Measures to prevent the spread of non-infected bronchioneocrosis, protozoan and lerniosis in fish

Khudaynazar Yunusov¹, Feruz Kurbanov¹, Xojiakbar Yuldashev¹, Odil Achilov¹, Najmiddin Ergashev¹, and O’tkirxon Muxammadiyev ¹

¹Samarkand State University of Veterinary Medicine, Livestock and Biotechnologies, Samarkand, Uzbekistan

**Abstract.** In general, the main cause of non-infectious bronchioneocrosis in fish is recognized to be chronic exposure to unfavorable environmental factors on fish. White carp - 20.0%, eel - 14.6%. The infestation of all three fish species by crustaceans was found to be on average 19.3%. According to the results of the analysis, 18.0% of crustaceans in four districts of the Samarkand region were infected with 2 types: lerniosis, 1.3% - arguliosis.

**1 Introduction**

Relevance of the topic. In accordance with the resolution, intensive development of the fishing industry in the republic is provided on the basis of a scientific approach, increasing efficiency through the introduction of modern and innovative methods of production of fish products into the industry.

This, in turn, contributes to the accelerated development of fisheries based on new innovative technologies and the widespread introduction in the industry of innovative methods of fish farming based on intensive technologies. As an example, a number of resolutions and orders of our esteemed president are given. In particular, this year, in accordance with the Decree of the President of the Republic of Uzbekistan dated August 29, 2020 No. PP - 4816 “on measures to support and improve the efficiency of the fishing network,” work is being carried out in the republic to support the fishing network, improve the efficiency of fishing and fishing farms, rational and efficient use of land and water resources in this area, in order to ensure widespread introduction of intensive technologies:

In 2021-2022 conditions of water scarcity, the practice of gradual widespread use of new resource-intensive intensive technologies and secondary water sources in artificial reservoirs by fisheries that receive water from rivers and canals has been introduced.

To date, most dangerous diseases have been studied in depth, and recommendations for their prevention and treatment have been developed. However, skilled personnel are required in the field to be able to select the optimal and cost-effective measures in specific conditions that will prevent and reduce damage from disease.

* Corresponding author: shernazarov.1987@mail.ru

© The Authors, published by EDP Sciences. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).
Currently, practical measures are being taken in the republic to implement this resolution. However, diseases encountered in fish during the farming of fish and fish products, including infectious and non-infectious fish diseases, to some extent hinder the development of the.

The degree of knowledge of the problem. When diseases complex treatment was noted that regular fishing reclamation, veterinary, sanitary and therapeutic measures help well in preventing the disease.

Purpose of the study. It is intended to test highly effective methods of bronching and treatment in 1-2 year old fish infected with lerniosis and untreated disease.

2 Materials and methods

Lakmus qog’ozidan foydalangan holda suvning pH qiymatini aniqlash, shuningdek, zaharlangan baliqlarni tashhislash, davolash va oldini olish maqsadida Samarqand davlat veterinariya, chovchilik va biotexnologiyalar universiteti hamda Samarqand davlat veterinariya universitetida ilmiy kadrar tashkil etilgan. O’zbekistonda veterinariya, biotexnologiya va chovchilikni rivojlantirish uchun tibbiyot, chovchilik va biotexnologiya. ilmiy biznes incubator” mega loyihasi “baliq” eksperimentini “qushlar, baliqlar, asalarlar va mo’ynali hayvonlar kasalliklari” xonasida jadal tayyorlash. Aro optatech laboratoriyasida mikologik tadqiqotlarni olib borildi, patogenning gifalarini aniqlashga asoslanib, tashhislash va patologik usullari qo’llanilgan.

During the clinical and organoleptic studies, the clinical condition of the fish, appearance, coordination of movements, reaction to the external environment, body position in the water, body weight, color of mucous membranes, color of coins, eyesight, and the condition of wound dressings was studied.

3 Results and Discussion

Fermada baliqlarning yuqumli bo’lmagan bronxial nekrozining asosiy sababi baliqlarga noqulay ekologik omillarning surunkali ta’siri edi. Kattaqo’rg’он tumanidagi baliqchilik xo’jaligida tajriba o’tkazishda suv sifatining buzilishi natijasida suvning gidrokimyoviy ko’rsatkichlarining o’zgarishi, suvga yakuniy chiqindilar (gung) va organik kislotalarning (miyadan suv o’tlarining ko’payishi) tushishi aniqlangan. ifloslangan suvlar bilan kislotali muihida suvning pH ning 5.0-5.6 gacha pasayishiga olib keldi: Pastdarg’om tumanidagi baliqchilik xo’jaliklarida suvning pH darajasi 9-10 dan 5.6 ni tashkil etdi, bu esa suvning pH qiymatining 5.6 ni tashkil etdi. normadan yuqori erkin ammiak konsentratsiyasi (0.4-0.7 mg yoki undan ko’p), ammiak azot (3 mg dan ortiq) oshdi nitrat tarkibi (0.3 mg dan ortiq) kuzatildi.
It has been established that the excessive application of organic and mineral fertilizers to reservoirs by economic ichthyologists in the spring is caused by the excessive use of waste, sometimes coming from livestock farms.

