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CONTENT

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THE EFFECT OF FEEDING BVMD «ENERVIK» ON THE BODY OF SILVER CARP AND CARP.

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Abstract

Experiments conducted on two groups of fish (silver carp and carp) age of two years, which in principle analogues were divided into two control and two experimental groups of 10 individuals each. Fish kept in special trays under conditions of continuous closed system of water circulation. Fishes of control groups within 30 days were fed with granulated feed. Individual research groups were fed with a similar feed additives drug "Enervik" in calculating the amount of 2,500 IU of vitamin A, 3333 IU of vitamin D3, vitamin E 1,7 mg and 5 mg / kg of potassium iodide, 40 mg / kg zinc sulphate and 0 3 mg / kg sodium selenite per kg of feed.

The stimulating effect of fat-soluble vitamins and trace elements selenium, zinc and iodine in the composition of feed additives to the activity of cellular and humoral body's natural resistance silver carp and carp has beenestablished. In particular, the fish of both experimental groups compared to the control found higher ($p < 0,05$- 0,01) phagocytic and bactericidal activity of blood, and the carp - lizocym activity of serum. It should be noted that the effect of the studied additives was more pronounced in the silver carp than carp.

Keywords: vitamins, Carp, bactericidal activity, fat-soluble, iodine, zinc, selenium, indicators of natural immunity.

Actuality of theme.

One of the most pressing scientific and practical problems of modern pond fish farming is to increase the resistance of fish to diseases and negative man-made environmental factors. Therefore, in the case of breeding new breeds and species of fish, much attention is paid to the study of their natural resistance.

Analysis of recent research and publications.

In fish, as in mammals, immune system encompasses a set of protective mechanisms against infectious agents and controls antigenic homeostasis [1].

Resistance of pond fish, in particular carp, largely depends on the degree of their need for fat-soluble vitamins and trace elements. This is due to the influence of these factors on a number of physiological functions and various metabolic links in their body [2]. In addition, vitamins play a significant role in regulating the natural and adaptive immune response [3].

Fat-soluble vitamins have a wide range of biological effects, ensure the normal course of biochemical and physiological processes in the body, they affect various parts of the metabolism, as well as have antioxidant and immunomodulatory properties [4].

In particular, vitamin A plays an important role in ensuring the function of the immune and antioxidant systems, vitamin D regulates the metabolism of calcium and phosphorus and is involved in bone formation, vitamin E is important for antioxidant protection in fish and their reproduction [5].

To date, the normative values of fat-soluble vitamins are well studied in farm animals [6]. However, the quantitative need for vitamins, as well as their effect on immune function in fish has been studied only in some species [7]. According to the literature, the carp's need for vitamins varies widely, including vitamin A from 1000 to 20,000 IU [8].

The role of trace elements in the body of fish is similar to their role in other living organisms. They are part of animal organisms as components of hormones and enzymes that provide their physiological function and the corresponding intensity of metabolism [9].

A surprise for researchers in various immunological laboratories around the world, who share immunotrophic, nutrigenomic approaches to the correction and restoration of immune potential, was the fact that some immunotropic trace elements (Zn, Cu, S, Co, Se, etc.) are more essential for restoring immunity. Famous "Immunopotentiating" vitamins (A, C, E) or even immunoregulatory peptides and mono-, lymphokines.

In human medicine, immunotropic trace elements are widely used today with high efficiency for the prevention and comprehensive treatment of many types of immune-dependent pathology.

The aim of the study was to determine the effect of fat-soluble vitamins and trace elements Selenium, Zinc and Iodine in the dietary supplement on the activity of cellular and humoral mechanisms of nonspecific resistance in silver carp and carp.

Materials and methods of research.

The experiment was conducted in Vinnytsia on two groups of fish (silver carp, carp) of two years of age, which according to the principle of analogues were divided into two control and two experimental groups of 10 individuals each. The fish were kept in special trays under conditions of a constant closed system of water circulation. The fish of the control groups were fed granulated feed for 30 days. Individuals of the experimental groups were fed a similar feed with supplements of the drug "Enervik" in the amount of 2500 IU of vitamin A, 3333 IU of vitamin D3, 1.7 mg of vitamin E, as well as 5 mg / kg of potassium iodide, 40 mg / kg of zinc sulfate and 0 , 3 mg / kg of sodium selenite per kilogram of feed.

