Technological features of the cultivation of mirror and scaly carp

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Abstract. The article presents the technological features of growing specular and scaly carp. The physicochemical properties of the pond where carps are grown are studied, the microbiological parameters determined by the fish productivity of two-year-old carps, and the calculated percentage of carp survival are studied. The average weight of the special control group was 315 g, experimental - 311 g, the difference - 5 g (1,27%).

1. Introduction
Over 70% of freshwater fish that humans artificially breed belong to the cyprinid family. Unpretentious to the environment, omnivorous, a source of tender meat containing many vitamins - so briefly describe this type of fish. One of the main advantages in breeding and growing carp is its unpretentiousness: this heat-loving fish tolerates winter well, hibernating, low oxygen level and low water flow. Carp and food are not neglected: it obtains food for itself at all levels of the water layers of the reservoir - from the bottom to the surface, enjoying the insect larvae, slugs, tadpoles, algae and plants and others. This type of fish is also characterized by rapid growth, and an already one-year-old individual can reach a mass of 1 kg, so increasing the weight of carp is of current importance [1].

2. Materials and methods
We set a goal: to determine the technological features of the cultivation of mirror carp in pond fish farming. To achieve this goal, the following tasks were set and carried out: to study the physicochemical properties of the feeding pond; determine microbiological indicators of the feeding pond; determine the productive qualities of year-two-year-old carp; determine the percentage of fish survival.

Years of carp were purchased for the experiment: the first group, the control group, consisted of scaly carp; experienced - from the mirror. Scale carps were purchased in the amount of 600 specimens, specular - 800 with a sample of fish in both groups of 33 grams. In May-month, individuals were launched into the feeding pond of one of the fish farms of the Krasnodar Territory with an area of 0.5 hectares.
Carp fish at the age of one year was released into a pond prepared 2 weeks before its stocking. When releasing fish, the water temperature was +7 °C. Pond stocking was carried out in small batches from different parts of the coastal zone, which made it possible to disperse young individuals evenly across the reservoir.

The fish was fed 2 times a day: in the morning, when the sun had already risen in and warmed up the water at 10-00 a.m. and in the evening before sunset at 5:00 p.m. Carp was fed compound feed, according to the prescription for fish at the age of one year, presented by Sklyarov V A [2] in different age periods. The daily feed rate in the pond depended on the amount of feed eaten by the fish, the temperature of the water, and the average weight of the fish. The daily feeding rate was 5-10% of the total fish mass. The temperature regime of water was measured using a thermometer from the pier when lowering it to a water depth of 25 cm for 5 minutes. The transparency of the water was determined using Secchi disk. The presence of oxygen in water was determined optically using a phosphor. A universal indicator was used to determine the concentration of hydrogen ions (pH). Samples for taking for the presence of phytoplankton used a bathometric method. For studies on the presence and species composition of zooplankton, planktonic nets were used. To determine the growth rate of fish throughout the growing season, control fishing was carried out once a month in the same area in the early morning hours (at 5-6 o’clock in the morning) using a shutter net. After catching, the fish was placed in special containers with water or in plastic buckets.

The average mass of year-olds-two-year-olds was determined by weighing the caught fish and dividing the resulting mass by the number of copies. Carrying out control fishing allows you to timely identify fish diseases that may appear in the pond or determine the nature of nutrition to eliminate the lag in the growth of pond fish.

3. The study of the structure of the modified lead-tin-base bronze

Water is the main habitat of numerous systematic groups of fauna and flora of the earth. Data on the number of various organisms are necessary for a total assessment and their role in various ecosystem processes [3]. Without taking into account these data, it is impossible to achieve the objectives associated with increasing the biological productivity of water bodies, obtaining from them the greatest amount of biological raw materials. Hydro biological methods are also used to study the distribution of ichthyofauna. When researching fish, an ichthyologist must always pay attention to the environmental conditions under which one or another fish lives [4].

| Date       | Transparency, cm | Temperature, °C | pH   | Oxygen, mg / l |
|------------|------------------|------------------|------|----------------|
| 16th of May | 60,0             | 15,0             | 6,9  | 7,2            |
| 27th of June| 45,0             | 18,7             | 6,8  | 6,5            |
| July 23    | 120,0            | 27,0             | 7,1  | 4,7            |
| August 16  | 55,0             | 19,0             | 8,2  | 9,6            |

Analyzing the data of table 1, it can be seen that the most transparent water in the feeding pond was measured on July 23, 120,0 cm. The muddiest water was observed on May 27; this figure was 45 cm across the Secchi disk. The transparency of the water in the pond is influenced by meteorological conditions, fish activity, the development of phytoplankton and zooplankton in water, etc. The temperature regime in the ponds was quite favorable for growing yearlings of carp, as it is heat-loving fish [5]. When measuring the temperature of the water in the feeding pond, when measured in July-month, the highest temperature was observed and amounted to 27,0 °C. When determining the concentration of hydrogen ions, it is clear that on all days of sampling it (pH) was within the acceptable concentration. So, in May this indicator amounted to 6.9, in June – 6.8, in July – 7.1, in August – 8.2. The presence of oxygen in water was also normal. In the studied pond, the amount of oxygen was in the range of 4.7-9.6 mg / L. It was noted that the highest indicator of the presence of O2 was in the month of August.
A large complex of factors affects the composition and distribution of phytoplankton in individual reservoirs, and its change within a single reservoir. Of the physical factors, light conditions and water temperature are of paramount importance, and for deep-water bodies, the vertical stability of water masses [6].

