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Influence of a Feed Additive in the Carp Diet on its Exterior Parameters

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Abstract

During fish farming, significant attention should be paid not only to the quantity, but also to the quality of marketable carp, primarily its physiological condition and high adaptive plasticity. Recently, increasing importance is attached to fish farming by industrial methods using various types of feed. A characteristic feature is the almost complete absence of natural food organisms. Significant success has been achieved in the creation of various starter compound feeds that can replace live feed when the larvae switch to exogenous nutrition [1]. During the development of artificial rations, attention was paid to the balance of basic structural elements of nutrition and, to a lesser extent, to various biologically active substances. For the majority of farmed fish, the need for protein and essential amino acids, fat and certain fatty acids, carbon and minerals has been established, on the basis of which, starter and production feeds, as well as various vitamin and mineral premixes, were developed [2]. However, natural food contains a wider range of biologically active components that are the regulators of many metabolic processes of body. Therefore, live food in fish nutrition, even in small proportion, can supplement the energy components of artificial feed and thereby significantly increase the balance of the diet [3].

Keywords: aquaculture, probiotic, exterior, aquatic organisms, bacteria, fatness ratio, diet

1. Introduction

The solutions to the issues of intensification of aquaculture require the expansion and implementation of new methods and elements of nutrition for balanced diets. One of the promising directions for the improvement of the quality of fish and increase of average

daily growth in the conditions of pond commercial fisheries is the use of productive feed additives in the diets of aquatic organisms, which contribute to the activation of metabolism, intensive growth, increased body resistance and product quality [4].

Nutritious feeding of fish in the pond culture is ensured by diets balanced in all the basic necessary nutrients and enriched with biologically active feed additives, which guarantees high growth energy and efficient use of feed in the grown carps [5].

The external forms of the body are closely related to the physiological state of body. Therefore, the constitutional, productive and breeding qualities of fish are evaluated by the exterior. In the process of domestication and breeding of fish, body parameters changed greatly. Cultural forms of carp, selected according to the growth rate, are characterized by a higher spin, rounded shape and a high value of the coefficient of fatness. In some cases, the correlation between the form and production traits, growth rate, survival and fertility are revealed in carp. In the experiments of V.V. Lobchenko, two-year-old carps that had lower values (high-body) during stocking, a clear advantage in terms of growth rate and productivity compared to the group of oblong carps was found [6]. A positive correlation between the high-backed body shape and growth of fish is preserved only to a certain limit. Excessive “high back” can be associated with an anatomical defect of spinal curvature, which in turn leads to a decrease in vitality and growth rate. The example is the Aishgrud carp, the increased selection for a high-back (round) body of which led to the decrease in vitality and the subsequent loss of this valuable breed [7].

Thus, for each species and species group there should be a standard on the basis of body parameters, within which selection can give positive results. The deviation from standard in one direction or another can lead to disruption of the functional systems of body and, consequently, to a decrease in productivity. The identification of such standard is obligatory for all fish species [8].

2. Methods and Equipment

In order to determine the effect on the exterior features of carp, Bacell-M feed additive was tested in two doses [9]. The description of the scheme is shown in Table 1. The feeding was carried out according to the same scheme used at this fish farm, i.e. morning and evening feeding [10]. The feeding places and the method of distribution of food also did not change in order to maintain the usual way of fish life. The distribution of feed into the ponds was done manually, the portioning was small for convenience and control over eatability.

Table 1: Experiment scheme

Group name	Amount of fish	Diet
P-0 – control Pond № 13	285 pcs / ha	MBP
P-1 – 1st experiment group Pond № 6	285 pcs / ha	MBP + 2kg of Bacell-M probiotic per 1 ton of feed
P-2- 2nd experiment group Pond № 11	285 pcs / ha	MBP + 3 kg of Bacell-M probiotic per 1 ton of feed

The area of each of the experimental ponds was about 70 hectares. The density of stocking in each pond was about 285 pcs / ha. The studied fish was in satisfactory condition, after the valuation, no signs of disease were recorded, the weight of carp corresponded to age norms on a traditional feeding diet [11]. Due to the fact that changes in environmental conditions were reflected in the intensity of fish nutrition, they were taken into account during feeding. The experimental period was 30 days [12].

