

ABSTRACT

**of the thesis of Akkozova Ardak Sabyrzhanovna on the topic:
"Veterinary and sanitary assessment of Clary catfish (*Clarias
Gariepinus*) grown on compound feeds with prebiotic "Ceobalyk" for the
degree of Doctor of Philosophy PhD in specialty
6D120200 - Veterinary Sanitation**

Relevance of the topic

In Kazakhstan, aquaculture can be considered a relatively new industry. To date, there is an active growth of private business activity in commercial fish farming. Breeding of Clary fish is one of the oldest forms of fish farming in the warm countries of Asia and Africa. African clary catfish is significantly superior to our local catfish in terms of taste. Experts put Clary catfish on the consistency and nutritional value of meat on a par with sturgeon and salmon fish, as well as with eel. There are practically no small bones in the tender white meat of fish, which allows it to be used in baby food. And because of the optimal combination of proteins, fats and amino acids (so necessary for a healthy diet) this fish is classified as dietary products. Clary catfish's meat is rich in Omega-3 fatty acids, there are even more of them in it than in mackerel and rainbow trout meat. These acids are exactly what fish oil is useful for, they soften the course of inflammatory processes in arthritis, relieve chronic fatigue syndrome, are used to prevent atherosclerosis and heart disease, reduce cholesterol levels in the blood, and also contribute to the development of the brain and nervous system in children.

The latest trend is the industrial breeding of fish in cold climates in closed water supply systems, which allows achieving stable optimal conditions for high productivity. The high quality of water for fish maintenance, the absence of genetically modified aquacultures and high-quality feeds obtained during the project implementation will allow obtaining and certifying organic food products from fish. Feed for such systems must have nutritional value, quality and optimal technological properties - high stability in water and the hardness of granules during feeding.

In the course of the work, the obtained prebiotic feed additive "Ceobalyk" is made on the basis of crushed environmentally friendly natural zeolite tuffs of the Changkanai deposit of Kazakhstan. The presence of macro-microelements vital for the body (iron, zinc, copper, magnesium, calcium, potassium) make this product an indispensable component in the preparation of feed additives.

The purpose and research problems

The purpose of the dissertation work: Veterinary and sanitary assessment of the quality of Clary catfish (*Clarias Gariepinus*) when using the prebiotic feed additive "Ceobalyk" as part of compound feed. To achieve this goal, the following tasks were set:

1. Study of the influence of local zeolite on the quality and on the growth activity and biomass yield of the probiotic;
2. Veterinary and sanitary assessment of the quality of African clary catfish when using the prebiotic "Ceobalyk" as part of compound feed;
3. Study of hematological and biochemical parameters of fish blood;

4. Investigation of the effect of the prebiotic "Ceobalyk" on the growth and safety of catfish;
5. Investigation of the effect of the prebiotic "Ceobalyk" on the mineral composition and experimental groups of fish meat;
6. Histopathological examination of meat, kidneys and gastrointestinal tract of clary catfish.

The results of the research work

When studying the effect of zeolite on the storage quality of fish and meat-bone flours, it was proved that the addition of zeolite in an amount of 10-15% stably preserves the amount of acid and peroxide fat, moisture and crude protein for up to 6 months of storage.

The addition of zeolite in an amount of 3% to the nutrient medium had a beneficial effect on the growth activity and biomass yield of the probiotic strain *Esherichia coli 64 Γ*. It has been proven that zeolite can be used as a prebiotic to increase the life expectancy of probiotics.

Based on the data obtained, a prebiotic feed additive "Ceobalyk" was made, which consists of zeolite, a probiotic strain of *Esherichia coli 64 Γ*, fish and meat and bone meals.

According to the veterinary and sanitary assessment of the quality of African clary catfish when using the prebiotic "Ceobalyk" as part of the compound feed, the following results were obtained: the skin of the fish of the control and experimental groups was smooth, clean, even, without mechanical damage and covered with a thin mucous membrane. The scales are intact and firmly attached to the skin. The growth of catfish in the experimental group was higher than in the control group of fish. Also, the body length of the fish of the experimental group was on average 2.1% higher than that of the control group.

It was found that both in the experimental and in the control group, the physico-chemical parameters of catfish meat met the requirements. The reaction with copper sulfate was positive. When cooking, the broth was transparent, the smell was characteristic of fish. The peroxidase reaction was positive, with the Nessler reaction, the filtrate was transparent.

According to the biochemical parameters of fish blood, the protein content in the experimental group was 36.52 g/l. This result is higher compared to the control group by 2.54 g/l. The serum amylase content was also high. According to the results of the hematological study, the hemoglobin content in the blood of the control group fish averaged 56.2 ± 3.6 g/dl. This indicator is lower compared to the experimental group (58.9 ± 6.2 g/dl). According to the results of the work, the high content of hemoglobin and platelets, neutrophils and monocytes in the blood of the fish of the experimental group means that they have higher immune indicators than the fish of the control group.

The increase in the fish of the control group was on average equal to 384 ± 0.7 g, in the experimental group – 481 ± 0.5 g. The average daily increase in the total weight of catfish compared to the control group was 4.9g higher. The absolute increase in the control group was - 203g, in the experimental group – 301g.

According to the determination of the chemical composition of catfish meat, the following results were obtained: the average protein content in catfish meat in the experimental group is 4.2% higher than in the control group. The total fat content was also higher ($7.2=0.6$ g/100 g) in the fish in the experimental group compared to the control group by 0.8 g/100 g. And there was not much difference in the amount of moisture and dry matter between the two groups.

It was found that the content of macro- and microelements in the composition of the control and experimental group of fish meets the requirements. It was found that in the control group the concentration of iron was 0.97 mg/100 g, and in the experimental group, where the prebiotic "Ceobalyk" was used as part of the compound feed, it was 1.1 mg/100 g. The same results were applicable to the elements of calcium, magnesium and phosphorus.

