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CONTENT

FOREST ECOLOGY

PHYSIOLOGY OF ANIMALS

WAYS TO IMPROVE COMMODITY FISH PRODUCTION

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Abstract

In this study, the main task was to investigate the technology of growing commercial fish and to design a more efficient technology for feeding and growing commercial fish in PE "Friendship of Peoples".

In fact, the unit cost of production amounted to 17.94 hryvnia, the selling price of 22 hryvnia. Profits are 74,700 hryvnias. The level of profitability is 23%. According to the project, the cost will be 22.49 hryvnias, which is 4.55 hryvnias. higher than the actual. The selling price will be from 30 hryvnias and above, it is slightly higher than the actual price - this is due to the increased final weight and quantity of carp. The profit will be 223,000 hryvnias, the level of profitability is 33%.

Keywords: marketable fish, carp, silver carp, pike, fertility, feeding, cost, profitability.

Topicality. Providing the population with physiologically complete nutrition is associated with the need to increase fish production. In this regard, a certain interest is a specific branch of animal husbandry - fish farming, from which you can get high quality protein, which along with high nutritional value has indispensable dietary properties. The fishery program is focused on the priority solution of feed production problems,

improvement of fish farming in ponds, on warm waters, in adapted reservoirs, small reservoirs, optimization of food fishery production.

Particular attention in the implementation of these measures will be paid to environmental protection, the creation of resource-saving and waste-free fish farming technologies.

In the near future, in order to optimize human nutrition, it is advisable to increase fish consumption to 22 kg per capita per year. However, the production of pond fish, the main source of live and chilled fish products, remains low and is 5-7 kg per capita, which hinders the qualitative improvement of the structure of the fish diet.

The construction of fish farms, fish farming in reservoirs created for other needs, by combining interests allow for rational and comprehensive use of water resources, accelerating the return on costs for the construction of artificial reservoirs.

The creation of large high-intensity fish farms in the immediate vicinity of industrial centers and cities, industrial shops on the basis of enterprises brings the production of live fish closer to consumption, reduces transport costs, allows to maintain high taste and dietary quality.

The share of private enterprises in the total catch of marketable fish was 38-40%, fish productivity of agricultural ponds was 2.7 times higher, the cost of marketable fish - lower by 30.8%, compared to other farms more efficient use of planting material, feed and other resources.

In order to more effectively solve the problem of rational fishery use of reservoirs, it is necessary to create small private enterprises that would specialize in the cultivation of commercial fish and other aquaculture facilities. After all, agricultural reservoirs are significantly different in nature from the special fish ponds of fish farms, which complicates their fishery development. Technologically, they are closely related to the organization of small-scale irrigation, the use of water for firefighting, watering livestock.

Analysis of recent research and publications. Fish farming originated before our era in the ancient civilizations of China and Rome. The book on Chinese fish farming provides data on the basis of which it is possible to make certain ideas about the methods of fish farming and breeding sites of marine and freshwater fish. The most typical way of fish farming was to catch fertilized eggs, free embryos and larvae. In the Roman Empire, fish farming reached a high level of development. Wealthy patricians built not only tanks for storing live fish, but also large reservoirs - sandpits with sea water for fattening and growing fish [3].

The decline of ancient civilizations had a negative effect on fish farming, and it was not until the Middle Ages that artificial fish ponds began to be built due to the growing urban population and the need to increase food production. In a number of Western European countries from the second half of the fourteenth century. Began to build descent ponds, where they practiced growing crucian carp, tench, carp [2].

French abbot Dom Penshon in the XV century. artificially bred valuable species of fish that did not breed naturally in artificial reservoirs. He created a kind of incubation chamber, in which he laid the eggs after pretreatment. This method of fish breeding was a huge step in the development of fish farming.

At the turn of the eighteenth century. fish farming began to decline due to significant advances in agricultural production, as a result of declining demand and prices for fish. Primitive production technology and low marketability of pond fish, improper construction of ponds often led to waterlogging of the surrounding areas, the destruction of dams. They were lowered and the fields were plowed and turned into agricultural lands.

Carl Friedrich Lund in the XVIII used artificial spawning environments. Wooden boxes with holes in the bottom of which I put spruce branches. They were installed in shallow water, which is well heated, and there landed the broodstock of lithophilous fish species. After spawning, the brood was removed and the eggs were incubated on artificially created substrates. Millions of young people were obtained, which were used not only for stocking maternal reservoirs, but also for acclimatization. Due to the primitiveness of the methods were not widespread [9].

Fish farmer - practitioner Stefan Ludwig Jacobi studied the biology of fish reproduction, and searched for ways of artificial reproduction. He developed the design of the incubator and the technology of reproduction, which are still relevant today. But due to the low efficiency of insemination (10 - 25%) the practical application of the method was difficult [9].

In the middle of the XIX century. Vrasky VP the Russian (dry) method of insemination of caviar, feeding and differentiation of young was created, original works on hybridization of fish were performed.

Ovsyanikov RV for the first time in the world practice he performed successful experiments on artificial insemination of sterlet caviar. Arnold MM expressed his opinion on the feasibility of using polyculture in pond fish farming and justified the use of phosphorus fertilizers to increase the productivity of ponds. Derzhavin AM developed a method of degreasing sturgeon caviar, developed an ecological method of stimulating the maturation of sexual products [9].

In 1930, the Institute of Fisheries was established in Ukraine. In the 50's, under the leadership of Kuzioma OI, the first breed of carp was created on the basis of Antonivsko-Zozulynets fish farm in Khmelnytsky region, it was the only one until 1985.

Natural forage base of ponds. Phytoplankton of fish ponds is represented by a set of algae of different systematic divisions, including: blue-green - Cyanophyta, euglenoid - Euglenophyta, dinophytic - Dinophyta, diatomaceous - Bacillariophyta, green - Chlorophyta, yellow-green - Citophyta - Xantophyta , raffidophytic - Raphydophyta and choral - Charophyta. There are unicellular, multicellular, colonial algae. In most of them, the cell is covered with a shell, has a cytoplasm, nucleus, chromatophores, gas vacuoles and various inclusions - starch grains, fat droplets, etc. [2,14].

The cell membrane of algae is cellulose, pectin or cellulose-pectin origin. In algae, mineralization, cutinization and mucosa of the cell membrane are common. Mineralization is the impregnation of the shell with salts of iron, calcium or silicon - in diatoms, dinophytes, and some chrysomonads. Mucus is formed by changing the outer layer of the shell or cytoplasm and is excreted through special pores and protects the cell from mechanical damage, drying, reduces the proportion of planktonic forms, helps to attach to the substrate.

The lower forms of amoeboid and flagellar algae are covered with the body layer of the cytoplasm - the periplast, have contractile vacuoles, eye and flagella. Periplast can be smooth or structured with different growths - bumps, rollers, warts, etc.

The cytoplasm is concentrated mainly in the parietal area, the middle of the cell is occupied by the vacuole. Lower algae have one or more contractile vacuoles that perform osmoregulatory and excretory functions.

Most algae have a single nucleus, but there are also multinucleated. Blue-green algae do not have a nucleus, which brings them closer to bacteria, they are also called cyanobacteria.

Autotrophic nutrition of algae is possible only in the presence of pigments - chlorophyll, carotene, xanthophyll, phycoerythrin, phycocyanin. Pigments color the cells in the appropriate color, and the color of the water in the reservoir depends on the predominant development of a particular group. Carriers of pigments in algae cells are chromatophores (they are absent only in blue-green). The pigments are located in front of the periplast. The shape of chromatophores and their placement in cells are systematic signs of algae. There are lamellar, ribbon-shaped, star-shaped, mesh-like, quarter-shaped, granular chromatophores. The chromatophores contain pyrenoids - protein bodies [3].

In lower representatives of algae (flagellates) throughout life, and in higher representatives - only at certain stages of development (zoospores, gametes) cells have organs of movement - flagella. Products of photosynthesis of algae - starch, leukosin, glucose, fat are deposited in different parts of the cell - directly in the chromatophores or around the pyrenoids.

Algae reproduce vegetatively, sexually and asexually. Vegetative reproduction - the direct formation of their own kind - is very common in algae. The following forms of vegetative reproduction are characteristic: 1) simple division of cells in two; 2) re-division; 3) budding (Cladophora and filamentous); 4) the formation of special vegetative bodies - hormonal hormones, nodules (in bent from green), etc. Asexual reproduction occurs through spores.

Zooplankton are invertebrates that are in the water in a suspended state, have organs of movement. The length of organisms ranges from 40 μm to 10 mm and more. The body of zooplankton organisms contains a large amount of water - an average of 80-85%. In addition to water, they contain various inclusions - gas, fat, etc., and the body itself can be enveloped in a mucous membrane.

Zooplankton organisms, depending on the nature of the life cycle are divided into two main groups: holoplankton (from the Greek golos - permanent) - the entire period of active life takes place in the water column and only at rest (eggs, buds, spores) - at the bottom and meroplankton (with gr. meros - part) - live in the water column only at certain stages of their development (pelagic larvae of benthic animals, etc.).

The composition of freshwater zooplankton includes 4 main groups: the simplest - Protozoa, rotifers - Rotatoria and crustaceans: otters - Copepoda and branched - Cludocera.

The simplest - Protozoa

Small, unicellular organisms of various shapes, the vital activity of which is provided by specialized organelles located in the protoplasm. The surface of the protoplasm is compacted and forms a film, or a real shell - the cuticle. Body size from 2 - 5 to 50 - 200 microns. Temperature range of life - 4 - 30 ° C, undemanding to the content of dissolved oxygen in water. Known forms that can live in oxygen-free ecotopes of reservoirs, where the content of carbon dioxide and methane, due to the presence in the cytoplasm of methane digestible bacteria that neutralize the toxic effects of methane. Reproduction is a simple division, depending on water temperature and food availability. Under adverse conditions, the protozoa form stable stages - cysts. The protozoa are an integral part of the feed of fish larvae during their transition to exogenous nutrition and many lower crustaceans, and are also objects of cultivation and biotesting [13].

Rotifers - Rotifera (Rotatoria)

Rotifers belong to the type of round June or primary cavity (Nemathelminthes), class Rotifera. there are more than 1.5 thousand species, body sizes from 0.1 to 3 mm, freshwater inhabitants, there are marine representatives, as well as species that inhabit moist moss and moist soil. In reservoirs lead mainly planktonic way of life and in appearance resemble the larva of worms or mollusks - trochophore. The body of rotifers is transparent, in some it is covered with armor, divided into head, torso, leg. The front of the head has the form of a disk, the edges of which are surrounded by a corolla of lashes. The disk covers the upper part of the main compartment and performs the function of movement and capture of food. There is also a proboscis, a dorsal protrusion, through transparent covers look through eye (rib cerebral) spots. The rotifers form the digestive system, which consists of the oral cavity, the masticatory stomach (mastax - has two pairs of jaws - an anvil and a hammer), esophagus, saccular digestive stomach, intestines and cloaca, which open laterally in the leg. On the abdominal side of the head is the mouth and behind it - the second corolla of slightly shorter lashes. Pre-oral and post-oral corollas form a rotating apparatus characteristic of rotifers (hence the name - rotifers). Organs of allocation of protonephridial type. The posterior ends of both glandular ducts flow into the bladder, the sensory organs are the tentacles and setae. It has no respiratory or circulatory system [14].