The blood was material for the study, which was taken from the heart of fish a month after feeding the studied mineral-vitamin complex. Bactericidal activity was determined in blood serum, Aeromonas hydrophila (Markov Yu. M, 1968), lysozyme activity on reaction

to microbial test culture of Micrococcus lysodeikticus by a photonephelometric method (Dorofeychuk VG, 1968) were used as a test microbe. immune complexes of average molecular weight (Chernushenko EF, 1978).

In heparin-stabilized blood was determined: phagocytic activity of blood leukocytes (FA; Gostev YM, 1958), calculated phagocytic number (PF) and phagocytic index (FI). The implementation of these techniques was carried out in accordance with the recommendations described by RV Mikryakov (1991).

The obtained digital data were processed statistically using Microsoft Excel software for personal computers, using conventional methods of variation statistics to determine the mean values (M), their quadratic error (m) and the significance of the differences, which were established by Student's t-test.

Research results and their discussion.

We can see, that feeding carp in the compound feed vitamin-mineral supplement caused changes in the indicators of cellular and humoral links of nonspecific resistance of the organism from the data given in the table.

Table 1

The indicators of nonspecific resistance of the organism of the studied fish, (M ± m, n = 4)

indicators	control	experiment
Silver curp		
Lysozyme activity, %	33,0 ± 1,08	34,5 ±1,19
Bactericidal activity, %	31,72 ± 0,72	35,92 ± 0,62**
Phagocytic activity, %	39,25 ± 1,10	43,5 ± 0,62*
Phagocytic index, unit	8,05 ± 0,12	7,85 ± 0,21
Phagocytic numeric, unit	3,16 ± 0,05	3,42 ± 0,08*
TZIK, mmol/liter	49,8 ± 1,41	47,6 ± 0,82
Curp		
Lysozyme activity, %	31,25 ± 1,10	34,25 ± 0,4*
Bactericidal activity, %	34,5 ± 1,71	42,0 ± 1,17*
Phagocytic activity, %	40,25 ± 0,85	43,52 ± 0,06*
Phagocytic index, unit	7,90 ± 0,23	8,14 ± 0,09
Phagocytic numeric, unit	3,17 ± 0,08	3,52 ± 0,08*
TZIK, mmol/liter	50,0 ± 1,0	48,8 ± 1,06

Note. Difference is a statistically viable comparatively to the control group:
** – p < 0,05;*
*** – p < 0,01*

In particular, the phagocytic activity of blood leukocytes in silver carp and carp was 4.5 and 3.3% (p <0.05) higher, respectively, than in control individuals.

Meanwhile, in the blood of silver carp of both experimental groups, compared to the control, an increase (p <0.05) of the phagocytic number was recorded, which expresses the number of phagocytosed microbial cells per 100 counted leukocytes. These data indicate the stimulating effect of vitamins and trace elements Selenium, Zinc and Iodine as a supplement to the cellular link of non-specific resistance of the organism.

During the study of indicators that characterize the humoral link of nonspecific resistance of the studied fish, draws attention to the higher by 4.2 (p <0.01) and 7.5% (p <0.05) bactericidal activity of serum in carp, respectively and carp, compared to control. It is known that the bactericidal activity of blood serum is an integral factor of natural resistance of the humoral type and indicates the ability of blood to self-cleanse. Lysozyme also belongs to the group of non-specific factors of humoral protection of fish.

It is believed that, in addition to direct antimicrobial activity, it affects the cells of lymphoid tissue and stimulates phagocytosis [10]. It was found that the lysozyme activity of serum in carp was higher (p <0.05) than in individuals of the control group. At the same time, feeding fish of the experimental groups of mineral and vitamin supplements did not significantly affect the content of circulating immune complexes in the serum. These data indicate the absence of antigenic load on the body of fish under the action of the studied additive. Therefore, studies have shown that feeding carp fat-soluble vitamins and trace elements Selenium, Zinc and Iodine as part of feed additives stimulates the activity of cellular and humoral parts of the body's natural resistance.