The Bacell-M feed additive was developed by the employees of Biotechagro LLC in the Krasnodar Territory. It consists of the microbial mass of living bacteria Bacillus subtilis 945 (B-5225) in the amount of at least 1 × 108 CFU / g (colony forming units), Lactobacillus paracasei (B-2347) in the amount of at least 1 × 106 CFU / g, Enterococcus faecium M-3185 (B-3491) in the amount of at least 1 × 107 CFU / g, as well as additives - sunflower meal, or products processing of cereals or legumes (83.95%), fodder chalk (10%) [13]. It does not contain genetically modified components. The amount of harmful impurities is in the maximum permissible concentrations. The probiotic feed additive Bacell-M is a loose powder with inclusions of particles from light brown to dark brown color [14].

3. Results

The assessment of the exterior is carried out by visual analysis and measurements. During the visual analysis we assessed the fish as a whole: the nature of the scale covering, the presence of a shift in the rows of scales, the nature of the lateral line, etc. The assessment by measurements more accurately characterizes the physique.

Using measuring instruments, we measured the body length - from the top of the snout to the end of the scale covering; the length of the head - from the top of the snout to the end of the gill cover; the greatest body height – slightly from the beginning of the dorsal fin, in which the largest thickness and the largest girth of the body are measured. As measuring tools we used: a special ruler, a centimeter tape and caliper.

Based on these measurements, the indices (indicators of the exterior) are calculated: high-back, broad-back, girth index, etc.

As a result of the experiment, it was found that the addition of the studied feed additive to the diet of fish positively affected the exterior of carp. According to the data obtained (table 2), the coefficient of fatness of fish increased in the experimental groups relative to control group by 17.85 (P <0.05) and 25.00 (P <0.05), body height index - by 7.41 and 11, 10% (P <0.05), body thickness index by 16.28 (P <0.05) and 22.09% (P <0.01), girth index by 5.19 (P <0.05) b 6.92% (P <0.01).

Table 2: Carp Exterior Parameters, % (n=10)

Pond №	Fatness coefficient	Body height index	Body thickness index	Girth index
Control (P-0)	2,8±0,17	2,7±0,12	17,2±0,81	80,9±1,13
I experiment (P-1)	3,3±0,15*	2,9±0,09	20,0±0,73*	85,1±1,09*
II experiment (P-2)	3,5±0,22*	3,0±0,11*	21,0±0,98**	86,5±1,21**

The experiments showed that the probiotic additive “Bacell-M” has the greatest positive physiological effect in the amount of 3 kg per 1 ton of feed. At the same time, the fish showed maximum improvement in all exterior parameters.

Thus, in pond fish production, the Bacell-M probiotic additive should be used starting from the transition of larvae to exogenous nutrition and after fish wintering. The additive should be used constantly during the period of growth and development of carp, feeding 2-3 times a day, throughout the entire period of marketable fish farming. When changing the diet, transportation and other stressful situations, accompanied by a violation of the intestinal microflora, the frequency of feeding or the amount of the additive must be increased.

4. Discussion

In modern economic conditions, with an ever-increasing consumption of fish products, including river fish, fish farming in artificial conditions is of particular importance. In order to increase the efficiency of reproduction, increasing importance is attached to fish farming using intensive technology. Moreover, the most vulnerable stage is reared smolt production, which is most sensitive to various changes in the external and internal environment. The use of intensive technology allows significant regulation of the parameters of the external environment, but it almost completely limits the availability of natural food. Therefore, the development and improvement of artificial starter feeds that

satisfy the physiological needs of smolt fish from the moment of transition to exogenous nutrition is extremely urgent task [15].

Artificial diets, balanced according to the basic elements of nutrition, with all their effectiveness, do not fully satisfy the physiological needs of young and mature fish of different ages.

This is due to the fact that natural food contains a wider range of biologically active components that are the regulators of many metabolic processes in the body of fish.The introduction of artificial probiotics into artificial feed is of particular importance, when feeding fish with dry granular feed and when growing fish in conditions of compacted stockings, in which the number of certain antagonists of pathogenic microorganisms is reduced and there is a real danger of fish infection [16].

It was found that during artificial fish farming, the introduction of the Bacell-M probiotic into the diet has a significant growth-promoting effect.

5. Conclusion

In modern conditions of intensive fish farming, the natural food reserve occupies the insignificant place in the diet of fish or is absent. As a result, feeding the fish with artificial feed is becoming increasingly important. Productive qualities of fish are determined, first of all, by its species affiliation and genotype. However, the manifestation of the possible potential is directly dependent on the conditions of farming, feeding and maintenance, that is, conditions that ensure normal growth, development and high productivity.

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Conflict of Interest

The authors have no conflict of interest to declare.

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