Branched crustaceans - Cladocera

Small planktonic animals with a body size of 0.25 to 10.0 mm. The body is not clearly segmented, but

there are main, thoracic and abdominal (abdominal) sections, ie they have a head, torso and postabdomen, which forms a cauda. The body is covered with a shell, in some species the shell is only on the dorsal side. The anterior edge of the main shell is often elongated in the form of a beak and forms a rostrum. There are 4-6 pairs of pectoral glabrous leaf-shaped limbs, which are armed with bristles. In front of the head there is a pair of short antennae - antennae. At the base of the head on the sides is a second pair of antennas that act as organs of movement.

Each limb consists of inner (endopodit) and outer (exopodit) joints. At the base of each limb is the appendix enditis (gill plate, which is involved in respiration). Breathing occurs through the gill appendages of the thoracic legs, in some - the back of the intestine (intestinal respiration) or the surface of the body. The main limbs have paired jaws - mandibles and maxillae. The mouth is covered by the upper lip. From the mouth there is a small esophagus, then - the midgut, which sometimes forms loops (1-2), followed by the hindgut with a hole in the back of the cauda. At the end of the moving cauda there is a pair of claws. On the dorsal side of the cauda there are a pair of large bristles, sometimes they are reduced. The edge of the anus has a number of teeth and serves as a systematic feature. In the place of continuation of a cauda in internals there are hepatic processes. In crustaceans on the dorsal side of the chest.

Characteristics of the main objects of fish farming and their biological features. Carp (Cyprinus carpio L.) is the most common valuable freshwater commercial fish that grows quickly and is very fertile. Carp meat has good taste, contains about 16% protein and 15% fat. Dishes made from this fish have a high caloric content, assimilation and a pleasant appearance. Carp is not very demanding on environmental conditions. It requires warm water 22 - 25 ° C, and 5 - 7 mg / l of oxygen. Under optimal conditions, its increase can be at least 5 - 7 grams per day [17].

Carp eat a variety of foods, from small crustaceans (daphnia, cyclops and their larvae) to larvae of mosquitoes, other insects, worms and other organisms. In addition to natural food, it absorbs artificial feeds well (compound feed, grain and other feeds), especially if the pond has favorable temperature and oxygen regimes.

Inhabits rivers, floodplains, lakes, ponds. Lives about 20 years, reaching a weight of more than 30 kilograms. The shape of the body is flattened on the sides, the mouth is retractable.

Fig. 1 Photo of scaly, frequent and naked carp frames

Inhabits rivers, floodplains, lakes, ponds. Lives about 20 years, reaching a weight of more than 30 kilograms. The shape of the body is flattened on the sides, the mouth is retractable.

Females reach sexual maturity at the age of 4 - 5 years, males a year earlier. Spawning in carp is one-time, spawning on soft young vegetation (phytophilous), so you need to have special spawning rates for breeding. Spawning takes place at a water temperature of not less than 17 - 18 ° C, in quiet, sunny, windless weather. The female lays about 180 thousand eggs per kilogram of weight, fertility of about 700 - 800 thousand eggs. 1 female and 2 males are nested on natural spawning [9].

Under normal conditions, the larvae hatch in 3 - 5 days, the larva in 3 - 5 days turns into a fry.

From one female you can get several hundred thousand fry, which of course depends on environmental conditions. The standard weight of this year should be at least 25 - 30 grams. The weight of commercial fish (two-year-old) should be at least 450 - 500 grams [1].

On a scaly cover of carp divide into scaly, mirror, naked, frame. There are hybrid forms of carp with Amur carp, these forms grow well in the first years of life, overwinter well, resistant to infectious diseases.

Silver carp is a herbivorous fish. Reaches a weight of 16 kg or more and a length of 1 meter. The scales on

the body of the fish are small, in the lateral line 110 - 124 scales, single-row teeth. In males on the rays of the pectoral fins on the inside of the horn teeth on the second and third rays. On the abdomen, from the throat to the anus stretches a sharp keel. A characteristic feature - the eyes are very low. The intestine is adapted to the digestion of low-calorie food - algae, its length is 10 - 13 times greater than the length of the body [7].

They reach sexual maturity at the age of 5 years. Fertility of females 5 - 7 years of age reaches 500 thousand eggs, and especially large females 1 - 2 million eggs. Spawning takes place on rivers in summer on the rapids. The caviar is small - 1 - 1.2 mm, and after swelling increases to 5 mm. The development of caviar at a water temperature of +21 - 25 ° C is 23 - 33 hours, at a temperature of +27 - 29 ° C - 17 - 19 hours.

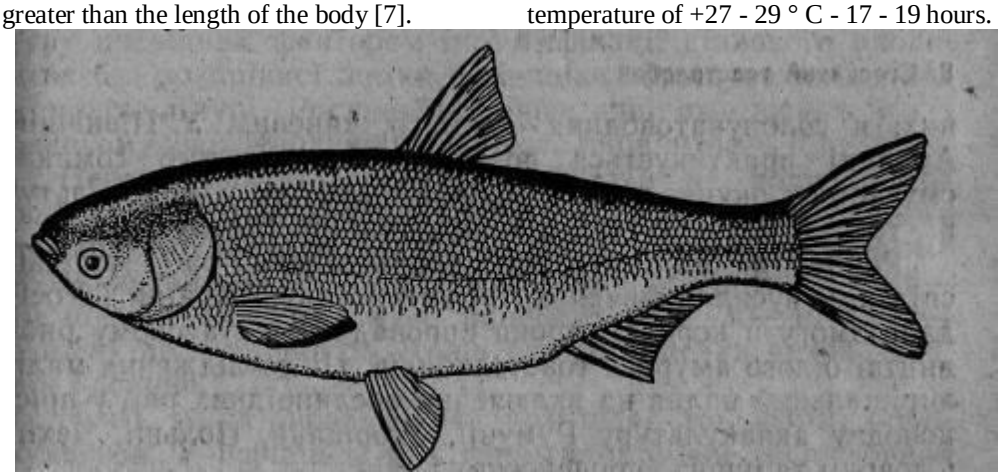

Fig. 2 Silver carp

In the conditions of Ukraine, young silver carp are obtained in incubators. In ponds silver carp grows quickly. Yearlings reach a weight of 15-30 g, two-year-olds - 200-700 g, three-year-olds - 1500-2000 g, four-year-olds - 3 kg, five-year-olds - 4 kg [5].

The silver carp differs from its relative the white silver carp by a darker color and dark spots on the sides, a larger head, and a small keel on the abdomen. Stamens on the gills are long, thick, but not fused together, their number is 200 - 270 to 8 - 10 per 1 mm brackets. The pectoral fins are long, their edge goes behind the abdominal fins. The relative length of the intestine is less than that of the white silver carp [9].

It reaches sexual maturity in China at the age of 3 - 4 years, in the south of Ukraine - at 5 - 6 years, in reservoirs of Dagestan - at 5 - 6 years, Krasnodar Territory - 5 - 7 years. Males mature a year earlier than females. Fertility reaches up to 2 million eggs, and an average of 500 thousand eggs. The eggs are yellowish-green, 1.7 mm in diameter, after swelling - 4.7 mm. The incubation period is about 40 hours at a temperature of + 28 ° C. The larvae feed on small zooplankton. Grows faster than white silver carp, reaches 1.5 kg at the age of two. In reservoirs - coolers of power plants it reaches weight to 45 kg and more, an annual gain of 2 - 3 kg. In Ukraine, young people are received in incubators.

Common pike is a carnivorous heat-loving freshwater fish. Prefers slow-flowing watercourses, river bays and lake-type floodplains. Reaches sexual maturity in the third or fourth year of life [2].

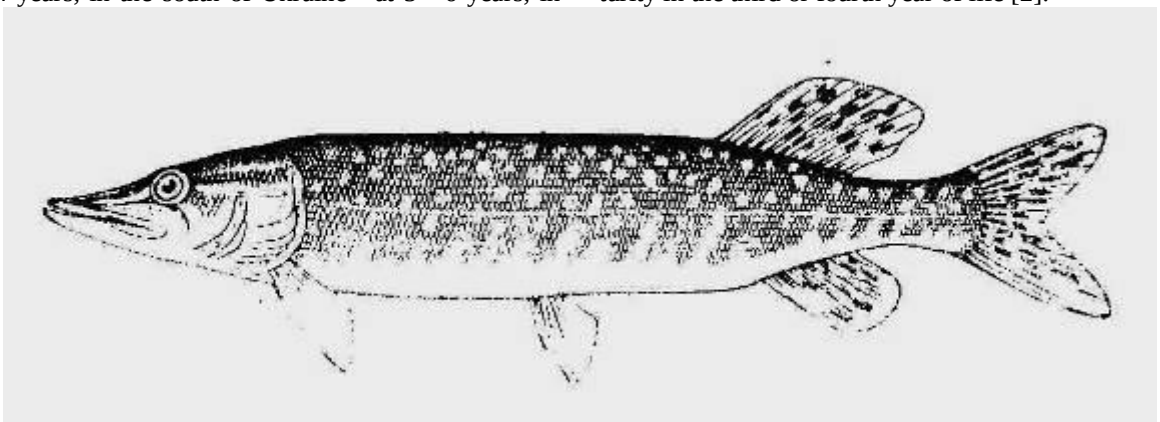

Fig. 3 Common pike

Pike grow quickly, especially in the first years of life before puberty. In lakes and rivers, yearlings weighing up to 100 g, biennials weighing up to 1 g, and three-year-olds weighing up to 1.5–2 kg are often found.

The value of pike as an object of pond culture lies not only in the fact that it produces good meat, but also in the fact that it, as a biological reclamation, increases fish productivity on carp, crucian carp and other fish that are bred by destroying their competitors. in nutrition. The resulting gain is often higher than the growth of the pike itself. The pike spawns in early spring at a temperature of 3–6 ° C, and lays its eggs on last year's dead vegetation. Fertility varies considerably from 17.5 to 215 thousand eggs, depending on the weight of the fish [2].

Cannibalism is observed among pike (larger individuals eat smaller ones). In carp ponds, pike can kill fry, as well as small carp. In the feeding ponds, which have small non-industrial, garbage fish, carp pike fry are planted until the year of the carp. Such ponds must be completely drained so that all pike can be caught in the autumn.

Ukrainian carp breeds. Ukrainian carp breeds were created in the 50s of the last century on the basis of the state Antoninsky-Zozulinetsky fish farm of Khmelnytsky region, under the direction of breeder Kuzyoma AI [17].

Ukrainian breeds are divided into tall (index - 1.2-2.6) and broad-bodied (index - 2.6-3). Depending on the scaly cover on scaly and scaly.

Their creation was based on local populations of Antonin's carp, which is a cross between aboriginal scaly carp and Galician mirrored carp, preserved in the ponds of Count Potocki. Created by purposeful selection work, as well as the creation of favorable growing conditions, new herds of framed and scaly carp were formed, the heredity of which is - 50% of the genes of aboriginal scaly and 50% - mirror Galician carp. Breeds were created by mass selection.

Work on the creation of the first Ukrainian breeds began in 1930, and in 1956 passed state approbation and were approved as breeds.

Ukrainian scaly breed - was created as a walking, mass selection, makes good use of natural feed base, created for extensive technology of fish farming. Characteristic features are heat-loving, fertility, high growth rate. In the first year of life in industrial cultivation peers reach a weight of 25 - 30 grams, biennials 300 - 450 grams. At breeding peers reach 50 - 80 grams, and two-year-olds 700 - 1500 grams.

Ukrainian scaly carp resembles Dnieper carp in location and size, but has a lighter color. Ukrainian scaly carp has a high search ability and grows quickly in foraging. Compared to the Ukrainian framed, it is better adapted to large reservoirs, especially with extensive management [2].

