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Histological Picture of Parenchymal Organs of Quails When Adding Dry Biomass of Microalgae Chlorella Vulgaris to the Diet

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ABSTRACT
Modern high-tech industrial poultry farming, due to the numerous impacts of negative factors of the technogenic environment, often leads to a pronouncednegative impact on the bird's body. Prevention of possible consequences of the impact of negative factors on agricultural poultry is carried out by adding biologically active substances to the diet, which include succinic acid. We studied the effect of dry biomassы of Chlorella vulgaris microalgae in different doses on the histological picture of the liver, spleen, bursa, and heart in meat quails. For this purpose, 4 groups of birds with 50 heads each were formed. The first experimental group received daily dry biomass of Chlorella vulgaris microalgae at a dosage of 2 mg/kg of live weight, the second experimental group – 4 mg/kg of body weight, the third – 6 mg/kg of body weight. The control group received a basic diet. The duration of the experiment was 7 weeks. After 50 days, the poultry was also slaughtered for histological studies. Studies have shown that отмечалась focal fattyliver dystrophy was observed in the control group, while no pathomorphological changes were noted in other organs. In all experimental groups, the histological picture of internal organs corresponded to the norm.
Keywords: *Chlorella vulgaris, internal organs, diet,hematology, quails, microscopy*

INTRODUCTION

The current stage of development of poultry farming is characterized by an active process of intensification. Increasing the productivity of poultry, improving the quality of products, significantly increasing the level of use of feed nutrients, mechanization and automation, high profitability, a sharp increase in labor productivity are the main signs of industrial technology for the production of poultry products [1,2,3].

The experience of industrial quail breeding and rearing in Russian farms shows us that the development of this important poultry industry in order to be competitive and obtainя additional dietaryproductsis possible if the problem of scientifically based enrichment of bird feed with various minerals, includingtrace elements, is solved, because they are located in different biogeochemical conditions In Russia, where microelementoses and their latent forms appear in birds [4,5].

Quail products in our country occupy a stable position in the range of poultry food products. Eggs and meat of these birds differ in dietary properties and are used in human medical nutrition. The demand for quail meat has been growing in recent years, although it is not fully met, despite a noticeable increase in the number of quail farms [6,7].

For the successful realization of the biological and productive potential of quails, proper organization of their full-fledged nutrition is important. It is difficult to imagine rational nutrition of quails without the use of a wide range of biologically active additives that can increase the productivity of birds and the quality of the resulting products, especially when the medium and feed are deficient in trace elements that are physiologically important for the normal development of the body [8].

The problem of full-fledged feeding of poultry in recent years due to the intensification of poultry farming is becoming increasingly important. It is proved that it is important not only to meet the needs of poultry in the main nutrition factors, but also the ratio of individual nutrients in the diet (sugar-protein, energy-protein, acid-base), the absence of anti-nutritional and toxic substances in the feed [9].

The experience of organizing feeding of broiler chickens in the conditions of industrial technology has shown that it is generally impossible to ensure the highest level of full-fledged feeding without the use of a complex of biologically active substances. Thus, the intensification of poultry farming has led to an accelerated development of the microbiological and chemical synthesis industry for the production of feed vitamins, amino acids, macro-and microelements, enzymes, antibiotics, and some other organic and

inorganic biocatalysts [10].
Microalgae -is a natural metabolite, a universal stimulant and adaptogen that has antihypotoxic, anti-stress, antioxidant and neutropic effects. It is a link in the Krebs tricarboxylic acid cycle that provides the body's energy needs. The effectiveness of using this metabolite in poultry feeding has been established [11].
The aim of these studies was to study the histological picture of the internal organs of quails when adding dry biomassы and microalgae Chlorella vulgaris in different doses to the diet.

MATERIALS AND METHODS

Scientific and economic experience was carried out in the farm Alimchuyeva Z.I. Medvedevsky district of the Mari El Republic, where 4 groups of quails of daily age of Texas breed were formed on the principle of analogues, 50 heads each. The conditions of feeding and keeping were the same for all quails. Poultry of all groups received mixed feed PK-5 start 1-3 weeks, from 4-7 weeks PK-5 growth. The first experimental group received daily dry biomass of Chlorella vulgaris microalgae at a dosage of 2 mg/kg of live weight, the second experimental group – 4 mg/kg of body weight, the third – 6 mg/kg of body weight. The control group received a basic diet. The duration of the experiment was 7 weeks.
After 50 days, the poultry was slaughtered and pieces of liver, myocardium, spleen and sacrum were taken for histological studies. Histological preparations were fixed in 10% neutral formalin, dehydrated in ascending density alcohols, and then poured into paraffin blocks. Histological sections were made with a thickness of 5-7 microns, stained with hematoxylin and eosin, and examined in transmitted light using aLeica DM 1000 microscope using oil immersion. Photographing was carried out on a digital camera "Nikon coolpix 4500".

