of animal husbandry. When obtaining eggs and meat products from poultry, it is important to take into account the physiological characteristics of their organism and use them on a scientific basis.

Poultry bones show certain differences from the bones of farm animals in terms of their morphological, mechanical and chemical composition. At various physiological stages of postnatal ontogeny of birds, the formation and development of locomotor organs, as well as their organ systems, is influenced by the internal and external environment.

Voluntary movement organs of domestic chickens have certain peculiarities, for example, according to the structure of muscle tissue, it has been proven in studies that they are not uniformly distributed in the body. The development of the musculature occurs due to the thickening of the myotome, and as a result, its cells become cylindrical and lose their borders, each segment of which develops a large number of nucleated syncytium. Then, on the inner side of the syncytium, many fibrils and folds are formed, which later turn into a muscle ribbon composed of muscle fibers [6].

The order of ossification of the skeleton of the chicken embryo was studied, this process occurs from the 8th to the 21st day of incubation, partial ossification of the leg bones begins on the 10th day, and on the 17th day of the breast bones, in which growth in length It is noted that the process slows down from the 11th to the 12th day and from the 17th to the 19th day of incubation [5].

Many scientific studies have been conducted on the development of bone structures during postnatal ontogeny. The development of most bones takes place in three stages, i.e. membrane, calcification and ossification. Nevertheless, the development of some bone structures takes place independently of these processes, such bones include the spine and individual bones of the skull. The development of the bones of the legs and chest goes through the above three stages. In this case, the process of ossification is somewhat important and it takes place in four stages, that is, in the first stage, the surface of the ankle is covered with a layer of bone tissue and perichondrial bone is formed. In the second stage, the core of the uncle softens to a mucous state. In the third stage, as a result of the accumulation of calcareous structures in the intercellular space, the process of calcification of the tumor occurs, after which the cells of the tumor are removed with the help of special erosive agents of the tumor. In the fourth stage, the internal ossification process takes place by the introduction of bone tissue by osteoblasts into the bone marrow on the inner surface of the perichondral bone [1, 2, 3, 4, 8]. It has been determined in scientific studies that the back legs of birds develop like the front legs and its belt, the first feathers are recorded on the fourth day, and the emergence of the foaling centers on the sixth day of incubation. According to the authors, the second stage of femur ossification of the chicken embryo begins on the 10th day of incubation, and the third stage begins on the 17th and 18th days. It is at this time that blood vessels and nerve endings grow and form bone marrow with the remaining part of the bone [7].

The purpose of the research is to study the morphometric characteristics of wing bones at the stages of postnatal ontogenesis 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 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:

K is the growth factor;

V0 is the initial index of bones.

Research results. It was observed that the absolute parameters of the linear dimensions of the free bones of the wings (forelegs) of chickens in the direction of the egg show specific dynamics at different physiological stages of postnatal ontogenesis.

The absolute indicator of the length of the humerus of chickens increases rapidly from the first day of postnatal ontogenesis to the 16th day, from 2.25 ± 0.02 cm to 3.22 ± 0.07 cm, or 1.26 times its growth coefficient during this period. and was observed to continue this process for the next 168 days. This indicator of bone at 35 days - up to 3.95±0.12 cm (K=1.22; $p<0.03$), at 85 days - up to 5.81±0.11 cm (K=1.47) , at 120 days - up to 7.8±0.08 cm (K=1.34; $p<0.02$), at 168 days - 8.31±0.12 cm (K=1.06; $p<0.04$), and at 280 days this size decreased to 8.15±0.18 cm and at 420 and 570 days it remained almost unchanged (respectively: 8.07±0.21 cm, K=0.99; 7, 95±0.12 cm; $p<0.03$). It was found that the growth coefficient of the absolute index of the length of the shoulder bone reaches 3.11 times during the period from the first day of postnatal development of chickens to 570 days of age.

It was observed that the absolute index of the thickness of the humerus shows the dynamics proportional to the absolute index of the bone width during the period from the first day of postnatal ontogeny of chickens to the 570th day. That is, the absolute size of the bone thickness is 0.19±0.01 cm in one-day-old chicks, and 0.23±0.01 cm in 16-day-old chicks (K=1.21; p<0 .03), at 35 days - up to 0.31±0.01 cm (K=1.34), at 85 days - up to 0.4±0.01 cm (K=1.29; p<0.02) , increasing to 0.54±0.01 cm (K=1.35) at 120 days, up to 0.58±0.02 cm (K=1.07) at 168 days, and increasing this indicator until 570 days unchanged, i.e. up to 0.61±0.01 cm (K=1.05) at 280 days of postnatal development, 0.63±0.02 at 420 days (K=1.03; p<0.03) it was found to reach 0.65±0.02 cm (K=1.06) at the age of 570 days. It was observed that the coefficient of growth of the absolute index of the thickness of the shoulder bone increased up to 3.42 times during the period from the first day of postnatal ontogeny of chickens to 570 days of age.