The uterus at the age of 5 is transferred from repair to a herd of broodstock, weighing 4.5 - 6 kg and more. In the first year receive up to 800 grams of caviar, or 600 - 650 thousand eggs. In the factory, you can get about 500 thousand larvae from them. Fertility of Ukrainian scaly carp during natural spawning averages 111 thousand 6-7-day-old young, some females give up to 300 thousand and more. The yield of this year from growing ponds - 65-70%. It is used in the forest zone and in the forest-steppe [8].

The Ukrainian scaly breed exceeded the Galician carp by 17% in terms of growth rate, 24% in terms of foraging yield, and 46% in terms of total fish productivity.

Ukrainian frame breed - bred by mass selection from the mirror Galician carp, in the same fish farm. Among the few scaly, this breed is the most productive. It was created as a feeder for intensive fish farming technology, less mobile, calmer, lazy to search for food. A characteristic feature is the outer frame of the contour with a large mirror scale. Refers to the most tall carp, almost inferior in productivity to scaly. It is used mainly in the southern regions [9].

The Ukrainian frame breed exceeded the Galician carp by 15% in terms of growth rate, 11% in terms of foraging yield, and 22% or more in terms of feed payment.

The creation of intra-breed types, differentiated by hereditary traits and the level of heterogeneity, opened the possibility of periodic, planned "refreshment of the blood" of breeding herds, without resorting to other imported breeds. This allowed not only to maintain the breed shift, but also to significantly improve it.

At the present stage, the Ukrainian frame breed of carp is differentiated into Antoninsko-Zozulenetsky, Nesvitsky and Lubinsky, and the Ukrainian scaly - into Antoninsky-Zozulenetsky, Nesvitsky, Nyvkivsky and Lyubinsky breed types are given in table. 1

Table 1

Structural ratio of breed types

Breed type	Interest
Antoninsko-Zuzulinetsky	45
Nesvichensky	15
Nyvkivsky	20
Lubinsky	20

The Nesvichensky breed type was created in the 50s and 80s with the use of a complex reproductive crossing of the mirror Galician (broad-line) carp with the Ukrainian one on the basis of the fish farm “Nesvich” of the Volyn fish factory. Presented in two forms framed and scaly. Their heredity consists of 75% of mirror Galician and 25% of scaly carp of aboriginal origin. In terms of productivity, these carp exceeded the original forms by 10% or more. Distributed in the western region [11].

Nyvkiv breed type was created for the central regions of Ukraine. The method of introductory crossing on the basis of Ukrainian scaly and Ropshin carp imported from Russia was used in the creation. When using this method of crossing, not only were the breed and productive properties preserved, but they were also expanded.

In their heredity from mirror Galician carp 43.75%, aboriginal scaly 37.5%, Amur carp 18.75%. Solid scaly cover, single cycloid scales form regular rows in the transverse and longitudinal directions, the color is lighter than in the original forms, more mobile (a sign of Ropshin carp) [15].

Carp of the Nyvkiv breed type are more cold-resistant, which makes it possible to spawn at lower temperatures, as a result of obtaining offspring earlier. This trait is well inherited. Embryos more easily tolerate sharp fluctuations in water temperature, this year at low temperatures they consume better food than local Ukrainian scaly carp.

The weight of this year is 25% higher, two years 7%, in combination with greater viability provides greater productivity by 20 and 10%, respectively.

The Lublin breed type has two types - scaly and framed. Work on the creation has been carried out since 1963 by the method of complex reproductive crossing. The original forms were scaly and framed carp - breeders of improved breeding herds of Gorodok and Nesvich origin, and males of Ropshin breed group. As a result of long selection work, highly productive herds of carp were obtained, the genotype of which contains 51.36% of the heredity of the Galician carp, 34.37% of the scaly Galician carp and 14.6% of the Amur carp [3].

This breed type has increased cold resistance, high growth rates and viability, as a result, fish productivity has increased by 20%, especially in growing ponds.

The zoning of Ukrainian carp breeds is carried out on the basis of existing breed types, which to one degree or another are better adapted to the respective region of Ukraine. Carp of Ukrainian breeds (Antoninsky-Zozulenets), as more heat-loving forms, are zoned mainly in the fourth, fifth and sixth zones of fish farming. Carp of the Nesvizh breed type occupy separate areas of the third zone, and Nykiv and Lyuben carp are bred in the northern regions of the fourth and third fish farming zones.

Technology of production of commodity biennials of carp. The technology of production of commercial biennials of carp consists of the following processes: the passage of spring floods, repair of hydro structures, filling ponds with water, stocking ponds, care for ponds and fish during the growing season, fishing and its implementation [8].

In camped ponds, where the filling of ponds with water is regulated by the farm, preparatory work on the lodge begins in the fall. After the catch, the main canal is cleared to better dry the soil. If saucers, pits, wet places remain on the bed, they are treated with ammonia water and lime. If green manure was used, vegetation remains were removed, forage areas were cleared and limed. If the soil dries out so that the tractor can pass, it is desirable to cultivate certain areas with a cultivator or heavy harrows, sow the coastal zone with winter crops. On the marshy bed reclamation works are performed after freezing and compaction of the soil [12].

Emergency materials are prepared in advance in winter: straw, manure, sand, boards, bags, which are brought to the dams, especially in potentially dangerous places. Even before the snow begins to melt, they start cleaning the spillways and drains, observe the melting of snow and the inflow of water. If longitudinal cracks are detected, a trench 1 m wide 15 - 20 cm deeper than the depth of the crack is dug along them, it is filled with loam and carefully compacted. Thus, the preparatory work for the cultivation of commercial fish is reduced to the preparation of the bed of the feeding pond, proper operation and timely repair of hydraulic structures, filling the pond with water in the optimal time necessarily through various filters [6].

There should be water meters on the drains to control the water level. After the passage of the bulk of the water pond is filled to the required level.

After filling the ponds with water, dams and drains can be damaged, so they need to be checked and repaired [19].

A prerequisite for high efficiency of fish farming is the full use of the growing season. This means that the ponds should be stocked as early as possible in the shortest possible time, at a positive temperature. Proper, well-organized stocking of ponds determines high rates of fish farming throughout the season. The usual stocking of feeding ponds is carried out in late March - April for 8 - 10 days. In some farms, autumn or combined stocking is used (partly in autumn and then re-stocking in spring). Before planting in the ponds, all fish planting material undergoes preventive treatment. This is important for farms with dependent water supply to ponds. Fish planting material is usually transported in tarpaulin vats on cars and tractors with a trailer. When releasing fish into ponds, a precautionary measure is used to reduce its injuries: special portable trays are arranged; release the fish through tarpaulin sleeves or polyethylene pipes on the windward side so that the wave does not hit it. It is also important to prevent temperature shock by equating the temperature in the fish container with the temperature of the water in the pond. After stocking, a stocking certificate is drawn up, which indicates the number of fish, its average weight and the condition and weather conditions during stocking [6].

The stocking density of fish is determined by the number of fish planted per 1 ha of pond area. It varies depending on the form of management in a wide range - from 1 to 10 thousand units / ha and more. High planting density, as well as low, reduces the efficiency of fish farming. The allowable level of stocking density is determined based on the plan of fish production, the availability of feed, fertilizers, ponds, the possibility of obtaining the required amount of fish planting material, taking into account regulatory indicators in the cultivation of commercial fish [4].

Feeding ponds should be stocked with quality yearlings with an average weight of 25-30g. This is of great importance for compacted plantings, as small fish planting material does not reach the commodity standard weight of 0.4-0.5 kg, reduces fish productivity, yield, increases feed consumption per unit of growth, as well as the consumption of annuals per 1 quintal of grown products.

After stocking the ponds, fish, water exchange, hydrochemical and gas regimes are observed [6].

The oxygen content during cultivation should be 5-6 mg / liter. When the oxygen content decreases, the flow rate is increased or artificial water aeration is organized. The optimum water temperature is + 20-26 ° C.

During the same period, monitor the growth of fish every 10-15 days. Check the health of the fish. The growth of fish in different months depends on weather conditions and the development of the feed base [13].

During the growing season, the following measures are taken: mow the coarse vegetation, reduce the thickets of soft underwater vegetation, make fertilizers as needed, lime if the water blooms.

Cultivation stops in September when the water temperature drops to 10-12 ° C. During this period, begin preparations for the capture of feeding ponds.

Catching ponds is one of the most labor-intensive processes. Terms of catching fish are determined depending on climatic conditions, economic needs. The dependence of fish farming on weather conditions leads to the need to catch fish in the shortest possible time. Farms with a low level of mechanization and organization of work, which are forced to start fishing at active temperatures (in August) and finish only in November, are at a disadvantage. For the correct organization of a catch make schedules, complete fish-breeding crews, prepare for descent of a pond and fish-breeding stock (seines, delusions, stretchers, baskets, podsaky, containers for transportation, scales, vehicles). Preparatory work should be completed 10-15 days before the start of the catch [5].

Preparations for fishing are carried out in the second half of September. Prepare tools for fishing depending on the method of catching the pond. In some fish are caught with seines, drags, nets, in others with the help of fish catchers (which is the most effective). The principle of such catching is slow release of water. Water is drained from the ponds gradually, replacing the shields with bars, which are regularly cleaned of debris, the fish for water enters the drain pipe and then into the channel behind the dam, where it is caught [8].

Feeding biennial carp. Increasing the production of carp is possible only with the intensification, the main elements of which are feed and feeding. As practice confirms, the cultivation of commercial biennials of carp weighing 400-450 g in ponds at high planting densities without intensive feeding is almost impossible. With the increase in the density of fish per unit area of water area is quickly eaten away by the natural feed base, the lack of which must be compensated by feeding complete feed or feed. The amount of feed replenishment will depend on the amount in the ponds of natural food and the density of fish per unit area [5].

When the planting density increases, the weight gain decreases due to the natural fodder base, and when the planting density exceeds 10 thousand units / ha, artificial fodder should reach 100% of the daily ration [2].

The growing season of commercial carp can be divided into two feeding periods. The first period begins immediately after stocking of feeding ponds, lasts until mid-July and is accompanied by active consumption of fish during the first 40 - 50 days of natural feed base before its almost complete consumption. During this period, it is recommended to feed compound feed with a protein content of at least 23%. The feeding regime envisages feeding the feed only 2-3 times during the first week, after which the fish is transferred to daily feeding with 1–3 feed distribution. This feeding regime in the first period is explained by the fact that in the spring, after winter, the level of reserve nutrients in the body of peer carp is quite low, their body is weakened, which reduces the efficiency of finding natural food, the level of development of which is also quite low. In the absence of natural food during this period, feeding fish with high-protein feed is crucial, provides renewal and intensive accumulation of reserve nutrients, stimulates the body's intake of vitamins, which has a positive effect on fish growth. At favorable water temperatures (not lower than 14–15 ° C), the concentration of dissolved oxygen in water is not lower than 4 mg / l, with normalized feeding of high-protein feeds two-year-old carp can reach a weight of 250 - 300 g by mid-July [7].

When growing commercial carp with a high planting density, you need to use feed or feed mixtures with a protein content of at least 23%. They are produced in feed mills or directly on fisheries.

This distribution is suitable for reservoirs whose water quality parameters meet industry standards. In fish farms of Ukraine, the maximum amount of feed is fed at a water temperature of 25-27 ° C.

The recommended distribution of feed by month is given in table. 2

Table 2

Approximate distribution of feed by months

Month	Percentage by weight
May	7
June	22
July	32
August	35
September	4

With a further increase in water temperature, the feeding rate is slightly reduced to prevent deterioration of the oxygen regime and overuse of feed for weight gain of fish. At a water temperature of 30 ° C and above, it is advisable to temporarily stop or reduce the daily norm by 80 - 90%. On average, during the growing season, the daily feeding rate of two-year-old carp should be 5.5-6% of fish weight. Adjusting the feeding of commercial carp, represented by two-year-olds with body weight within industry standards, according to the determining physicochemical parameters, taking into account the weight of individuals at the time of feeding feeds provides not only rational use of feed, but also improves fish habitat [5].

