

Time Course of Morphophysiological Status of the Broilers during the Postnatal Ontogeny with Consideration for Biogeochemical Characteristics of the Chuvash Volga Region

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Translated from *Byulleten' Eksperimental'noi Biologii i Meditsiny*, Vol. 148, No. 10, pp. 466-467, October, 2009
Original article submitted March 25, 2009

Experiments proved that treatment with Suvar and Combiolax under biogeochemical conditions of the Chuvash Volga ecological subregion significantly stimulates growth and development of broilers, hematological, biochemical, and immunological profiles, structure and function of the digestive organs, hemopoiesis, and immune defense at different stages of postnatal ontogeny.

Key Words: *broilers; blood; endocrine glands*

Monitoring studies at different biogeochemical regions of the country in order to detect zones of high ecological risk and selection of productive animals capable of effective metabolism of nutrients and transformation of the fodder biological components for prospective use in nutrition for humans and in industrial technologies is an important task of physiologists, morphologists, immunologists, geneticists, and ecologists for the nearest future [1,2,9].

Therefore, trials and scientific validation of the use of Russian new-generation ecologically safe immunocorrectors, characterized by high preventive and therapeutic efficiency, is a pressing problem of modern biological science and biotechnology [3-8].

We studied the morphophysiological status of broilers bred under biogeochemical conditions of the Chuvash Volga Region and receiving Suvar and Combiolax.

MATERIALS AND METHODS

A series of experiments was carried out on 60 broiler roosters. Three groups were formed, each consisting of

20 broilers of similar clinical and physiological status, age, breed, and body weight.

Group 1 roosters (control) received basic ration on days 7-56 of life. In group 2 broilers, basic ration was supplemented with suvar in a dose of 50 mg/kg (20-day courses with 10-day intervals). Group 3 broilers received combiolax (1.5 ml/kg daily).

Clinical physiological status, body length, hematological, biochemical, and immunological profiles were studied in 10 roosters from each group on days 7, 14, 28, 45, and 56 of life. The histostructure of the small and large intestine, liver, pancreas, thymus, bursa of Fabricius, spleen, mesenteric, submaxillary, and prescapular lymph nodes was studied in broilers decapitated at the age of 56 days.

RESULTS

Body temperature, heart rate, and respiratory rate per min gradually decreased in broilers of all groups with aging: from 42.30 ± 0.02 - 42.40 ± 0.03 to 40.80 ± 0.02 - $41.00 \pm 0.01^\circ\text{C}$; from 441.00 ± 5.12 - 443.00 ± 5.46 to 304.00 ± 5.51 - 306.00 ± 4.95 , and from 30.00 ± 0.78 - 32.00 ± 0.65 to 18.00 ± 0.52 - 20.00 ± 0.56 , respectively. The birds looked tidy, with good feathering and appe-

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tite; with the crests, earrings, and feet of normal color; all roosters exhibited normal group reflexes, which, altogether, indicated their normal clinical physiological status.

Body weights of group 2 and 3 broilers aged 14, 28, 45, and 56 days, receiving suvar and combiolax, respectively, was 8.6-14.0% higher ($p < 0.05$) than that of intact broilers of the same age.

The mean daily body weight increment of the studied roosters corresponded to the time course of their weight.

The counts of blood leukocytes and erythrocytes in experimental broilers were higher than in the controls throughout the experiment. These counts were 1.8-6.3% higher ($p < 0.05$) than normally at the age of 14, 28, 45, and 56 days.

A similar regularity in hemoglobin concentration fluctuations was detected in birds of the compared groups.

Experimental roosters had significantly higher serum levels of total protein and its albumin fraction starting from day 14 until the end of the study.

The time course of γ -globulin concentration was fully in line with the pattern of changes in albumin levels. The content of α - and β -globulins decreased by the end of the observation period in a wave-like mode virtually similarly in all groups.

Histological studies of intact broilers revealed mucosal degeneration and focal catarrhal inflammation in the small (duodenum, jejunum, ileum) and large intestine (cecum, colon, rectum), protein and fatty degeneration in the liver, Langerhans islet atrophy in the pancreas. Birds of the same age in group 2, treated with suvar, developed desquamation of the mucosal epithelium in the small intestine, focal granular hepatocyte degeneration in the liver, and slight loosening of interlobular connective tissue in the pancreas.

In group 3 broilers treated with combiolax, these organs had normal structure with natural morphology and function of the digestive system.

The structural and functional status of immuno-competent organs of control broilers was characterized by early age-associated involution of the thymus, bursa of Fabricius, and high loss of the splenic lymphatism. Moreover, a reduction of lymphocyte count and connective tissue growth were detected in the studied immune organs.

The thymus, bursa of Fabricius, and spleen of experimental broilers receiving suvar and combiolax had normal structure.

Hence, comprehensive morphophysiological evaluation of the effects of new biogenic compounds on the broilers has shown that suvar and combiolax significantly stimulated the growth and development, hematological, biochemical, and immunological profiles, morphometric status of the structures of organs of digestion, hemopoiesis, and immune defense under biogeochemical conditions of the ecological Chuvash Volga subregion. It is noteworthy that the growth- and immunity-stimulating effects of suvar and combiolax were about the same, while the structural and functional effect was more pronounced in the broilers treated with combiolax.

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