Table 1. Occurrence of non-infectious bronchial necrosis by season.

<table>
<thead>
<tr>
<th>No.</th>
<th>Seasons</th>
<th>Changes to the pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Winter</td>
<td>In adult fish, non-infectious bronchionecrosis in most cases occurs in late winter and early spring. And this condition becomes the basis for the development of infectious and parasitic diseases by spring.</td>
</tr>
<tr>
<td>2</td>
<td>Spring</td>
<td>During our experiments, it was noticed that the disease in the spring months is in most cases accompanied by saprolegniosis, opportunistic microflora and ectoparasites. In Pisces 2 - 3 years of age, it was recorded mainly in the spring-summer period.</td>
</tr>
<tr>
<td>3</td>
<td>Summer</td>
<td>Poisoning of fish with endogenous ammonia and non-infectious bronchial necrosis was more common. In Fish, the gills are primarily affected as a result of the excretion of major metabolic end products and ammonia by the gills. In our experiments, it was noticed that the lack of oxygen dissolved in water and the slowdown in the excretion of ammonia due to unfavorable environmental factors and an increase in the level of the water (pH) environment, these toxic ammonia substances accumulate in the body and mainly cause ear injuries (jabra).</td>
</tr>
<tr>
<td>4</td>
<td>Autumn</td>
<td>Non-infectious bronchionecrosis at different ages was observed in sturgeon, silverwings (crucian carp), herbivores (grass carp) and other fish during intensive fish farming in a basin farm.</td>
</tr>
</tbody>
</table>

In the second half of winter and early spring, non-infectious bronchionecrosis was more often observed in the group of cultured salmon fish; the disease was chronic and, as a consequence, complicated by saprolegniosis. In our experiments, it was noticed that the occurrence of the disease in such cases is due to the deterioration of the aquatic environment in winter. Due to oxygen deficiency or fluctuations in water, an increase in ammonia nitrogen, hydrogen sulfide and toxins was observed. As a result of such conditions, the fish become very worried, and then calm down and begin to gather on the surface of the water and at the entrance to the water.
Spring spread of Harrier necrosis is most often observed in 2-3 year old killer whales and other fish species. They have been observed to occur due to optimal or increased oxygen levels in the water due to photosynthesis by macrophytes and algae, as well as increased ammonium nitrogen concentrations. Its source is considered to be macrophytes and phytoplankton. Under such environmental conditions, ammonia nitrogen is converted to the free ammonia form, which then causes disease.

Table 2. Measures to prevent non-infectious bronchial necrosis of fish during the seasons.