At a water temperature of 18-20 ° C it is expedient to feed the daily norm in two receptions, at 20–25 ° C - in three, at temperatures above 25 ° C - in four. Repeated feeding of fish provides significant feed savings per unit of weight gain: with two feedings the feed savings reach 15%, with three or more - 20% and above. However, repeated feeding should take into account the cost of human labor and energy consumption of this process [7].

It is advisable to start feeding at 7-9 hours, the content of dissolved oxygen in the water increases, and the next, depending on the water temperature, after 4, 6, 8 hours, finish no later than 16-18 hours. Due to the cessation of photosynthetic activity of aquatic plants in the

dark part of the day, the concentration of oxygen in the water can fall sharply, so in the morning there may be fatigue. After 60-120 minutes, be sure to check their eating fish, which is determined by the remnants of food on feed sites or tracks. In the presence of the remains of compound feed the feeding rate is adjusted. In the case of sharp fluctuations in water temperature during the period of the greatest increase in fish, it is advisable to conduct additional control catches in order to quickly make changes to the feeding rate depending on the actual situation in the pond. Feeding efficiency is assessed by the actual increase in fish weight and feed consumption per unit of fish production [20].

If the water temperature drops to 12–14 ° C at the end of the growing season, the growth of fish practically stops, but feeding should be continued until the beginning of the descent from the ponds. The daily feeding rate should not exceed 1-3% of the weight of fish, which will undoubtedly increase the total cost of feed, but prevents the loss of biennial commodity weight. On average, during the growing season, the daily diet for feeding two-year-old carp should be 4.5-6.6%, the weight of farmed fish [8].

In case of detection of diseases of fish urgently carry out treatment and preventive measures. For this purpose, prophylactic and therapeutic drugs (chloramphenicol, biomycin, etc.) are added to the feed ration. At this time, the feeding rate is reduced or stopped feeding for several days [10].

Thus, in recent years there have been changes in the technology of fish production due to increasing the level of privatization and intensification of production. The species composition of fish farms has been changed, the share of herbivorous fish has increased, new fish farms have appeared, and opportunities for further expansion of the range of fish products have been realized.

Ukraine's fish farming is characterized by a close connection between science and production, which has made it possible to ensure a fairly successful development of the industry in recent decades in rather difficult conditions. It is obvious that for the further development of fish farming in the conditions of market relations it is necessary to keep constant contacts of science and production, to provide training of experts of average and higher qualification.

Pond fish in Ukraine are grown by fish factories, fish-breeding and reclamation stations, collective, private, state farms, and individual industrial enterprises on their subsidiary farms.

The aim of the study. The aim of the work was to find ways to improve the production of marketable fish, one of the areas of research was to reduce feed costs for fish farming and increase the final weight.

Material conditions and research methods. The location of the farm PE "Friendship of Peoples" is located at a distance of 25 km from the district center of Mogilev-Podolsky and 45 km from the neighboring district center of Shargorod, which are the main place of sale of marketable products. This farm is a typical incomplete farm. Its territory is a rolling plain, cut by valleys of small rivers, ravines and gullies. The studied pond is a channel located on the river Derlo, which is one of the tributaries of the river Murafa.

The climate of the region is moderately continental. Winters are mild, with frequent thaws, summers are warm and slightly dry. The average air temperature in January is -6.7oC, in July + 21.1oC. The period with a temperature above + 15oC is about 170 days. Precipitation is up to 470 mm per year, most of it falls in the warm season. The average height of the snow cover is 15 cm. The ice cover on the reservoirs persists from the beginning of December to the second half of March. There are early autumn frosts, and late spring frosts.

The period with a relatively high temperature is about 128 days. Precipitation is up to 460 mm per year, most of it falls in the warm season. The average height of snow cover is 15 cm. The ice cover on reservoirs usually lasts from the beginning of December to the second half of March. There are early autumn frosts and late spring frosts. Typical soils of the area - acidic chernozems are slightly humus and chernozems are strongly degraded, in low-lying areas - alkaline, sandy, sometimes swampy.

Planned stocking of commercial ponds with carp and herbivorous fish yearbooks usually becomes possible from the second half of March and lasts until the first half of April. Therefore, the duration of the growing season favorable for the effective cultivation of marketable carp, depending on weather conditions in a given year, the difference may vary between 170-180 days (maximum duration is observed from the second decade of April to the second decade of October).

In recent years, fish farming is carried out by grazing and semi-intensive technologies with the feeding of two-year-old carp and grass carp feed. The components for creating a feed mixture are grains of cereals and legumes. A two-year cycle is used for carp and a three-year cycle for herbivorous fish. The average fish productivity of farming ponds with semi-intensive technology of fish farming is about 0.8–1 t / ha, feeding ponds depending on the species composition of fish in the range of 0.6–0.8 t / ha.

One of the characteristic features of the farm is the cultivation of quality products in excess of the standard weight, which allows to obtain marketable products of biennial carp and herbivorous fish with an average weight of at least 500 - 800g.

The farm uses mainly organic fertilizers and liming according to well-known methods in pond fish farming for targeted impact on the pond ecosystem. Mineral fertilizers are used in limited quantities, mainly during the first half of the growing season in order to create favorable conditions for bioproductive processes.

Depending on the stocking density, the amount of applied organic fertilizers (cattle humus), as a rule, does not exceed 2.0 - 2.5 t / ha.

The total area of the farm is about 28.7 hectares, of which: feeding - 24 hectares, growing - 4 hectares, wintering - 0.7 hectares.

The main source of water supply in the farm is surface water, which is formed due to precipitation. Filling is carried out by gravity from the accumulative pond Traces.

Most pond areas are surrounded by arable land. Therefore, together with rainwater, a certain amount of organic matter washed from the soil and dissolved nutrients enters the ponds, which has a positive effect on the development of the natural food base for fish.

Growing ponds when filling water and its discharge are mostly independent. Growing ponds are filled with 0.2 of their volume of water 2-3 days before they are stocked. Then the water level is gradually brought to the NPG. Stocking of ponds with non-four-day larvae of herbivorous fish and carp is carried out simultaneously.

The average flow of water per 1 ha of water mirror of the commodity pond Traces is up to 1.0 - 2.0 l / second and depends on the flooding of the river Derlo.

This enterprise PE "Friendship of Peoples" belongs to the incomplete economy. In its structure there are not all categories of ponds where production of landing material and commodity fish is carried out, see in the table. 3

Table 3

The structure of the pond fund of the incomplete economy of PE "Friendship of Peoples"

The name of the pond	Area, ha	Interest
Uterine	-	-
Repair	-	-
Spawning	-	-
Fry	-	-
Growing	4	14
Feeding	24	84
Wintering	0,7	2
Total	28,7	100

The temperature conditions of a particular year have a significant influence on the temperature regime of ponds. The amount of heat of the aquatic environment during the fish farming season is 2350-2950 degrees - days.

The average seasonal content of water-soluble oxygen is typical for ponds of the Podolsk region and is in the range of 3.9 - 6.8 mg / l.

Natural features of soils under water play a major role in shaping the natural fish productivity of ponds.

In the conditions of non-full-system carp pond farming with two-year turnover, when fish planting material is produced for own needs, the ratio of pond category can be as follows: spawning - 0.1%, breeding - 5.9%, feeding - 93.8%, wintering - 0.2%. In a particular case, the ratio of pond areas can be adjusted according to the specific tasks of the current year.

Analyzing the ratio of the category of ponds of this farm for the last year, we see that the area of feeding ponds is more than 84%, and the area of growing ponds is only 14%. Therefore, the farm pays great attention to the cultivation of marketable fish for sale.

The main purpose of this work is: to improve the feeding and cultivation of commercial fish in PE "Friendship of Peoples" p. Traces of Mohyliv-Podilskyi district.

To achieve this goal, the task of the work included:

- to conduct theoretical substantiation of the topic on the basis of elaboration of primary sources of professional literature;
- to analyze the cultivation of marketable fish on the farm;
- to study abiotic and biotic factors of the environment of feeding ponds;
- to study the normative - technological parameters of effective cultivation of marketable fish;
- make an economic assessment of research, conclusions and proposals for production.

Annuals of carp and herbivorous fish served as biological material for research. Technological processes of growing commercial fish by intensive and extensive methods of cultivation were studied: starting with the preparation of feeding ponds by flooding them with water by planting a yearbook of Ukrainian scaly carp breed with their subsequent cultivation in ponds of the same area. During the cultivation, all fish farming and technological measures were carried out that contributed to the better growth of biennials. The scheme of the experiment is given below.

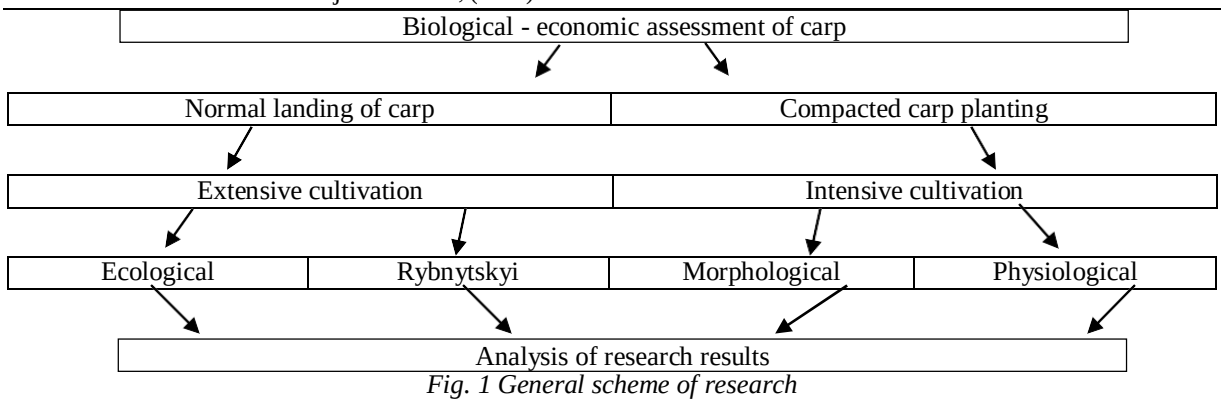

Fig. 1 General scheme of research

Natural water contains in dissolved form a certain amount of different substances, the complex of these substances - the chemical composition.

Water samples for chemical analysis should be taken with a special device - a bathometer. Selection is carried out in three places: near the source of water supply, in the middle and near the water drain. The best time to take samples is in the morning.

Physical properties of water.

Temperature. Sharp fluctuations in temperature (8 - 12 ° C) do not favorably affect the life of organisms. Measured with a thermometer.

The color depends on the content of organic matter in the water, brown water is not suitable for breeding fish in it. The color is determined using a scale, and expressed in degrees of chromaticity. It is not recommended to use color more than 40 °.

The transparency of water depends on the number of suspended mineral and organicparticles. Turbid water is not used, the transparency of the water is determined by the Sekki disk.

In commercial ponds, the chemical properties include the oxygen content, which should be 5 - 8 mg / l, as well as the acidity of the water and the bottom of the pond.

Calculation of planting fish. The choice of planting density determines the system of fish feeding and the overall fish productivity of the pond, which means the annual increase in fish, which is obtained in the pond for one growing season from a unit of water mirror due to natural and imported feed.

