

Improvement methods of feeding of aquaculture

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Abstract. For stable, sustainable provision of the country's population with a variety of fish products, a scientifically sound strategy for the development of the fishing industry is needed, which consists in optimizing aquaculture cultivation technologies. The priorities of the development of aquaculture are the use of resource-saving technologies and equipment, reduction of losses during fishing, transportation, processing and sale of products, and efficient use of aquatic biological resources. This article presents material on the use of modern technologies in the distribution of feed for proper nutrition of fish.

1 Introduction

The main goal of the strategy for the development of aquaculture in Uzbekistan is to reliably provide the country's population with a wide range of fish products at prices affordable for people with different income levels.

All the work of the fishing industry is aimed at ensuring uninterrupted and supply product of food to the population sufficient quantity – fish. Since fish meat is a high-calorie dietary product, and it contains valuable, easily digested proteins necessary for normal growth, development and vital activity of the body, vitamins and minerals. Fish fat contains a lot of unsaturated fatty acids, which are easily absorbed by humans. High nutritional qualities of fish, combined with dietary properties, make it the most valuable product of food [1].

Nutrition is the basis of the vital activity of any organism. The food consumed is transformed in the digestive tract. Complex organic molecules are split into simpler ones. As a result of their decay, energy is released, which ensures the implementation of all vital functions of the animal.

Feeding fish with a full-fledged and normalized feed is a difficult task, since it depends on the type of fish, metabolism, habitat, water temperature, oxygen dissolved in water, pH, atmospheric pressure, illumination, and others.

Also, it is necessary to distinguish between feeds used for growing fish in ponds, in cages or pools. In ponds, even at high planting densities, fish can consume natural food, which serves as a source of biologically active substances - vitamins, trace elements, as well as high-value protein. Therefore, pond feeds do not have such strict requirements for the balance and usefulness of diets [2, 3].

Consequently, compound feeds used in industrial conditions, that is, pools and cages should be full-fledged,

that is, contain all the substances necessary for the growth and development of fish, as well as balanced, that is, contain them in such quantities and ratios that they meet the nutritional needs of fish. Therefore, the feeds used for industrial fish farming contain more protein, fat and include premixes, enzyme preparations, antioxidants in their composition (Table 1).

Table 1. The content of components in compound feeds for growing carp in industrial conditions.

Components	Mixed Feed Recipe			
	12-80	16-80	16-82	111-9
fish flour	25	10	5	19
meat and bone meal	6	-	6	1
herbal flour	-	-	5	-
wheat bran	-	-	-	15
hydrolysis yeast	10	20	5	3
sunflower meal	18	30.5	15	10
soy meal	-	-	15	20
corn	-	-	-	10
wheat	16.5	19	15	19
oats	-	-	10	-
barley	-	-	10	-
mel	-	1	1	-
inorganic phosphate	-	1	1	-
table salt	-	-	0.5	-
molasses	3	3	-	-
methionine	0.5	0.5	0.5	-
protosubtilin GZh	-	0.05	0.05	-
premix PF-2B or P-5-1	1	1	1	1

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2 Material and method

Currently, there are many constructions of auto-feeders. However, in our opinion, the best among the existing ones are auto-feeders of the "Reflex" type. It is a hopper with a feed located above the water (Fig. 2). At the bottom of the hopper has a hole through which the feed is poured out. There is a locking table under the hole. The feed, spilling out of the hopper, falls on the table. The resulting feed cone locks the hole. There is a ring damper on the table, which goes around the table, continues in the form of a rod and goes underwater. The fish, having touched the rod with any part of the body, transmits the movement to the ring damper, which drops several pellets of feed from the table. In order to get a new portion of feed, the fish must push the rod again. The position of the feed table under the hopper opening can be adjusted by setting it higher or lower. The feed cone in this case is located closer or further from the edge of the table. Thus, the size of the feed portion and the effort that must be expended by the fish to obtain it are regulated. The experience of operating self-feeders has shown that fish do not push the pendulum and do not pour out food just out of curiosity. When they have no appetite, they do not approach the auto-feeder. The use of self-feeders allows the fish to actually get food at the moment when it wants it and in the quantities that are required. The feed is given out in small portions and consumed immediately. Feed losses are practically excluded. Feeding efficiency increases both by eliminating unproductive feed losses and by feeding fish in accordance with their internal biorhythms. Due to less pollution of the reservoir with organic matter, fish habitat conditions are improving [4, 5].

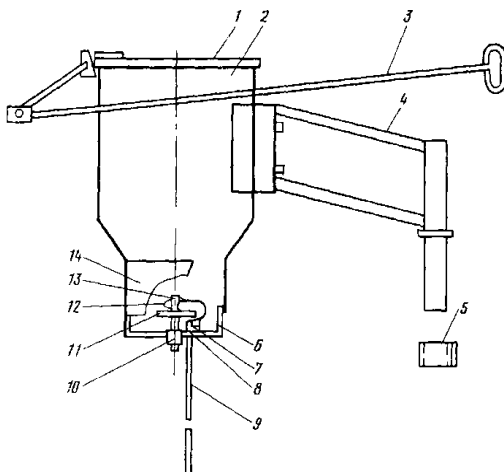


Fig 1. Auto-feeder "Reflex T -1-50" 1-lid, 2-hopper, 3-pull for opening the lid, 4-bracket, 5- support cup, 6-crossbar, 7-screw, 8-ball bearing, 9-pendulum, 10 - nut, 11-table, 12-loop-shaped granule dumper, 13-protective pin, 14-moisture-proof casing.

3 Results and discussion

It is more profitable to load auto-feeders with feed using a floating feeder of the Reflex-T-1000-16 Auto-feeder type (Fig. 2). One auto-feeder is designed for feeding commercial fish in stocked reservoirs with an area of up to 100 hectares on the basis of a developed reflex reaction.



Fig 2. Multi pendulum auto-feeder "Reflex-T 1000-16".

It consists of a hopper containing 1000 kg of granular feed, mounted above the water on two sealed cylindrical pontoons. At the bottom of the trough-shaped hopper there is a gap through which the granulated feed is poured onto a support bar-channel suspended under it. 16 pendulums up to 1.5 m long are suspended on the bar, which can deviate in any direction under the influence of fish.

4 Conclusion

Currently, auto-feeding is the most effective way of feeding. In addition to the above advantages, it is less laborious, does not require daily measurement of water temperature and oxygen dissolved in water, as well as regular control catches to determine the mass of fish.

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