Phytoplankton are microscopic organisms that freely soar in the water column and carry out photosynthesis. Diatoms and green protococcal algae mainly represent associations of rheophilic plankton. In the composition of limnophilic complexes, cyanobacteria are the most widespread causing bloom of water bodies [1].

| Date          | Phytoplankton, thousand cells / ml | Saprophytes, thousand cells / ml |
|---------------|-----------------------------------|----------------------------------|
| 16th of May   | 2.4                               | 1.1                              |
| 27th of June  | 4.6                               | 1.4                              |
| July 23       | 8.2                               | 2.4                              |
| August 16     | 9.5                               | 1.8                              |

The data in table 2 indicate that the largest amount of phytoplankton was determined in July and August. An indicator of 8.2 and 9.5 thousand cells / ml is considered optimal. But in May and June it is slightly lower – 2.4 and 4.6 thousand cells / ml of water. The number of saprophytes was also within the permissible concentration: 1.1-1.8 thousand cells / ml of water. Apparently, such indicators of the presence of microorganisms in the water due to the low stocking of the pond.

Studying the patterns of fish growth gives an idea of the degree of use of the food base. In general, it is the basis for breeding work, to establish the most economically favorable terms for growing fish [3]. A specific feature of fish growth is the prevalence of assimilation over dissimilation, due to which fish grows throughout life. The intensity of growth depends on the annual cyclicity of physiological processes and their regular change in connection with a change in lifestyle [5].

After the onset of puberty, the growth rate decreases, but the increase in body weight continues, and its maximum increase is observed at an older age. A significant part of the food consumed is spent on the formation of germ cells and the accumulation of reserve substances that ensure the maturation of the gonads, a successful wintering outcome, etc. [4]. Table 3 presents the indicators of weight growth of scaly and specular carps in the conditions of the feeding pond.

| Date             | Group                | Experienced to control, % |
|------------------|----------------------|---------------------------|
| 16th of May      | control 33           | -                         |
| 27th of June     | 260±0.0              | 95.3                      |
| July 23          | 315±0.01             | 98.7                      |
| August 16        | 860±0.04             | 105.0                     |
| September 26th   | 950±0.008            | 102.4                     |

The average live weight of yearlings of carp when landing on the feeding grounds of both specular and scaly was 33 g. By the control catch on June 27, this indicator slightly changed in favor of the control group by 12 ± 0.0 g (4.62%). Apparently, this was influenced by the fact that mirror carp is much more legible in food than scaly carp and prefers to eat shellfish [2]. A month later, by the next control fishing, the scaled carp also remained superior, albeit insignificantly. So, the average weight of individuals in the control group was 315 g, experimental - 311 g, the difference is only 5 g (1.27%). Individuals in the experimental groups in the hinge almost leveled.

According to many scientists [6], due to the insufficient number of blood cells, mirror carp needs well-aerated water, so they try to stay closer to the surface of the water, where the water temperature is
slightly warmer than at depth. Most likely, at this time of the year, the temperature regime affected the indicator of the specimen carp weighed.

By August-month, with control fishing and subsequent weighing, a clear superiority of the individuals of the experimental group over the individuals of the control was noticeable. So the mirror carp surpassed 48 grams (5.0%) in the weight of flake carp. In September, at the end of the growing season, the weight of flake carp was 950 g, and that of mirror fish was 973 g. I would also like to note that the feeding in the last 2 months of control fish rearing was changed from recipe No. 1 to recipe No. 2. In the formulation of compound feed No. 2, the components were changed: sunflower meal was 10% more, soybean meal - 12%, peas were excluded, wheat bran was added 1%. Apparently, such a compound feed recipe also favorably affected the growth of mirror carp.

For a more complete description of weight growth, weight gains were calculated. So, during the period from May 16 to June 27, there were no differences between the two groups - the daily increase was 5 g. Then, from June 28 to July 23, the average daily increase was only 2.0-2.3 g for both groups. From July 24 to August 16, there is a sharp jump in growth upward, which increased by almost 10 times and during the period amounted to 545 g in the control group and 597 in the experimental group. Further, from the end of August to the end of September, there was also a decrease in the increase in live weight of fish. Most likely, this is due to a change in the type of feeding, as well as an increase in water temperature, since carp is a thermophilic fish and this factor favorably affects its growth and development.

4. Conclusion
As it turned out, the fish grows unevenly, and in different periods, certain features characterize its growth. First, the nature of fish growth is different before and after puberty. As a rule, before puberty, fish grow most rapidly. The food they use is mainly for weight and mainly linear growth, i.e. is mainly producing.

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