The scheme of the experiment is given below in table. 4

Table 4

The scheme of the experiment

Technology	Pond area	Planting density pcs / ha	The total number of thousand pcs.	Research indicators
Actually	24	1000	9,6	output of biennials
Project	24	1600	14,4	total weight of two years

To calculate the required amount of fish planting material was based on the plan of fish farming, the total fish productivity of the pond, taking into account the availability of feed. The need for fish planting material for a specific pond was calculated by the formula.

Calculation of the required amount of feed. The farm's need for feed was determined by the production plan for growing commercial fish.

When calculating the planned amount of feed used the following initial information: 1) the area of ponds; 2) fish farming plan; 3) planned fish productivity due to natural fish productivity; 4) total increase due to fertilizer application; 5) fish products in the expected polyculture; 6) the total weight of fish planting material; 7) feed ratio of feed, feed mixture or granular feed.

Specifically for a particular pond, the need for feed was determined by the formula.

Feed consumption was determined by its residues at feed sites with a mesh scoop 2-3 hours after distribution. Feed consumption was checked in each pond at several feeding sites.

The average growth of fish was established by control catches on the 1st, 10th and 20th of each month, they were carried out by dragging or raking in 2-3 areas with a total catch of at least 0.5% of the number of fish planted in the pond.

Research results. When growing commercial fish, feeding ponds are used, for the construction of which various plots of land with different soils are allocated. Ponds are built by embankment of large areas or by blocking beams and riverbeds with dams. Became Tracks was built by blocking the bed of the river Derlo. The dam was mostly built of homogeneous clay soil. When choosing the type and design of dams are based on topographic, geological and hydrogeological conditions, pressure, estimated maximum water consumption and the availability of building materials.

Dams of light and medium loams are the simplest and do not require any anti-filtration devices.

The main body of the dam was made of loam and clay, but it was necessary to arrange a protective coating of sandy soils or light loams, which protects the body of the dam from the temperature effects on slopes, from bulging, slipping and cracking. The thickness of the protective layer should be 1.5 m, but not less than the depth of freezing in this area.

Swampy soils, as well as soils with a high content of dissolved salts, are unsuitable for construction of earth dams.

Over time, earth dams and dams are deformed and destroyed during operation, due to the action of wave phenomena and filtration. At the same time filtration and wave rolling are more dangerous. Prolonged exposure to these factors is the cause of breakthroughs and landslides. On the part of the prevailing winds, destruction is often observed, which requires strengthening of the slopes. Prefabricated and monolithic reinforced concrete slabs and other fastening methods are used for this purpose. Good protection of dams and dams from waves and erosion are hornbeam and reeds that grow in the coastal part of the ponds. It is advisable to sow dry slopes with grass, which ensures the development of a thick layer of turf, which secures the earthen structures.

As a rule, unproductive lands (sandy, sandy loam, loamy, saline, floodplain, podzolic) and only in rare cases - fertile (chernozem, chestnut) are allocated for commercial fish farming. Sources of water supply can be precipitation, springs, rivers, lakes, irrigation canals and wastewater from irrigation systems. Areas and depths of ponds are determined by the terrain and economic purpose, may differ slightly from the normative parameters.

In this farm, depending on the specific conditions, structural features and water supply develop the optimal biotechnology of pond preparation. The preparation of channel and beam ponds in which it is necessary to provide passing of flood waters deserves great attention. In addition, it is necessary to take all measures to ensure that the flood waters do not get into the ponds of pesticides intended for field treatment.

Fish ponds should be periodically drained, which is achieved by equipment on the bed of drainage channels, which drain water from the bed of the pond, discharge groundwater, drain the surface layer of soil, and ensure the orientation of fish to fish catchers when catching it. The drainage network consists of the central and lateral channels which are a part of it. They are laid so that the areas of the pond bed are completely drained. It is necessary to regularly clean the channels from silt, restoring the capacity.

Passing flood waters through the hydraulic structures of the pond is one of the main works before stocking the ponds. In late January - early February, each farm organizes a special team, which should establish contacts with the district commission for flood control. According to the received information about the weather, the size and nature of the flood, the water level of the team performs the necessary work, establishing their order.

In early spring, first of all, water drains, spillways, pipes for various purposes, and drainage canals are cleaned of snow and ice. Carefully check and inspect the service bridge and mechanisms for lifting shields, risers, dams, clearing them of snow. If a longitudinal crack is found on the dam, a trench 15-20 cm deeper than the crack depth should be dug along it, filled with loam and carefully compacted. The transverse crack should be cut with a trench and also filled with clay or loam.

In spring, clay, sand, rubble, manure, and shovels are harvested near the ponds; crowbars, axes, barges, pitchforks, wire, ropes, lanterns, boats. To monitor the water level near the building set a measuring rail. As the snow melts, water is passed through the hydraulic structures, opening the shields, and make sure that the water level does not exceed the planned. When opening the pond, you must immediately insert the grill so that the fish does not come out of the pond. Lattices can be installed only on those structures where ice will not pass. If it accumulates near the drain (spillway), it is broken by crutches and passed between the risers. During the passage of spring water on the main structures of water supply ponds should be permanent on duty.

In the presence of siphons on reservoirs it is necessary to organize careful care of them: to insulate for the winter, to grease latches, to watch their condition in the winter so as to prevent thawing of all system.

In channel, beam ponds, even in the conditions of a rigid water mode if they are constructed by a cascade and their hydrological mode is carefully thought over, high fish productivity can be reached. This is facilitated by proper preparation of ponds, bed planning, developed system of catchments (which provides full release of water during the autumn catch), rapid drainage of the bed, the ability to treat wet places and ditches with quicklime and refill ponds with water from above. When filling the treated pond with water, it is necessary to provide fish and garbage protection, the ability to make the flow of quicklime, which precipitates throughout the bed of the pond.

When stocking in the fall, it is more difficult to pass floods through ponds that do not have a flood spillway. To save the dam or to avoid significant damage, an emergency earthen canal is dug around the shoulder of the dam. It should start with a wide entrance, gradually narrowing, the bottom of the channel - not steeper than 1: 1.5. The end of the canal is displayed and equipped in the form of a high-speed stream with a stone fortification or fascines.

In fish ponds fenced with dams, where filling with water regulates the economy, preparatory work on the lodge begins in the fall. After catching the fish, the main canal is cleared to better dry the soil. If saucers, pits, wet places remain on the bed, they are treated with ammonia water and lime. When green fertilizers were applied, vegetation remains were collected, forage areas were cleared and limed. If the soil dries out so that the tractor can pass, it is desirable to cultivate certain areas with a cultivator or heavy harrows, sow the coastal zone with winter crops. Reclamation works are performed on the heavy bed after the soil freezes.

Thus, the preparatory work for the cultivation of commercial fish is reduced to the preparation of the bed of the feeding pond, proper operation and timely repair of hydraulic structures, filling the pond with water in the optimal time necessarily through various filters.

A number of effective methods of intensification have been developed in fish farming, which contribute to a fuller use of the main means of production of pond areas.

Fisheries intensification provides for the optimal concentration of resources per unit of pond area to obtain the maximum number of high quality fish with sufficient profitability. At the same time reach the most effective use of pond areas.

When developing technology for growing fish, it is necessary to take into account environmental conditions. Therefore, intensification measures should be aimed primarily at improving the environment for fish farming and increasing the productivity of the water area. Intensification measures include land reclamation, chemicalization, fish feeding, treatment and prevention of diseases, mechanization and automation of production processes, etc. The complex application of all intensification factors allows to obtain a significant increase in the productivity of ponds. Methods of intensification include the use of compacted plantings of fish, mixed plantings of different age groups of fish of the same species, polyculture, breeding of highly productive fish, planting in ponds of predatory fish species, feeding fish, treatment and prevention measures.

As a result of operation, fish ponds undergo significant changes caused by natural processes and active human activity in order to increase fish productivity. The combination of natural processes and economic activity on ponds leads to siltation and waterlogging, at the same time physical and chemical parameters of water change and the sanitary condition worsens. These negative factors, against the background of the adaptive nature of fish growth, lead to a decrease in growth rates, lag in development, due not only to the direct effect on fish, but also on the feed base. The consequence of this situation is a decrease in natural fish productivity and a sharp restriction on the implementation of intensification measures.

One of the elements of intensification is reclamation, ie a system of technical and organizational economic measures aimed at improving the pond itself, as well as the surrounding area in order to create optimal environmental conditions for fish farming. Reclamation measures can be capital, which contribute to a radical change in the regime of the reservoir, and current, which affect the pond in the short term.

The use of mineral fertilizers not only provides the optimal ratio of nitrogen and phosphorus dissolved in water, but also contributes to the enrichment of water with oxygen during the day due to the intensive development of phytoplankton, which can be considered as biological enrichment of water with oxygen. The effect of chemical aeration can be achieved by applying potassium permanganate at a rate of 20-50 mg / l in combination with liming.

Mandatory use of lime or liming of ponds is multifaceted. This measure helps to improve the physicochemical regime of the environment and can be considered as a fertilizer. But the main importance of soil liming - reclamation, which helps to improve the water and soil of the bed ponds, reduces the possibility of a number of fish diseases. Approximate norms of introduction of quicklime in a reservoir are resulted in tab. 4

Table 4

Approximate norms for the introduction of quicklime into the reservoir

The purpose of liming	Application rates, c / ha
Control of siltation and fermentation of soils	30 - 40
Deposition of organic matter, control of gill rot	8 - 12
Disinfection	10 - 20

As the active principle, quicklime (CaO), slaked lime or calcium oxide hydrate Ca (OH) 2, limestone or similar rocks based on calcium carbonate (CaCO3) are used. Practitioners prefer slaked lime (pushonka), while adhering to the dosage and ensuring control of the results given in table. 5.

Annual liming of ponds is most effective in autumn and spring after lowering the water. Lime is applied to the wet surface of the bed of ponds 15-25 days before filling with water, evenly spreading on the bottom, or applied to lower the bed, in which water is retained.

When considering environmental measures, attention should be paid to the protection of ponds from sewage. To do this, create bypass channels that accumulate runoff and protect the ponds from siltation. Forest belts, shrub plantings and siltation are essential in this regard.

Table 5

Approximate norms for the introduction of slaked lime into the reservoir, c / ha

pH of water	Soil type:		
	heavy clay, loamy	sandy loam	sandy
Less than 4.0	42,0	22,0	17,5
4 , 0 - 4 , 5	32,0	17,0	14,5
4 , 51 - 5 , 0	27,0	14,5	12,0
5,01 - 5,5	17,0	12,0	7,0
5 , 51 - 6 , 0	12,0	7,0	4,5
6 , 01 - 6 , 5	7,0	5,0	2,0

To inhibit the development of soft and floating aquatic vegetation, it is effective to inhabit annual grass carp at the rate of 150 - 1500 pieces / ha. To destroy excess hard vegetation, it is advisable to keep a special reclamation herd, represented by two - and three-year-old individuals. The planting density can range from 160 to 400 pieces / ha.

The radical effect is achieved by mechanical (mowing, burning, destruction of the roots of wetland plants) and biological methods of reclamation, which

allows grass carp to eat young shoots, contributing to the intensive cleaning of water bodies and their recovery.

To minimize the number of fish species in the pond that are not objects of cultivation (roach, crucian, pikeperch, roach, ruff, perch), but compete in nutrition with the objects of pond fish farming or eat the young of cultivated fish species, carry diseases such as biological ameliorators use predatory fish. These fish have a high growth potential (pike, catfish, pike perch) and planted in ponds with fry, can not harm annual carp and herbivorous fish, but effectively reduce the number of species that are not cultivated and have no economic value.

