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Growth and Technological Quality Indicators of Common Carp in Cages in the Fergana Valley of Uzbekistan

Esonaliyeva O. T.
Association "Uzbekbaliqsanoat" of the Republic of Uzbekistan

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Annotation: In Spring 2025, common carp (Cyprinus carpio) yearlings were stocked in three floating cages (1 m³ each) installed in the Karkidon Reservoir. The initial total weight of yearlings was 28.9 g on average. They were fed with on-farm-made feed with an estimated protein content of 35%. The feeding ratio was 1.5% of the fish biomass in May and September and 3% throughout the summer. The total catch was conducted on September 30. The fish grew to an average weight of 954 g. The technological quality indicators of commercial carp were analyzed. The indices of the head, carcass, and other organs as a percentage of the total body weight, as well as an organoleptic assessment, are presented. A positive correlation was found between the viscera and gonad weight indices and the total body weight, and a negative correlation between the head weight index and the total body weight of carp of the generation.

Keywords: Common carp, Cyprinus carpio, fish farming, floating cages, technological quality of fish, Uzbekistan.

Cage fish farming holds promise for the rational use of water resources in Uzbekistan. Cage fish farming does not require changes in the discharge regime, the reservoir irrigation phase has no noticeable effect on carp behavior in the cages (no signs of stress have been observed), and the fish actively feed. Currently, only common carp (Cyprinus carpio) is widely used for industrial cage fish farming in Uzbekistan's seasonal, sharply continental climate (Akromov et al., 2023). To date, carp as a species for cage farming in local conditions remains poorly studied. The aim of this study was to investigate carp growth in floating cages in the foothills of the Karkidon Reservoir in the Fergana Valley of Uzbekistan and to evaluate the commercial quality of the resulting carp.

Materials and Methodology

Cages (each 1 m^3) were installed in the Karkidon Reservoir. Three cages were stocked on April 22, 2025. Each cage contained 30 yearlings (the average individual weight of all carp was 28.9 g). The yearlings were brought from a pond hatchery. The fish were not fed for the first three days; this was the carp's adaptation period to the cages. Subsequently, throughout the season, the carp were fed pelleted feeds of their own production with an estimated protein content of 35%. Locally available ingredients were used to produce the feed: fishmeal, soybean meal, and wheat bran. The required quantities of ingredients were weighed, ground into flour, mixed, water was added to bring the mixture to a minced consistency, and then minced. The resulting pellets were dried and crumbled to form pellets, which were used for 5 days (since the fishmeal and soybean meal contained antioxidants, the feed quality did not deteriorate over this period). In May and September, when the water temperature was below 20°C, the feed ration comprised 1.5% of the total fish biomass in the cages. From late May to mid-September, when the water temperature was above 20°C, the feed ration comprised 3% of the total fish biomass in each cage. To determine fish weight, test catches were conducted every 10 days, during which 20 carp in each cage were individually weighed.

The final fish catch in the cages was conducted on September 25. All fish were caught, 15 individuals in each cage were weighed, and the fish were transferred to the fish farm operating in the reservoir (which also owns the experimental cages).

The commercial quality indicators of the fish were defined as the technological quality indicators of the fish as food products. Four randomly selected carp were measured for their total body length (TL, cm), standard body length (excluding tail) (SL, cm) with an accuracy of 1 mm, and total body weight (W, g) with an accuracy of 1 mg. Raw material quality was determined using generally accepted cutting methods (scale removal, gutting, decapitation, finning, and filleting). All specified organs were weighed with an accuracy of 0.1 mg on an electronic scale. Organ indices were determined relative to total body weight, and statistics for one variable for each index (%) were calculated (Chernysheva, Tsibizova, 2011; Tsibizova, 2012).

Results

During the partial growing season, the carp grew to a total body weight of 742–1250 g (an average of 954.0 g). It should be noted that the final cage harvest was conducted almost 1–1.5 months before the end of the carp growth period due to economic needs at the fish farm. During the final cage harvest, 27, 28, and 29 individuals were caught, representing a survival rate of 90%, 93%, and 97% for the season. This figure is higher than the standard for pond fish farming (approximately 80%).

Growth. According to our data, body weight gain averaged 701–1220 g (925.1 g). The growth rate of the fish during the experimental period was 4.49–7.81 g (5.93 g) per day. The average feed conversion factor was 1.86. These data exceed the average long-term data for carp in pond conditions, where the standard carp size is set at 0.5 kg of average individual total body weight.

Organoleptic assessment: the commercial carp specimens tested had a clean body surface, with a clearly visible, slightly golden color characteristic of carp. The scales were shiny, with the

aforementioned golden sheen, and adhered tightly to the body surface. The muscle tissue was dense and elastic; the resulting indentation quickly and completely recovered when pressed, was difficult to separate from the bones, and had a color characteristic of carp when cut. Gill cover movement was normal, and the gills were a good red color. The surface of all carp was covered with mucus. The eyes of the fish were light, convex, and undamaged. The odor was species-specific. There were no signs of disease.

The mass composition of commercial carp as a percentage of total body weight is shown in Table 1; the content of various organs is given in the indices. Since all the carp were immature, we included the mass of the gonads in the amount of waste.

742 – 1250 (average 954.0)

Table 1. Indicators of commercial quality of carp grown in a fattening pond fish farm in Tashkent region, Uzbekistan, 2024

Body Parts		Minimum – Maximum	Average
Total Body Length, cm		30,8 – 36,2	35,1
Total Body Weight, g		742,0 – 1250,0	954,0
Index, % of total body weight	Porky	72,5 – 81,1	76,9
	Carcass	45,4 – 59,6	54,1
	Tail	6,3 – 7,2	7,1
	Head	17,8 – 23,4	20,2
	Scale	2,4 – 3,0	2,9
	Innards	10,0 – 15,5	14,5
	Fins	2,5 – 3,0	2,6
	Bones	9,0 – 11,9	10,5
	Skin	3,8 – 5,0	4,7
Waste, %		47,8 – 53,3	50,5
Minced meat (fillet) yield, %		31,0 – 38,0	36,9

Discussion

In Uzbekistan, a significant advantage of industrial fish farming is the opportunity to develop methods for improving the rational use of water resources. Until now, the primary aquaculture technology has been pond fish farming, which is a water user (water from surface runoff must be added to ponds throughout the growing season), although the water quality in this technology is not changed and is returned to surface runoff at the end of the season. Cage fish farming, on the other hand, creates a completely supplementary function in existing reservoirs without changing the qualitative and quantitative use of water for primary functions. (Kamilov et al., 2003).

The main objective of the experiment, conducted throughout the growing season, was to determine the feasibility of cultivating high-quality commercial products. For carp, the standard weight is 500 g. In our experiment, all fish significantly exceeded this figure in the incomplete growing season. Moreover, by the end of September, fish productivity in cages reached 24.3–30.1 (26.2) kg/m3 (in pond fish farming, carp productivity is 200–1000 kg/ha or 0.01–0.1 kg/m3) (Kamilov et al., 2003). Thus, cage farming of commercial carp has high potential even in the conditions of a small foothill reservoir like the Karkidon Reservoir.

Technological quality of fish depends on the species, age, and size of the fish. Our sample included same-age fish (1+) from the same generation, reared in cages. During the planned economy, the standard for commercial carp was considered to be fish with a total weight of 250 g or more after two years of fattening in Fish Farming Zone VII, which includes Uzbekistan. By all indicators, carp in cages in the Fergana Valley is a high-quality raw material.

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