This can be explained by the complex additive effect of these factors in the composition of vitamin and mineral supplements on non-specific defense mechanisms of the body. In particular, vitamin A optimizes the structural organization of cell membranes, which has a positive effect on the receptor apparatus of immunocompetent cells [11].

However, it is important to emphasize that currently known mechanisms of participation of the studied fat-soluble vitamins and trace elements provide a wide range of metabolic processes that determine, above all, the level of cellular and humoral immune responses, maintaining genetic homeostasis of fish.

The silver carp (Hypophthalmichthys molitrix) is a species of freshwater cyprinid fish, a variety of Asian carp native to China and eastern Siberia. Although a threatened species in its natural habitat, it has long been cultivated in China. By weight more silver carp are produced worldwide in aquaculture than any other species of fish except for the grass carp. Silver carp are usually farmed in polyculture with other Asian carp, or sometimes with catla or other fish species.

The species has also been introduced, or spread by connected waterways, to at least 88 countries around the world. The reason for importation was generally for use in aquaculture, but enhancement of wild fisheries and water quality control have also been intended on occasion. In some of these places, the species is considered an invasive species.[5] The silver carp reaches an average length of 60–100 cm (24–39 in) with a maximum length of 140 cm (55 in) and weight of 50 kg.

The silver carp is a filter feeder and possesses a specialized feeding apparatus capable of filtering particles as small as 4 μm. The gill rakers are fused into a sponge-like filter, and an epibranchial organ secretes mucus which assists in trapping small particles. A strong buccal pump forces water through this filter. Silver carp, like all Hypophthalmichthys species, have no stomachs; they are thought to feed more or less constantly, largely on phytoplankton. They also consume zooplankton and detritus.

In places where this plankton-feeding species has been introduced, they are thought to compete with native planktivorous fishes, which in North America include paddlefish (Polyodon spathula), gizzard shad (Dorosoma cepedianum), and young fish of almost all species.[8]

Because they feed on plankton, they are sometimes successfully used for controlling water quality, especially in the control of noxious blue-green algae (cyanobacteria). Certain species of blue-green algae, notably the often toxic Microcystis, can pass through the gut of silver carp unharmed, picking up nutrients in the process.

Thus, in some cases, blue-green algae blooms have been exacerbated by silver carp. Microcystis has also been shown to produce more toxins in the presence of silver carp. These carp, which have natural defenses to their toxins, sometimes can contain enough algal toxins in their systems to become hazardous to eat.[8]Silver carp are filter feeders, thus are difficult to catch on typical hook-and-line gear. Special methods have been developed for these fish, the most important being the "suspension method", usually consisting of a large dough ball that disintegrates slowly, surrounded by a nest of tiny hooks embedded in the bait.[8] The entire apparatus is suspended below a large bobber. The fish feed on the small particles released from the dough ball and bump against the dough ball, with the intention of breaking off more small particles that can be filtered from the water, eventually becoming hooked on the tiny hooks.

In some areas, it is also legal to use "snagging gear", in which large, weighted treble hooks are jerked through the water, to snag the fish. In the United States, silver carp are also popular targets for bowfishermen; they are shot both in the water and in the air. In the latter case, boats are used to scare the fish and entice them to jump, and the fish are shot when they jump.

Conclusions and prospects for research.

The stimulating effect of fat-soluble vitamins and microelements Selenium, Zinc and Iodine as a part of compound feed additive on the activity of cellular and humoral parts of the body's resistance to silver carp and carp has been stated. This is evidenced by the higher ($p < 0.05–0.01$) phagocytic, lysozyme and bactericidal activity of blood in fish of the experimental groups compared to the control. This effect was expressed to a greater extent in the body of silver carp than in carp.

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