In terms of biological reclamation, black grass carp, of which mollusks form the basis of the diet, is of exceptional interest. Actively reducing the number of mollusks in ponds, grass carp breaks the biological cycles of a number of pathogens of fish, which is a radical method of inhibiting the spread of disease.

Hydrobiological and hydrochemical regime of the studied pond. The hydrochemical regime of ponds significantly affects the normal physiological viability of hydrobionics and fish. Its formation depends on many factors - hydrobiological regime (water exchange), sources of water supply, soil conditions, clogging, temperature, planting density, intensification measures and other indicators. Fish are adapted, and therefore hydrochemical research is an important part of fish production technology.

The climatic factor is of great importance in the organization of pond production. It affects the form of farming, intensification measures, largely determines the quality of fish farming, the length of the growing season.

Intensive development of aquatic organisms that feed on fish, as well as intensive nutrition and growth of fish occurs at water temperatures above 15◦C. at a water temperature of 8–10◦C, feeding may continue partially, but the growth of fish stops.

When analyzing the temperature regime of the studied ponds, no significant difference in water temperature was observed. The temperature for growing fish in ponds was favorable. It ranged from 19.6 ° C at the beginning of the season to 22.4 ° C in the middle of it. The water temperature of 20 ° C and above reached 68 days, and the sum of temperatures was 1493.5 degrees. The warmest year was 1996, when the number of days with a temperature of 20 ° C and above was 79 days, and the sum of temperatures was 1720.7 degrees.

During the growing season, monitoring of the oxygen regime in the growing ponds was carried out regularly and it did not fall below 4.1 mg / liter. The oxygen regime of the ponds is an important factor in determining the growth and nutrition of fish, as well as the use of artificial feed.

The content of dissolved oxygen in the pond Traces are given in table. 6

Table 6

The content of dissolved oxygen in the pond Traces (mg / l)

Date	Oxygen content, mg / l		
	6.00	12.00	18.00
05.06.17	4,9	6.6	7.8
15.06.17	4,4	5.3	6.1
25.06.17	4,6	5.7	6.2
05.07.17	4,8	5.6	6.7
15.07.17	4,5	5.5	6.6
25.07.17	4,2	5.0	6.2
05.08.17	4,2	5.1	6.2
15.08.17	4,3	5.2	6.3
25.08.17	4,3	4.8	5.2
05.09.17	4,3	4.9	6.1
15.09.17	4,8	5,6	6,3

Analyzing the obtained data, we can conclude that the content of dissolved oxygen was in the range of 4.2 - 7.8 mg / l, ie these indicators met the fish standards and contributed to the cultivation of commercial fish. For this reason, no fish suffocation was observed during the growing season.

The active reaction of the medium (pH), which depends on the concentration of hydrogen ions (H +) and the hydroxyl group (OH-), is important for the hydrochemical regime of the ponds. The pond water constantly had a weakly alkaline reaction medium (6.6 - 7.8), with a lack of nutrients, especially such as nitrogen, phosphorus, iron. The oxidation of water was within normal limits (18.5 mg / l). Chemical parameters of water are given in table. 7

Table 7

Chemical parameters of the reservoir Traces

№ p /p	Water quality indicators	pond	MPC for pond water
1	Hydrogen index, pH	7,68	6,5-8,5
2	Free ammonia, NH3, mgN / l	0,014	0,05
3	Permanganate oxidation, mgO / l	7,52	до 15,0
4	Dichromate oxidation, mgO / l	18,5	до 50,0
5	Ammonium nitrogen, NH4 +, mgN / l	0,73	1,0
6	Nitrites, NO2-, mgN / l	0,19	0,1
7	Nitrates, NO3-, mgN / l	0,02	2,0
8	Mineral phosphorus, PO43-, mgP / l	0,11	0,5
9	Total iron, Fe2 +, Fe3 +, mg Fe / l	0,82	1,0
10	Calcium, Ca2 +, mg / l	58,1	50-65
11	Magnesium, Mg2 +, mg / l	43,7	15-30
12	Sodium, Na +, mg / liter	29,8	15-25
13	Potassium, K +, mg / L	9,94	10-20
14	Hydrocarbons, HCO3, mg / l	305,1	300
15	Chlorides, Cl-, mg / l	42,5	50-70
16	Sulfates, SO42 +, mg / L	33,3	50
17	Total hardness, mg-nov / l	5,5	4-6
18	Mineralization, mg / l	522,4	400-500

Based on this table, we see that the chemical parameters of the pond do not exceed the MPC for pond water, namely: nitrates are 0.02 mgN / l. MPC for pond water 2.0 mgN / l; potassium - 9.94, MPC - 10 - 20; free ammonia - 0.014, MPC - 0.05; ammonium nitrogen - 0.73, MPC - 1.0 mgN / liter.

Phytoplankton for the entire study period was represented by 76 species and intraspecific taxa, which belong to four systematic groups.

The greatest species diversity of phytoplankton was observed in July and August in the study pond. In June, the largest number of taxa (13) was recorded at the top, the dominance of green algae was at the same level.

In July and August, the dominant group of algae were greens with a predominance of chlorococci. Other groups of algae - blue-green, euglenoid and diatoms were only 1-3 taxa.

Spatial dynamics and structural ratio of the quantitative composition of phytoplankton were evaluated by the values of the number (thousand cells / m2) of taxa table. 8. Experiments have shown that the largest number and biomass of phytoplankton in June was observed at the top of the pond with a predominance of green algae; in July, the greatest development of phytoplankton was observed in the middle part of the pond with dominant blue-green algae. with a predominance.

The greatest development of phytoplankton in August was observed in the coastal part of the pond due to the development of blue-green algae with a predominance of Microcystis aeruginosa. At the top of the pond, the phytoplankton biomass was much smaller.

The average seasonal indicators of phytoplankton biomass were (g / m³): in the pond - 337755 / 17.76, which are given in table. 8

Table 8

The number and biomass of phytoplankton in the pond Traces thousand cells / m g / m³

Pond	Months			Average seasonal indicators
	June	July	August	
Traces	2980/0,52	322320/18,55	687964/34,82	337755/17,76

Thus, summer (June, July, August) phytoplankton in terms of both number and biomass was formed mainly due to green (chlorococcal) and blue-green algae.

It should be noted that the phytoplankton of the feeding pond Traces differed significantly in the number and biomass of representatives of individual systematic groups. Thus, in June, green algae dominated in numbers (92%) and biomass (64% and 79%). The leading role belonged to chlorococcal algae, the main dominants were species of the genera Coelastrum, Pediastrum.

In July, the leading positions in terms of numbers (88% and 95%) and biomass (64%) were occupied by blue-green algae, respectively.

During the experimental period in the feeding pond the total number of phytoplankton varied from 964.0 thousand cells / m2 to 1637984 thousand cells / m2, biomass - from 0.30 g / m2 to 123.51 g / m2. The maximum values of algal biomass were observed in August.

The second most important in the period of maximum development of phytoplankton were diatoms. Other groups of algae had little effect on the formation of phytoplankton ponds.

The problem of studying the productivity of zooplankton groups in fishery reservoirs requires reliable data on the number and biomass of species populations

to assess the productivity of reservoirs. Studies of zooplankton, as well as phytoplankton, were performed in the Ponds Trail.

The basis of zooplankton of the studied pond PE "Friendship of Peoples" for the entire period of experiments (June - August) were rotifers (Rotatoria), branched (Cladocera) and oars (Copepoda) crustaceans.

In June, there was a significant development of zooplankton in the experimental pond, especially at the top, where the biomass of zooplankton was 23,550 g / m³ due to the vegetation of Cladocera with the leading forms of Bosmina longirostris and Daphnia longispina. Significant development of zooplankton was also recorded in the lower part of the pond (12.502 g / m³).

Quantitative development of zooplankton of the experimental pond of PE "Friendship of Peoples" is given in table. 9

Table 9

Quantitative development of zooplankton PE "Friendship of Peoples"

Groups of organisms specimens / m³ г / м³	The top of the pond	The bottom of the pond
Rotatoria (rotifers)	9600/ 0,552	240400/ 3,740
Cladocera (branched crustaceans)	66800/ 0,459	393200/ 7,201
Copepoda (paddle-legged crustaceans)	20880/ 0,117	74800/ 1,561
Total	183680/ 1,128	7084400/ 12,502

Studies of zooplankton in July indicate a significant development of branched and otter crustaceans. In feeding ponds, the development of zooplankton was almost on a par with the dominant otter crustaceans.

Technological aspects of commercial fish farming. Full use of the growing season is a prerequisite for high fish farming efficiency. Ponds should be stocked as early as possible in a short time, at a positive temperature.

Stocking the feeding pond should be carried out immediately after the ice age. With a calendar deadline, it falls on the second half of March. Carp and herbivorous fish with an equal weight that would meet the standard or exceed it should be stocked with yearlings, pike larvae should be planted for biological reclamation. After all, the pond is channel and a large number of garbage fish flows into it from natural reservoirs, which are located above the cascade.

When transporting and transporting fish stocking material should be carried out by specialized live fish transport with the ratio of fish to water should be 1: 3 and higher depending on the temperature of the water during transportation. During transportation, fish stocking material should be treated with dyes (malachite blue, diamond green, purple K), which are available in appropriate concentrations depending on the duration of transportation of fish. The release of fish stocking material should be carried out in pre-prepared places, which must be provided with entrances into the water so that the fish go directly into the water and are not injured. The water in the pond should be lowered so that it does not come out of the pond for 10 days, which will allow the fish to disperse along the pond and not gather near the source.

In this farm, all of the above requirements are met, because the farm specializes in growing fish material for their own needs. Pond Traces was stocked with yearlings from their own growing ponds, as well as purchased from neighboring specialized farms. The average weight of carp yearlings was 25 grams. The average weight of purchased herbivorous fish was 200 grams.

The stock was transported in bulk on a tarpaulin and the duration of transportation did not exceed 20 minutes. including loading and unloading. During unloading, the fish rolled directly into the water. During the transportation of fish planting material was not treated with dyes, because it was pre-treated in winter ponds. The pond was stocked for one day after which the outposts in the pond were closed and water did not flow from the pond for more than two weeks, which allowed the stock to disperse along the pond. The results of stocking the feeding pond. table. 10.

To prevent water loss on the farm, shandora is carefully shaken with overcooked cattle manure or sawdust.

Table 10

The results of stocking the feeding pond Traces

Technologies	Area, ha	Carp annuals and their weight are planted			Two-year-old silver carp and their weight are planted			Pike larvae, pcs.
		total thousand pieces	pieces per hectare.	mass, kg	total thousand pieces	pieces per hectare.	mass, kg	
Actually	24	14,4	600	360	9,6	400	1920	-
Project	24	337	1000	1200	14,4	600	2880	5000

Analyzing this table, we can conclude that the area of this pond was not fully used for stocking. The stocking density of carp was reduced to normal by 400 units / ha, and for silver carp by 200 units / ha, which affected the total yield of fish from 1 ha. Predatory fish, which are bio-ameliorators of ponds, were not used when stocking this pond. Contamination of this pond with garbage fish species reduced the overall fish productivity, because they ate a large amount of natural feed.