The absolute length of the carpus increased slightly from the first day of postnatal ontogeny of chickens to 168 days, from 2.14±0.02 cm to 2.74±0.04 cm at 16 days (K=1.28; p<0.03). , in 35 days - up to 3.49±0.05 cm (K=1.27), in 85 days - up to 4.91±0.11 cm (K=1.4), in 120 days - 7.54±0, 07 cm (K=1.53), and in 168 days - 7.76±0.07 cm (K=1.02). The growth rate of this size of the bone slows down from 280 days of postnatal development, that is, this indicator at 280 days - 7.71±0.15 cm (K=0.99; p<0.03), at 420 days - 7.65±0.13 cm (K=0.99), and at 570 days - 7.58±0.1 cm (K=0.98). It was noted that the growth coefficient of the absolute index of the length of the wrist bone increased up to 3.54 times during the period from one day to 570 days of postnatal ontogeny of chickens.

The absolute index of the thickness of the wrist bone in one-day-old chicks is 0.1±0.01 cm, and this index increases at a high rate until the 168-day stage of postnatal ontogenesis, that is, at 16 days - 0.12±0 0.01 cm (K=1.11; p<0.02), at 35 days - 0.14±0.01 cm (K=1.16; p<0.02), at 85 days - 0.18 by ±0.01 cm (K=1.28; p<0.02), at 120 days - by 0.25±0.01 cm (K=1.38), at 168 days - by 0.26±0.01 cm (K=1.04; p<0.02), this indicator increased to 0.26±0.01 cm (K=1.0) in 280 days, 0.27±0 in 420 days, 01 cm (K=1.03), and in 570 days - 0.28±0.01 cm (K=1.07). It was observed that the growth coefficient of this indicator of the wrist bone increased up to 2.8 times during the period from one day to 570 days of postnatal ontogeny of chickens.

The absolute indicator of the length of the ulna of chickens is equal to 2.25±0.02 cm on the first day of postnatal ontogenesis, and it increases rapidly until the 35th day, that is, at the 16th day - 2.88±0.05 cm (K =1.28; p<0.03), reaching 3.64±0.04 cm at 35 days (K=1.26; p<0.02), continuing the growth process until the next 168 days and at 85 days - up to 5.12±0.07 cm (K=1.4), at 120 days - up to 7.71±0.08 cm (K=1.5), at 168 days - 7.93±0 An increase of up to .09 cm was recorded. This indicator of the bone is almost unchanged compared to that of chickens younger than 280 days, at 280 days - by 7.88±0.1 cm (K=0.99), at 420 days - by 7.82±0.09 cm, 570 it was found to be equal to 7.74±0.09 cm (K=0.98) per day. It was observed that the coefficient of growth of this indicator of the elbow bone increased up to 3.44 times from one day to 570 days of postnatal ontogeny of chickens.

The absolute index of the thickness of the ulna from the first day of postnatal development to the 16th day of chickens reaches from 0.16±0.01 cm to 0.17±0.01 cm (K=1.06; p<0.03), this condition Lasting up to 168 days and at 35 days - 0.24±0.01 cm (K=1.41; p<0.02), at 85 days - 0.29±0.01 cm (K=1.2; p <0.04), at 120 days - 0.37±0.01 cm (K=1.27), at 168 days - 0.39±0.01 cm (K=1.05; p<0.03) was noted to be equal to. This indicator of the bone, in proportion to its other linear dimensions, almost does not change until the 570th day of postnatal ontogenesis, that is, at 280 days - 0.41±0.001 cm (K=1.05), at 420 days - 0.43 It was observed that it was ±0.01 cm, and in 570 days - 0.44 ± 0.02 cm. It was found that the coefficient of growth of this absolute index of bone thickness increases up to 2.75 times during the period from the first day of postnatal development of chickens to 570 days.

In conclusion:

- it was observed that the absolute parameters of the linear dimensions of the free bones of chickens in the direction of the egg from the first day of postnatal ontogeny to the 16th day, and this state continues until the physiological maturity of the chickens, i.e. 168 days.
- from the 280th to the 570th day of the postnatal development of chickens, it was found that the growth rate of the absolute indicators of the linear dimensions of the free bones of the wing decreases due to the increase in their egg-laying process;

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