RESULTS AND DISCUSSION

The control group

Bursy in quailis covered by a dense capsulea, consisting of connective tissue fiberslocated close to eachother. From the capsule, interlobular septa extend inward, whichляюseparate the t follicles of the bursa from eachother. Theolokna septa are thin and arranged more loosely, compared to the capsule. The vessels of the bursa are dilated, the arteries are empty, the veins are unevenly located red blood cells and single lymphatic cells.
Bursa follicles of various sizes, mostly oval in shape, are filled with lymphatic cells. The cortical and cerebral layers are distinguishable, but not without clear boundaries, the width of the cortical layer varies and is about 1/4 ofthe width of the brain. In the cortical zone, lymphocytes are denser than in the medullary zoneй and have an intense color. Lymphatic cells of the brainго layerare of different colors, many light oval cells. Here there are fragments of hyperchromic cells. Between the cells, free spaces are defined in the form of almost circular cavities. B Lymphatic cells are also visible in the septa.
The spleen. The vessels are dilated. The arteries are empty. Loose connective tissue fibers, impregnated with weakly eosinophilic colored homogeneous masses, are located around the arteries in a coupling-like manner. The veins and capillaries are filled unevenly with red blood cells. Thespleenis coveredта with a dense capsule consisting of connective tissue fibers located close to each other. Trabeculae leave the capsule inside. In sections, trabeculae are not detected everywhere; in some places, connective tissue fibers are visualized between lymphatic clusters in the form of eosinophilic tender formations.
The white pulp consists of a collection of lymphatic cells. Follicles are rare, they are round formations of lymphatic cells. Germinal centers are not visible, the location of lymphocyte bin the follicle is approximately uniform.
Liver. In triads, the vessels are dilated, the arteries are anemic, the veins are dilated, and unevenly filled with red blood cells. The lumen of the bile ducts is empty. The structure of the lobules is indistinct, the boundaries are not defined. The girder structure is not pronounced. Hepatocytes located mainly in the central part of the lobules have circular optical voids. The nuclei in hepatocytes are round, basophilic with one or rarely two nucleoli. The sinusoids are dilated and unevenly filled with red blood cells (Figure 1).

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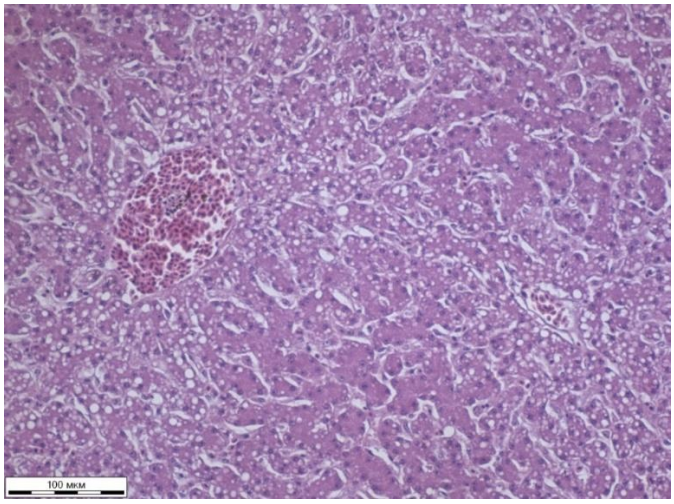

Figure 1-liver, control group, hematoxylin and eosin staining, x300.

Heart. The arteries are empty, their walls are thickened, the structure of the walls is clear. The veins and capillaries are dilated and unevenly filled with red blood cells. Cardiomyocytes are located in sections both longitudinally and transversely. With the structure of cardiomyocytes without features. The nuclei are basophilic. Cells of theconducting systemthat have a lighter color and a shape close to round or oval are visualized.