<table>
<thead>
<tr>
<th>No.</th>
<th>Seasons</th>
<th>Disease prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Autumn</td>
<td>Ultrasound regulates the cultivation of fish in artificial reservoirs, draining each reservoir until February and spraying the bottom from moles (to clean the bottom from spores of parasites and cysts, as well as for better development of species of aquatic bottom creatures. Benthos) --- March 22 in Sandor, part of march composition, sito gas filters were installed, water was discharged, the water temperature exceeded 17 degrees Celsius (Ammophos and horse light), a natural nutritional base was created for the pools and a normal aquatic environment was maintained.</td>
</tr>
<tr>
<td>2</td>
<td>Spring</td>
<td>Calcium hypochlorite and copper sulfate 0.1-1.0 mg/l. Gacha, Karbofos and copper 8 - hydroxyquinolate 0.01 mg/l. from 0.1 mg/l. to, rotenone 0.001 mg/l. from 0, 01 mg/l. The use of Gacha, antimycin and levoristatin in concentrations of no more than 0.001 mg/l gives a good effect against saprolegniosis, opportunistic microflora and ectoparasites. The experiments were carried out taking into account the fact that ichthyocides cannot be introduced into water bodies in concentrations dangerous to warm-blooded health. It is better to use quickly decomposing ichthyocides - calcium hypochlorite, copper 8 - hydroxyquinolate. Rotstock decomposes in 4 - 8 weeks, but since it is expensive, it is recommended to use less expensive tools. After using copper hydroxyquinolate, the concentration of its ions decreases in the 4 th year, and after using detoxicants, in the 1st– 2 nd year to the level of the natural background. Levoristatin, calcium hypochlorite, copper sulfate are soluble in water. Carbofos and Tribask are soluble in organic solvents (they were used in the form of emulsions). Karatan, an 8 - hydroxyphenolate of copper, is insoluble and was applied to the reservoir in the form of suspensions.</td>
</tr>
<tr>
<td>3</td>
<td>Summer</td>
<td>In the summer months, they generally weighed 100 kg of insoluble hops per hectare and poured them into a basin in the form of a suspension (liquid), and a day later they sprayed the basin with a mother solution - a mother solution of 150-200 grams per hectare in 300- 500 liters of water. A good effect was achieved when using 65% calcium hypochlorite at 6- 8 kg per hectare every other day with repeated spraying of winter rye.</td>
</tr>
<tr>
<td>4</td>
<td>Winter</td>
<td>Liming of ponds not only reduces the acidity of water, eliminates iron oxide compounds; in experiments it was noticed that lime promotes the development of beneficial nitrogen-fixing bacteria, improves the composition of the soil, transforming insoluble phosphorus, potassium, Siliceous bricks into an easily digestible, soluble state, loses the toxic properties of sodium and magnesium. Calcium salts contained in lime are important for the formation of tissues in the body of plants and animals. Quicklime (CaO) is considered a disinfectant and is used to combat small polluting fish and various infectious and invasive fish diseases. Lime is used in ponds for various purposes and it has been observed in experiments that ponds ultimately result in increased fish productivity. Application in the form of quicklime (CaO), slaked lime (Ca(OH)2) and calcium carbonate (CaCO3), depending on its application quantity, is reflected in our experiments to combat small pollutants and predatory fish, improve soil quality or even calcium deficiency in the pond.</td>
</tr>
</tbody>
</table>

A total of 155 specimens were subjected to parasitological research. (Table 1) of different fish species. Of these, 6 out of 41 specimens examined, i.e. 14.6% were infected.
with lerniosis, and the intensity of invasion averaged 9-18 specimens. Of the 69 species of carp examined, 15, i.e. 18.8% were infected with lerniosis, and 2 were infected with arguliosis, which amounted to 2.9%. The intensity of invasion was 7-9 and 1 specimen, respectively.

Table 3. Infection of fish with crustaceans, level test results.

<table>
<thead>
<tr>
<th>Types of fish</th>
<th>Number of fish examined</th>
<th>Damaged</th>
<th>From this</th>
<th>Lerniosis</th>
<th>Arguliosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Acne</td>
<td>41</td>
<td>6</td>
<td>14.6</td>
<td>6</td>
<td>14.6</td>
</tr>
<tr>
<td>Carp</td>
<td>69</td>
<td>15</td>
<td>21.7</td>
<td>13</td>
<td>18.8</td>
</tr>
<tr>
<td>White carp</td>
<td>45</td>
<td>9</td>
<td>20.0</td>
<td>9</td>
<td>20.0</td>
</tr>
<tr>
<td>GENERAL</td>
<td>155</td>
<td>30</td>
<td>19.3</td>
<td>28</td>
<td>18.0</td>
</tr>
</tbody>
</table>

When examining 45 species of white carp, lerniosis was found in 9 of them, and the infestation with crustaceans was 20.0%. The intensity of invasion was 1-4 copies.

According to the results of the inspection, the average infestation of fish with crustaceans in farms and natural reservoirs of the Kattakurgan district of the Samarkand region was 19.3%. Of these, Lerniosis accounted for 18.0%, Arguliosis - 1.3%.

In natural and artificial reservoirs of our republic, the level of contamination of fish with crustaceans is on average 19.3% and its increase is observed every year.

Among the 3 fish species examined, the infestation of carp with crustaceans was high and averaged 21.7%.

White carp - 20.0 %, eel - 14.6 %. The three fish species were contaminated with crustaceans by an average of 19.3%.

According to the results of our surveys, it was found that 18.0% are infected with 2 types of crustaceans - lerniosis, and 1.3% - arguliosis.

Improving the aquatic environment in fisheries.

- An increase in the inflow and outflow of water in reservoirs where fish died was ensured (Otabek Dustov, Payarik district).

- Air is supplied to the water using aeration equipment, water enters the pool from above in a canal or reservoir (Otabek Dustov, Payarik district).

- Additional aerators were installed, resulting in water splashing and asphyxia was prevented by saturating water droplets with air oxygen (Otabek Dustov).

- Conventional aeration devices were installed at the entrance to the watercourse (Payarik district).