To determine the intensity of growth of carp biennials, control catches were carried out every decade of the month, the fish caught were weighed, average values were determined, a control catch was drawn up, table.11

Table 11

Graph of growth of biennial carp and silver carp in the pond Traces

№ pp.	Date control fishing	Mass of fish at the rate, g.		Normative indicator for carp
		carp	silver carp	
1	12.05	65	224	40
2	22.05	110	310	65
3	03.06	127	412	90
4	13.06	160	508	120
5	23.06	214	600	150
6	03.07	259	694	190
7	13.07	335	802	230
8	23.07	368	916	280
9	02.08	405	1022	340
10	12.08	450	1140	370
11	22.08	489	1260	400
12	01.09	505	1374	430
13	11.09	514	1463	438
14	21.09	522	1500	445
15	01.10	529	1510	450

This table shows that the growth schedule of carp exceeded the normative indicators and at the end of the growing period was 79 g higher than the normative one. The project plans to stock carp weighing more than 50 g, this will allow the same growing technology to obtain a final weight of carp 800 - 900 g, because carp with this weight is more competitive in the market.

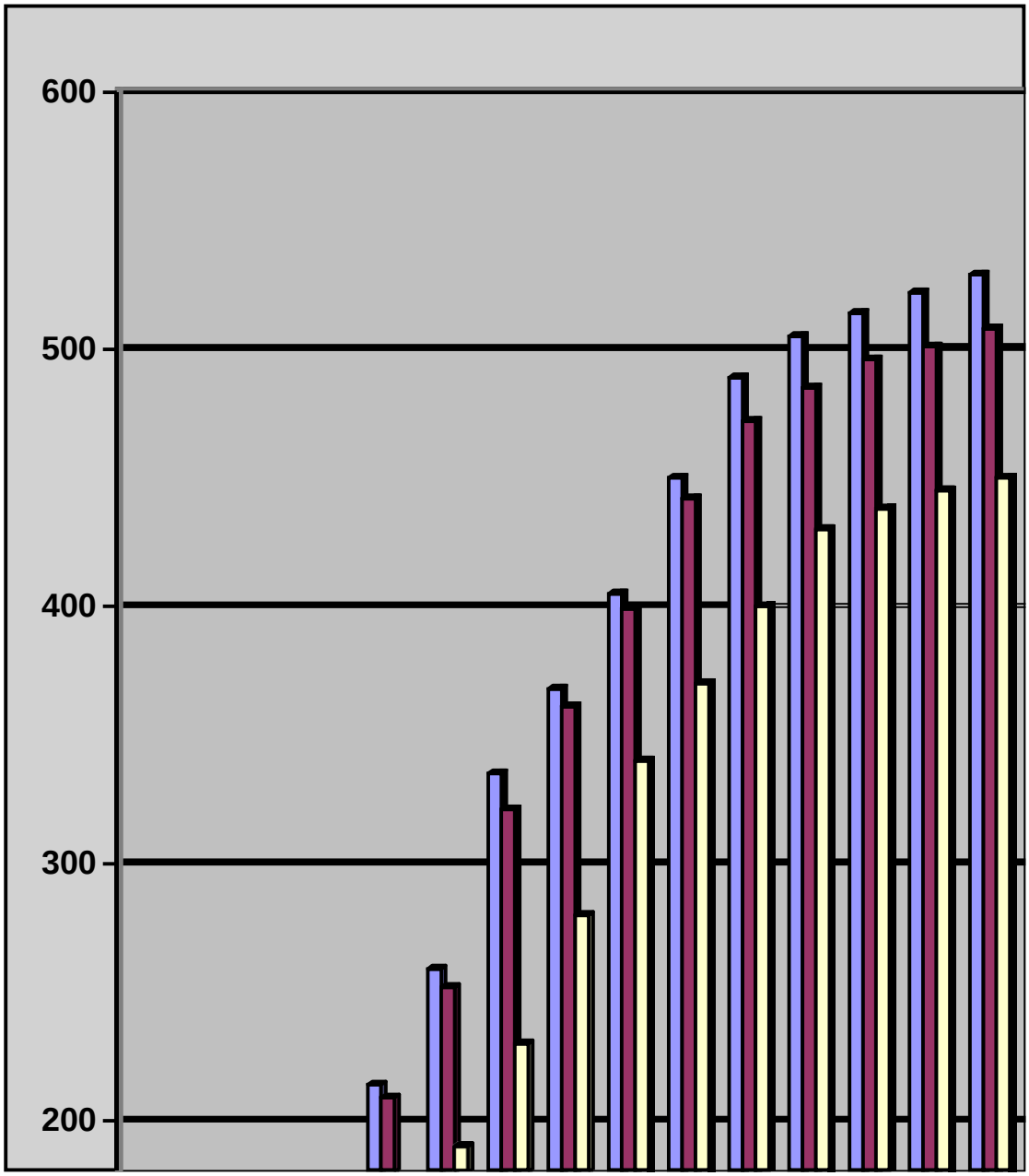

Рис. 4 Графік росту дволіток корона та товстолобика у ставу Сліди

This graph shows that by the end of August the intensity of fish growth in the pond was the same, and from September carp began to predominate in growth.

In all species of fish, the growth rate and efficiency of nutrient utilization increases with increasing temperature, but to a certain extent. The concentration of oxygen in the water also has a great influence on the efficiency of fish feeding. Decreased oxygen concentration acts as a signal to loss of appetite. A decrease in the oxygen content in water is often accompanied by a change in the values of other parameters, such as an increase in the concentration of ammonia, urea, nitrates, which inhibit growth.

To determine the oxygen concentration and water temperature, the thermooximeter IT-8201 "Oxymet-2" is used. The results of research on the fish shop are reflected in table.12

Table 12

Dissolved oxygen content in water and water temperature in the pond Traces

Date	The content of O2, mg / l	t of water, ºC
12.05	6,0	16
22.05	5,9	18
03.06	5,6	20
13.06	5,5	20
23.06	5,3	24
03.07	5,2	24
13.07	5,0	25
23.07	4,9	27
02.08	4,8	25
12.08	4,9	24
22.08	5,0	23
01.09	5,2	22
11.09	5,4	19
21.09	5,3	17
01.10	5,8	16

After analyzing the results of studies on the content of dissolved oxygen in water and temperature given in table 8, we can draw the following conclusions: the content of dissolved oxygen in water and water temperature are inversely related, ie at elevated temperatures the content of dissolved oxygen decreases. The studied indicators on the pond did not decrease to critical values (content of dissolved oxygen in water - 2.0–2.5 mg / l), the optimal concentration of dissolved oxygen in water was 5–7 mg / l. Water in the pond throughout the growing season met the requirements of GOST 15.378.87. The indicators were in the range of normal values due to the relief of the area where the pond is located and the area of the pond, in windy weather aeration takes place.

The organization of feeding of two-year-old carp. Modern traditional warm-water fisheries are based on the polyculture of carp and representatives of the Far Eastern ichthyofauna of the carp family, among which the dominant role belongs to white and variegated silver carp and hybrid forms of these species. A little less important is the grass carp, In this regard, it is advisable to lay out the material for feeding carp.

Growing marketable products. In the case of carp farming in feeding ponds and pools to the commodity mass as a planting material used this year or peers of different origins, which are grown directly in the conditions of fish farms or obtained from full-system pond warm-water fish farms. The possibility of obtaining fish planting material from specialized fish farms is not excluded. With regard to age criteria, it is not advisable to take a hard line when choosing planting material. Rybnytsia enterprises, depending on the volume of wastewater use and technical conditions, may not adhere to a clear seasonality in technological processes. The average weight of fish planting material and the planned weight of marketable products are the main criteria in resolving this issue, and the age indicators in the case of hot-water fish farms are quite conditional. Nevertheless, universal age terms (peers, peers, biennials) should be used regardless of growing conditions.

Feeding when growing commercial carp should begin the day after stocking ponds or pools and use recipes for feed with a proteus content of at least 30%. The most efficient cultivation of commercial carp is provided at a concentration of dissolved oxygen in water of 5-8 mg / l and a water temperature of + 25-30 ° C.

Granulated feed fed to fish farms contains a certain proportion of destroyed pellets that crumbled during transportation. Therefore, before feeding the fish, such feed should be sifted through a metal sieve with a hole diameter of up to 1 mm. Whole pellets are fed to carp weighing more than 80 g, and from screenings with a particle size of up to 1–1.5 mm, protein and vitamin feeds are prepared or carp of smaller mass are fed in pure form. Feeding unsifted granular feed leads to overconsumption of feed per unit growth of up to 20% due to the fact that its dusty fractions float on the water surface and are almost not consumed by fish.

Carp grown in ponds and pools using warm water should be fed daily. A break in feeding for one day or even skipping one of the daily feedings leads to weight loss of carp, because at a water temperature of + 24-31 ° C in his body is quite active metabolism, accompanied by increased energy expenditure, carp should be fed in clearly defined hours in accordance with the daily routine, which provides for the regime of feeding fish. The number of feedings per day depends on the fish's feed intake. In the conditions of intensive cultivation of carp in planters or pools it is necessary to adhere to the daily norms of feeding given in tab. thirteen.

In this farm, the feeding of commercial carp is carried out with feed of own production, which is crushed and mixed in its own feed shop. The main components of feed mixtures of own production are grain of barley, wheat, corn, soybeans and sunflower meal.

Table 13

Daily feeding rates of complete feed of carp

Mass of fish, g	Water temperature	
	22- 25 °C	26-30 °C
	amount of feed,% (g)	
35 - 50	7,2(3,1)	9,5(4,1)
50 - 70	6,7(4,0)	9,0(5,4)
70 - 90	6,2(4,9)	8,5(6,8)
90-100	5,8(5,8)	8,0(8,0)
110- 130	5,4(6,5)	7,5(9,0)
130- 150	5,3(7,4)	7,0(9,8)
150- 200	4,5(7,8)	6,5(11,4)
200-250	4,2(9,4)	5,6(12,6)
250-300	3,7(10,1)	4,9(13,8)
300 - 350	3,4(11,0)	4,4(15,0)
350 - 400	3,2(11,2)	4,0(15,0)
400-450	2,9(12,3)	3,4(15,4)
450-500	2,7(12,8)	3,1(17,2)
500-550	2,5 (13,1)	2,8(14,7)
550-600	2,3(13,2)	2,5(14,0)
600-650	2,2(13,7)	2,3(13,7)
650-700	2,0(13,5)	2,1(13,6)

It has been experimentally proved that at feeding rates of 1.5 - 0.6 - 0.5% of carp body weight, fish consumed 18 - 39 - 42% of the set amount of food, respectively. The rest of the food sank to the bottom of the pond and the fish did not have time to eat it. Therefore, in ponds, the daily rate of feed, which ranges from 2 to 10% of fish weight, should be fed in portions of not more than 0.3-0.5% of body weight of fish. The number of feedings per day at a water temperature of + 24–31 ° C with mechanized distribution of feed should reach 16–20 times, ie it should be carried out every hour and even more often. At a water temperature of + 19–23 ° C, the number of feedings is reduced to 11–12 times a day, and at a temperature of + 14–18 ° C - to 6–8 times. The first feeding in summer should begin at 6 o'clock, and the last to finish at 21-22 o'clock.

The daily rate of feeding is regulated depending on the content of dissolved oxygen in water. At a water content of 5–6 mg / l, 100% of the daily ration is given, at 3–4 mg / l - 70–80%, at 2.0–2.5 mg / l - 40–50%. At appreciable decrease in oxygen feeding is stopped.

In the complex of technological processes performed during the cultivation of commercial biennials of carp and herbivorous fish, important attention was paid to fertilization and liming of the feeding pond. On average, one to two tons of cattle manure should be applied to each hectare of each pond. In summer, be sure to lime the areas of the pond where the forages are located. On average, 0.2 to 0.7 tons of lime per hectare is applied to the feeding pond during the season.

For the correct assessment of feeding, daily control over feed consumption was carried out, every decade the epizootic condition of fish and natural forage base of ponds was determined, feed costs per unit of growth were determined, keeping logs of fish feeding and control catches.