The first experimental group

Seminary. The blood vessels are dilated, the arteries are empty, the veins are unevenly located red blood cells and single lymphatic cells. Bursa in sections with a capsule, which is represented by densely located connective tissue fibers. The lobules are separated by partitions. Lymphatic cells are also visible in the septa. The septa themselves are made up of looser connective tissue fibers. Lobules are follicles in which the cortical and cerebral layers are visualized, the boundaries between them are blurred. Bursa follicles of various sizes are oval or almost round in shape. In the cortical zone, lymphocytes are located close to each other, and in the brain layer they are more loose. Also, the brain layer is determined by the polymorphic composition of cells (Figure 2).

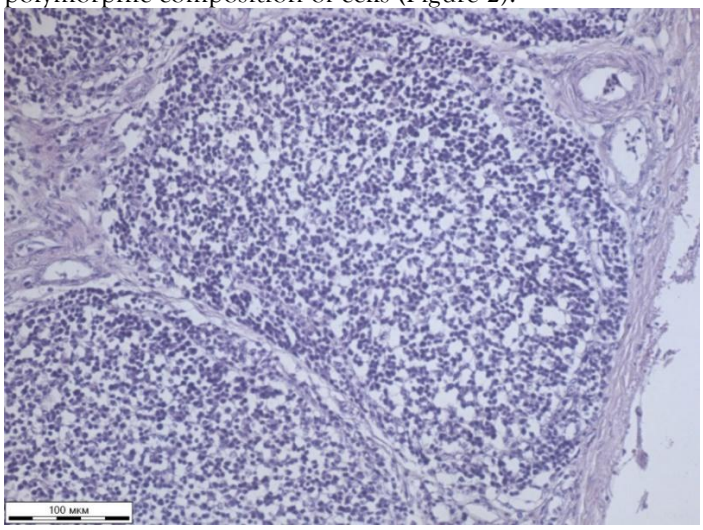

Figure 2 - Ring sac, first experimental group, hematoxylin and eosin staining, x300.

In the cortex, round cells are intensely blue in color. In the brain layer there are dark cells and light, round and oval, also more elongated. There are fragments of cells in the form of fragments. Between the cells, free spaces are defined in the form of almost circular cavities.

The spleen. The outside is covered with a dense connective tissue capsule. The spleen vessels are dilated. The arteries are empty. Loose connective tissue fibers, impregnated with weakly eosinophilic colored homogeneous masses, are located around the arteries in a coupling-like manner. The veins and capillaries contain red blood cells. Telomecules arerarely visualized as strips of dense connective tissue. The stroma is visible as fibrous connective tissue tender structures. Anemia of the red pulp. There are numerous lymphatic cells in the white pulp. Follicle-like structures are rare. No breeding centers were found in them. In the central part of the spleen, cell fragments (apoptosis) are detected.

Liver. Cross-sections of arterial vessels with empty lumen. The veins are dilated and filled with red blood cells. Bile ducts with empty spaces. The veins in the center of the lobules are also dilated, filled with red blood cells. The structure of the quail liver does not have a clear division into lobules. The boundaries between the lobules can only be defined conditionally. The girder structure is not pronounced. Hepatocytes with eosinophilic cytoplasm, basophilic nuclei. The structure has no special features. Nuclei in hepatocytes are rounded, basophilic with one nucleolus, in single nuclei of hepatocytes two nucleoli are determined. Sinusoids are dilated, unevenly filled with red blood cells, round-nuclear cells. Kupffer cells are rare (Figure 3).

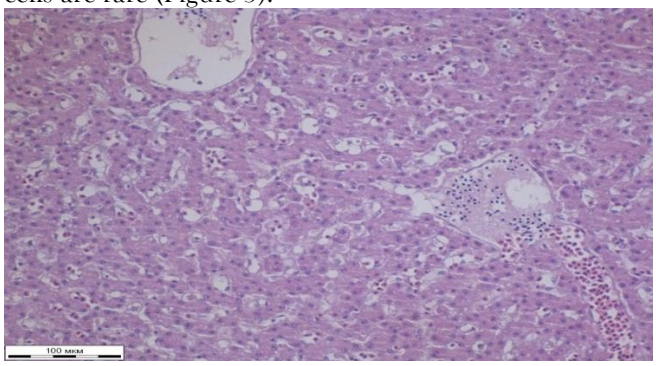

Figure 3 - Liver of group 1, hematoxylin and eosin staining, x300.