- Asphyxia was prevented by using permanganate and potassium peroxide (1 g/m³) to quickly saturate the water with oxygen (Otabek Dustov, Payarik district).

- The amount of oxygen for carp and herbivorous fish in winter and summer should be 6-8 mg O₂/l, for trout and other salmon and ostriches - 8 mg O₂/l (for carp 4-5 mg O₂/l is required). Asphyxia was prevented by using permanganate and potassium peroxide (1 g/m³) to quickly saturate the water with oxygen, the excess of which causes oxygen deficiency.

Trichodinosis disease of fish is widespread in the farms of our region, mainly affects young, one- and two-year-old fish. In the treatment of trichodinosis, using the bath method with appropriate solutions of table salt, formalin, methylene blue, and chlorine preparations gives good results. In order to prevent the disease, it is effective to regularly carry out fishery reclamations, veterinary-sanitary and treatment activities.

The analysis of our studied literature data showed that the protozoan disease of young fish kept in fisheries is a protozoan disease spread by infusoria, which causes a violation of movement coordination in young fish, loss of external characteristics, and a gray flaky
coating on the body. The wounds are covered with colorless mucus. When the disease worsens, the fish sink to the bottom of the water and die.

In the group treatment and prevention of protozoan diseases of fish when we carry out treatments using bath methods, in aquarium conditions, they are treated with table salt solution 0.5%, Malachite blue-0.2-0.5 g/m³, Violet K-0.2-0.3 g/m³, Brilliant green-0.1-0.2 g/m³, FMS mixture-100 liters/1 ml solutions were highly effective, and the clinical-organoleptic results were improved.

As soon as the disease carriers and pathogens are detected, small fish are transferred to another place. Fish are cleaned as soon as possible after the breeding season is over. After emptying any pond, drain it and clean it with slaked or chlorinated lime, and any inverter that came in contact with infected fish should be dried and cleaned quickly.

It is necessary to always add copper sulfate with 0.5% sodium chloride solution to the water and stop water exchange for 2 days. In this case, the alkaline environment of the water increases, preventing the development of protozoan diseases and the reproduction of other types of parasites.

Since the disease is mostly late in young fish, before transplanting the fish, the basins are cleaned in a 5% salt bath for 5 minutes or Malachite blue-0.2-0.5 g/m³, Violet K-0.2-

Treatment using solutions of 0.3 g/m³, Brilliant green-0.1-0.2 g/m³ is effective in the treatment of trichodinosis.

Treatment in small ponds by the bath method, i.e., 1 ml FMS mixture (0.5 liter formalin, 1.75 g malachite green and 1.75 g methylene blue) with furazalidon (1 ml FMS +0.5 grams of furazalidon) to replace 30-40% of the water in the drug bath and add another 1 ml of the drug. 5 days of treatment in this order is also effective in the initial treatment of the disease.

In addition, it is advisable to constantly pass clinical, epizootological, clinical, organoleptic examination of fish in small ponds that are raised by natural, artificial, and intensive methods.

4 Conclusion

In the diagnosis of non-infectious bronchial necrosis, it is important to determine the quality indicators of water, changes in its pH, the amount of oxygen dissolved in water, ammonia and ammonia nitrogen, the content of nitrite and nitrate nitrogen, hardness, oxidation, size, as well as the basic physical properties of water.

- In natural and artificial reservoirs of our republic, the level of contamination of fish with crustaceans is on average 19.3 % and its increase is observed every year.
- Among the 3 fish species examined, the infestation of carp with crustaceans was high and averaged 21.7 %.
- White carp - 20.0 %, eel - 14.6 %. The three fish species were contaminated with crustaceans by an average of 19.3 %.
- According to the results of our surveys, it was found that 18.0 % are infected with 2 types of crustaceans - lerniosis, and 1.3 % - arguliosis.

References

1. Khudaynazar Yunusov, "Diagnosis of saproligniosis and protozoa of fish and veterinary and sanitary assessment of their meat (Uzbekistan)," BIO Web of Conferences, EDP Sciences, 95 (2024)
2. F.I. Kurbanov, A.S. Daminov, Iffectiveness of anthelmintic drugs used against fish helmintosis, Internatsional Journal for innovative Engineering and Management Research, Elsevier SSRN, 10, 101-105


6. A. Akmatova, S. Niyazbekova, V. Britvina, K. Karabaeva, A.Osmonova, Legal mechanisms of the Kyrgyz Republic to promote sustainable development and environmental protection, E3S Web of Conferences, 431, 07040 (2023)


8. K.F. Enatillayevich, Test results of separate anthelmintic preparations against the helminths of fish in the carp, Scienceweb academic papers collection (2020)