According to the results of histopathological studies of meat, liver and intestines of clary catfish of the control and experimental groups, no visible pathological changes were detected. Skeletal muscle fibers were characterized by dystrophy and detachment. The liver of fish of both groups is normal, the structure is preserved, reddish-brown in color, the consistency is dense, the pattern of the inner surface is clear, the volume and shape are not increased. The gastrointestinal tract is light yellow, the bark is thickened. When rinsing the intestines with water, the creamy shell was slightly swollen, and thickened striped bruises were found. According to the results of the study, it was found that the experimental feed additive had a good effect on the digestive tract of fish, increased the digestibility of feed.

The scientific novelty of the study

The influence of local zeolite on the quality and technological properties of feed flour during their storage was studied for the first time. Also, the effect of zeolite on the growth activity and biomass yield of the probiotic strain was studied. A veterinary and sanitary assessment of the quality of African clary catfish was carried out when using the prebiotic feed additive "Ceobalyk" as part of the compound feed. Organoleptic parameters of catfish were studied, physico-chemical and microbiological parameters of fish meat were studied. Hematological and biochemical parameters of fish blood were studied. It has been established that the prebiotic "Ceobalyk" has a positive effect on growth indicators and the chemical and mineral composition of fish meat. Pathomorphological studies of changes in the quality of meat, kidneys and intestines of catfish were carried out.

The use of prebiotic feed additive "Ceobalyk" as part of catfish feed improves veterinary and sanitary indicators of fish quality, promotes intensive growth and increased productivity of adult fish, improves the quality of meat and scales.

The scientific and practical value of the work

When using the prebiotic feed additive "Ceobalyk" as part of the compound feed, the veterinary and sanitary quality indicators of African clary catfish are improved. Also, the improved feed with the addition of the prebiotic "Ceobalyk" has a beneficial effect on the quality, physiological state and growth activity of fish. The total mineral composition of fish meat significantly increases when using the feed additive "Ceobalyk". Prebiotic feed additive "Ceobalyk" is made on the basis of local natural mineral raw materials zeolite. In addition, zeolite positively affected the

quality of feed flour during storage and the growth activity of the probiotic strain *Esherichia coli* 64 Г.

The results of our dissertation research work can be used in the educational process of veterinary and sanitary examination, chemical and pathomorphological study of fish meat.

The conducted experimental studies show that in the fishery, a complete feed with the addition of the prebiotic "Ceobalyk" can be used to improve growth and increase the nutritional and biological value, as well as the mineral composition of catfish meat.

The research results are used in the educational process for students of the Kazakh National Agrarian Research University.

The main provisions of the for the defense:

- The effect of zeolite on the quality and technological properties of feed flour during storage and on the yield of biomass of the probiotic strain *Esherichia coli* 64 Г;

- Veterinary and sanitary assessment of the quality of African clary catfish when using a complete feed with a prebiotic feed additive "Ceobalyk";

- Hematological blood parameters, growth activity and preservation of catfish when using feed additive "Ceobalyk";

- Chemical and mineral composition of the muscles of Clary catfish when using the prebiotic "Ceobalyk" in the sotava feed;

- Histopathological examination of meat, kidneys and gastrointestinal tract of Clary catfish. control and experimental groups.

Compliance with the directions of scientific development or state programs.

These studies were carried out at NAO KazNAIU under the grant project of LLP "AsylTasEngineering" No. 236-16-GC "Production of organic products from fish (tilapia, African clary catfish, etc.) grown on the basis of local environmentally friendly feed in accordance with international standards."

Approbation

Based on the materials of the dissertation, **4 works** were published, including: **1 - in** a journal with a high impact factor and **2 patents** of the Republic of Kazakhstan were obtained:

- Effect of feed additive «Ceobalyk» on the biological and microbiological parameters of African sharptooth catfish (*Clarias gariepinus*). «Veterinary World» (Scopus, percentile - 79%), - 2021. – V.14(3): p.669-677. doi: www.doi.org/10.14202/vetworld.2021.669-677.

- **3 articles** in journals included in the list of publications recommended by the Committee for Quality Assurance in the Field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan for the publication of the main results of scientific activity:

- Study of blood values of catfish (*Clarias gariepinus*) when using the prebiotic "Ceobalyk" // Scientific journal: «ҒЫЛЫМ ЖӘНЕ БІЛІМ». - 2022. -№4-1(69). – P.44-51. DOI 10.56339/2305-9397-2022-4-1-44-52.

- Study of the effect of "Ceobalyk" prebiotic on growth indicators when applied to the main diet of catfish (*Clarias gariepinus*) // С.Сейфуллин атындағы Қазақ агротехникалық университетінің Ғылым жаршысы (пәнаралық). - 2022. - №4 (115). - p.66-73. doi.org/ 10.51452/kazatu.2022.4.1239.

- Study of the effect of prebiotic "Ceobalyk" on the chemical composition and nutritional value of meat of catfish // «3i: intellect, idea, innovation - интеллект, идея, инновация» көпсалалы ғылыми журналы. - 2022. - №4. - p.13-20. DOI: 10.52269/22266070_2022_4_13.

- **2 patents** of the Republic of Kazakhstan:

- The method of preparing food for the clary catfish. patent of RK, №34894;

- Full-fledged compound feed for clary catfish. patent of RK, №34895.

Volume and structure of the dissertation. The thesis work was presented to a common pattern. It consists of an introduction, literature review, materials and methods, results of the research, discussion of results, conclusions, list of sources used 234 items. The dissertation is presented on 135 pages of text, drawn up in compliance with the required standards, illustrated with 19 tables and 38 figures.