Heart. The arteries are empty, their walls are thicker than those of the veins, the structure is clear. The veins and capillaries are dilated and unevenly filled with red blood cells. Cardiomyocytes without features. Their cytoplasm is colored in eosinophilic color, while their nucleiarezophilic. The transverse striation is determined. Cells of the conducting system under the endocardium are more pale in color, mainly ooval in shape.

The second experimental group

Seminary. The vessels are dilated, blood-filled unevenly. The arteries are empty, and the veins have unevenly spaced red blood cells and single lymphatic cells. Outside, the bursa is covered with a dense connective tissue capsule. The lobules are separated by connective tissue partitions. In the septa, lymphatic cells are identified, both dark, and light. Lobules consist of cortical and cerebral layers.

The boundaries between them are not clear. Bursa follicles of various sizes are oval or almost round in shape. In the cortical zone, lymphocytes are located close to each other, in the brain layer there are free spaces between the cells. The cellular composition of the brain layer is polymorphic. In the cortex, round cells are intensely blue in color. In the brain layer there are dark cells and light, round and oval, also more elongated. There are fragments of cells in the form of fragments.

The spleen. The stroma is defined as connective tissue delicate fibrous structures. Red pulp is anemic. It occupies a much smaller area than the whiteone. There are numerous lymphocytes in the white pulp. Follicles встречаются are rare, havean almostround shape.

Reactive centers are not visible in them. Rare fragments of cells are visualized.

Liver. The walls of the arteries are thicker than those of the veins, the lumen is empty, the structure is clear. The veins are dilated and filled with erythromass. The lumen of the bile ducts is empty, the structure of the walls is visible. The division of the parenchyma into lobules is not expressed, the boundaries are determined conditionally (Figure 4).

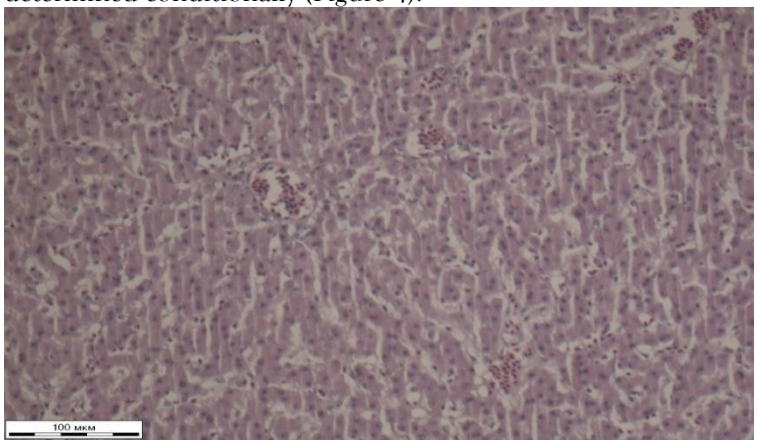

Figure 4 - Liver of the 2nd group. Hematoxylin staining-Eosisandn. x300.

The girder structures are poorly formed. Hepatocytes with eosinophilic cytoplasm, basophilic nuclei. Sinusoids are unevenly expanded, and unevenly filled with red blood cells, single round-nuclear cells, Kupffer cells are rarely found.

Heart. Arterial walls with a clear structure, lumens without contents. The veins and capillaries are dilated and unevenly filled with red blood cells. Cardiomyocytes have a clear structure, transverse striation is determined. The cytoplasm of cardiomyocytes is eosinophilic, the nuclei are basophilic. Cells of the conducting system are identified in the form of nodes and chains of cells, they have a lighter cytoplasm, an oval shape, and clear contours.

The third experimental group

Seminary. Blood supply is uneven. The arteries are desolate, their walls are thicker than those of the veins, the structure of the walls is without features. Red blood cell accumulations are detected in the veins. Outside, the bursa is covered with a dense connective tissue capsule, from which the septa extend deep into the organ.

In the septa, lymphatic cells are identified, both dark and light. The septa divide the organ intolobules, which consist of the cortical and cerebral layers. The boundaries between layers are poorly defined. Bursa follicles of various sizes are oval or almost round in shape. In the cortical zone, the density of lymphaticcells is higher than in the brain. The brain layer contains dark, light, round, oval and elongated cells. There are fragments of cells in the form of fragments.

The spleen. In some places, the stroma can be traced in the form of connective tissue delicate fibrous structures. Red pulp is anemic and occupies a smaller area than white pulp.

In the white pulp there are numerous lymphocytes, from which follicles are formed in places, which have an almost round shape. Reactive centers are not defined in them. Rare fragments of cells are visible in the red pulp.

Liver. In triads, the arteries are empty, the veins are dilated, filled with erythromass. The lumen of the bile ducts is empty. The cross-section of the vessel walls is clear. The division of the parenchyma into lobules is not expressed, the boundaries are determined conditionally by the location of blood vessels. The girder structures are poorly defined (Figure 5).

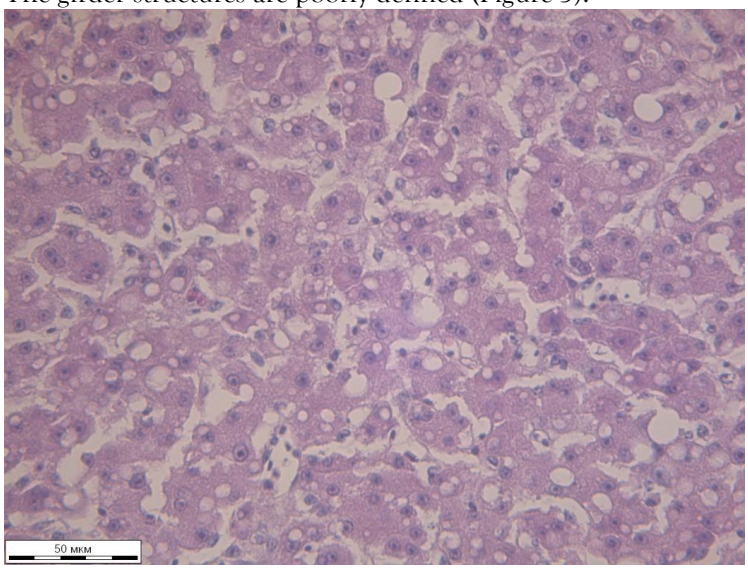

Figure 5 Liver of the 3rd group. Color of Hematoxylin-eozand N. X600.

Hematocytes with eosinophilic cytoplasm, basophilic nuclei. The sinusoids are unevenly expanded and unevenly filled with red blood cells. In sinusoids, there are single round-nuclear cells.

Heart. Arterial walls with a clear structure, lumens without contents. The veins and capillaries are dilated and unevenly filled with red blood cells. Cardiomyocytes with eosinophilic cytoplasm and basophilic nuclei (Figure 6).

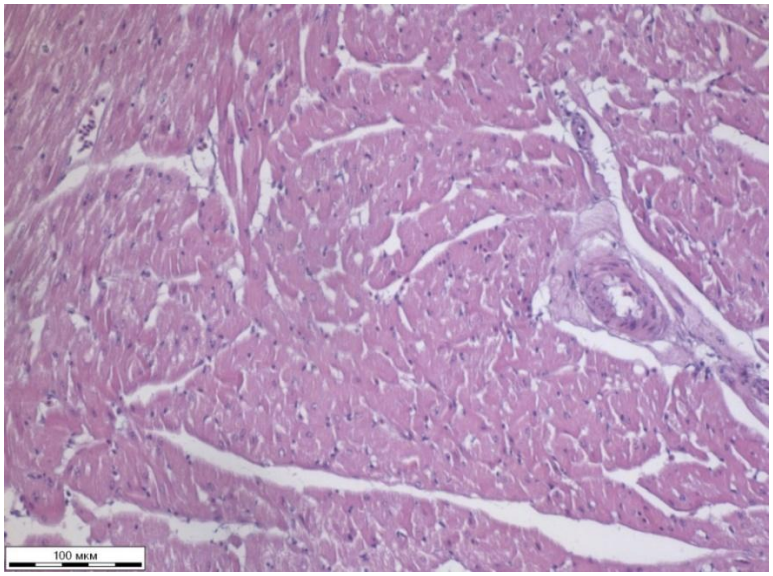

Figure 6- heart, third experimental group, hematoxylin and eosin staining, x300.
Noperatic striation in cardiomyocytes can be traced. Cells of theconducting system are visualized by a lighter cytoplasm and an oval or almost circular shape.

CONCLUSION

Thus, the results of histological studies of the liver, bursa, spleen and heart muscle of quails showed, that focal fattyliver dystrophy was observed in the control group, while no pathomorphological changes were noted in other organs. In all experimental groups, the histological picture of internal organs corresponded to the norm.

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