Partial feeding can not ensure maximum fish productivity of ponds, does not allow the use of compacted plantings of annuals. For full feeding of fish use the recommended daily norms of feeding of two-year-old carp.

The amount of daily feed is calculated depending on the weight of the fish and water temperature. Normative indicators of daily feeding of carp depending on water temperature are given in table. 14

Table 14

Daily feeding rates of biennial carp,% by weight of fish

Water temperature, ° C	Mass of fish, g												
	20	30	50	70	100	150	200	250	300	350	400	450	500
11	1,2	1,1	1,0	1,0	0,9	0,8	0,7	0,7	0,6	0,6	0,5	0,5	0,5
12	2,4	2,2	2,0	1,9	1,8	1,6	1,4	1,3	1,2	1,1	1,0	0,9	0,9
13	2,4	3,1	2,8	2,6	2,4	2,2	2,0	1,9	1,8	1,7	1,5	1,4	1,3
14	4,0	3,7	3,3	3,1	2,9	2,6	2,4	2,2	2,0	1,9	1,7	1,6	1,5
15	4,7	4,4	4,0	3,7	3,4	3,1	2,9	2,7	2,5	2,3	2,1	1,9	1,8
16	5,4	5,2	4,7	4,4	4,1	3,7	3,4	3,1	2,8	2,6	2,4	2,2	2,0
17	6,2	5,8	5,5	5,2	4,9	4,4	4,0	3,7	3,4	3,1	2,8	2,6	2,4
18	7,2	6,8	6,4	6,1	5,7	5,1	4,7	4,3	3,9	3,6	3,3	3,0	2,7
19	8,5	8,1	7,6	7,2	6,7	6,0	5,4	4,9	4,5	4,1	3,7	3,3	3,0
20	10,0	9,5	8,9	8,4	7,8	6,8	6,2	5,4	4,8	4,3	3,8	3,4	3,1
21	10,6	10,1	9,5	9,0	8,3	7,3	6,5	5,7	5,0	4,4	3,9	3,5	3,2
22	11,2	10,7	10,0	9,5	8,8	7,7	6,8	6,0	5,2	4,5	4,0	3,6	3,3
23	11,8	11,3	10,5	10,0	9,3	8,2	7,2	6,3	5,4	4,6	4,1	3.7	3,4
24	12,4	11,9	11,0	10,5	9,8	8,6	7,5	6,5	5,6	4,8	4,1	3,8	3,5
25	13,0	12,5	11,5	11,0	10,2	9,1	7,9	6,8	5,7	4,9	4,3	3,9	3,6
26	14,0	13,0	12,0	11,5	10,8	9,5	8,2	6,9	5,8	5,0	4,4	4,0	3,7
27	14,0	13,0	12,0	11,5	10,8	9,5	8,2	6,9	5,8	5,0	4,4	4,0	3,7
28	12,5	11,7	10,9	10,2	9,2	7,9	6,9	6,0	5,2	4,5	4,0	3,6	3,3
29	10,5	9,7	9,0	8,4	7,7	6,7	5,8	5,0	4,6	3,7	3,3	3,0	2,8
30	8,0	7,4	6,8	6,4	5,8	5,1	4,4	3,8	3,3	2,9	2,6	2,4	2,2

The transition to complete feeding with artificial feed is accompanied by high labor costs, as well as sharply deteriorating hydrochemical regime of ponds, constantly need to carry out liming, which further prevents the development of natural feed base, and increases the cost of commercial fish production.

During the cultivation of commercial carp, from the moment of stocking the pond until the end of the technological cycle, it is necessary to constantly monitor the epizootic situation and comply with the requirements aimed at preventing the occurrence of the disease. Cultivation of commercial fish is stopped when the water temperature drops to + 10–12 ° C. At this time, preparing to catch marketable fish.

The results of growing commercial biennials. In cultural descent ponds, fish are caught with a simple tool with a small drag, and the pond is released. Fishing in such ponds is often carried out with the help of fish traps built behind the dam.

Fish catchers are used to catch fish and keep it for a short time. Designs are different. The standard fish trap is a channel 7 - 14 m wide at the bottom, 1 m deep, 35 - 130 m long. The ratio of fish weight to water weight is 1: 4.

To keep fish in fish traps provide water flow. To sort the fish, the catchers are equipped with grates with cells of different diameters.

It is more difficult to catch fish from descending ponds, lakes and rivers.

These reservoirs are caught with various tools - seines, nets and traps. If the overgrown vegetation has become overgrown or there are many underwater plants in it, it should be lowered first slowly until the water leaves the thicket, and with it the fish will come out, and then release the water faster.

On the contrary, if it became clean, the water is released faster at first, and more slowly at the end.

Most often, fish are caught with such tools as seine and nets. The net consists of three main parts: the wings - right and left, the drives and the ball. The wings are a mesh cloth planted on the upper and lower heels, the wings are made of liquid. The ends of the wings are connected by claws. To prevent the upper and lower heels from narrowing, bridles and rope weights are attached to them. The drive is the part of the wing located near the ball. It is made of thick case and is 30% of the wing length. The upper selection is equipped with floats, and the lower - with sinkers.

The length of the seines is usually from 100 to 150 m long and from 2 to 4 m high. For large reservoirs, seines up to 1–1.5 km and more are used. Seines are made of nylon case of different mesh sizes. Ropes for the upper heel - 32 mm, for the lower and cuts - 38 mm. Volokusha is the same seine, but smaller in size. It is fished in small and shallow ponds and lakes. These fishing gears are 50 - 80 m long and 2 m high and the size of the delhi eye is 18 - 22 m.

In overgrown ponds, fishing is most effective with nets. The best results of fishing are given by single-walled nylon nets, which are called gill nets. It is better to catch large fish with a three-walled net. For catching carp, single-walled nets with a mesh of 40 to 50 mm are used. Three-year-olds weighing 1–1.5 kg are caught in nets with a mesh of 60 mm.

The standard length of the nets is 25 m, the height is 1.2–2 m. Of the other fishing gear, a 6x6 m lifting net can be noted. It is lowered to the bottom of the pond, where the net is spread. Then put the food and, when the fish gather, lift. This method is used in overgrown and clogged ponds.

The trail pond has a fish reservoir, during the descent of which the fish gathers and is then caught. According to the calendar term, the beginning of the catch fell on the second half of October, see table. 15

Table 15

Schedule of descent and capture of the pond Traces

Value	Area	The beginning of the descent	End of descent	Duration of descent, days	The beginning of the catch	The end of the catch	Duration of the catch, days
Actually	24	15.10.17	21.10.17	6	21.10.17	28.10.17	8
Project	24	15.10.17	21.10.17	6	21.10.17	28.10.17	8

This table shows that the pond descends in 6 days, the duration of its catch was 8 days - this is due to the fact that the pond was equipped with a fish tank with which you can quickly catch fish. During the project, the duration of the pond catch will also be 8 days, as the hydraulic structures will not change. Such a long time of fishing is associated with a large number of fish and its sorting by species, as well as the lack of mechanization. The results of the catch are given in table. 16.

Transportation of fish for sale to nearby district centers was carried out by live fish transport and was sold live. The stocking density of fish in the water in live fish transport for both carp and silver carp was 1: 3. Live fish transport was provided with oxygen cylinders to keep marketable fish alive during transportation and sale.

Table 16

The results of growing commercial fish in the feeding pond Traces

Value	Area, ha	Yield of carp and its mass				The yield of silver carp and its mass				Mass of predatory species and crucian carp, t	Total fish products, t
		number of thousand pieces	% yield from planted	average weight, kg	total weight, t	number of thousand pieces	% yield from planted	average weight, kg	total weight, t		
ac tu	24	12,9	85	0,52	6,9	7,7	80	1,5	11,5	1,3	18,4
pr ai	24	20	80	0,8	16,3	11,2	80	1,2	13,4	1,5	29,7

From this table it is seen that the actual weight of carp was higher than the normative by 79 g, and silver carp exceeded the normative by 300 g. This is due to the fact that this pond was fed fish, but the planting was sparse and therefore the carp exceeded the standard weight. Silver carp grew above the standard weight due to the large amount of natural feed, because the pond was quite rare planting fish. But the total fish productivity in fact was 750 kg / ha. In the project part of stocking, fish productivity is planned within 1230 kg / ha due to full stocking and partial feeding of fish. For carp, fish productivity is planned to increase from 300 kg / ha to 680 kg / ha, ie by 380 kg / ha. For silver carp, fish productivity should increase from 310 kg / ha to 550 kg / ha due to compacted planting, while the average weight of silver carp will decrease from 1500 g to 1200 g. By increasing carp feeding, its average artificial weight should increase from the actual 270 g and will be 800-900g, which will increase the selling price for this type of product.

Economic conditions for growing commercial fish in PE "Friendship of Peoples". One of the determining indicators of economic efficiency is the cost of production. The cost is based on costs that can be divided into cyclical and continuous.

Analyzing the indicators of economic efficiency of table 17, we can conclude that the bulk of the costs both in fact and in the project are payments for wages, planting material, the cost of purchasing feed, and other costs. In fact, the unit cost of production was 17.94 hryvnias, the selling price was 22 hryvnias. Profits are 74,700 hryvnias. The level of profitability is 23%.

Table 17

Indicators of economic efficiency of commercial fish farming in the pond Traces

Indexes	Actually	Project
Costs for the production of marketable fish: The cost of fish planting material, UAH	66400	152800
Lease of land and hydraulic structures, UAH	56000	56000
Remuneration, UAH	54000	80000
Deductions for social events, UAH	26200	31400
Depreciation deductions, UAH	11040	34430
Fuel and lubricants, UAH	40337	122480
Feed, UAH	64200	168000
Electricity, UAH	5037	14890
Other expenses, UAH	6886	8000
Total: UAH	330100	668000
Unit cost of production, UAH	17,94	22,49
Sales unit price, UAH	22	30
Revenue from sales of products, UAH	404800	891000
Profit, UAH	74700	223000
Profitability level, %	23	33

According to the project, the cost will be 22.49 hryvnias, which is 4.55 hryvnias. higher than the actual. The selling price will be from 30 hryvnias and above, it is slightly higher than the actual price - this is due to the increased final weight and quantity of carp. The profit will be 223,000 hryvnias, the level of profitability is 33%.

Such a high profit will increase the cost of social activities, as well as modernize production and reduce manual labor.

Therefore, the level of profitability of this economy will increase by 10%, and real profits will increase 3 times.

Conclusions and prospects for further research. PE "Friendship of Peoples" has a total area of ponds of 24 hectares, of which 24 hectares are feeding ponds, so the farm is not full-fledged and is engaged in growing commercial fish.

1. Growing rates are absent, so the farm buys fish planting material from specialized fisheries.

2. The growth rate of carp exceeded the norm throughout the season. This is due to the liquid planting of carp and eventually it was 529 g, which is 79 g higher than the norm. The growth rate of silver carp also exceeded the norm throughout the growing season and ultimately amounted to 1510 g.

3. The project plans to stock carp weighing more than 50 g, this will allow the same growing technology to obtain a final weight of carp 800 - 900 g, because carp with this weight is more competitive in the market.

4. But the total fish productivity in fact was 750 kg / ha. In the project part of stocking fish productivity is planned within 1230 kg / ha due to full stocking and partial feeding of fish. For carp, fish productivity is planned to increase from 300 kg / ha to 680 kg / ha, ie by 380 kg / ha. For silver carp, fish productivity should increase from 310 kg / ha to 550 kg / ha due to compacted planting, while the average weight of silver carp will decrease from 1500 g to 1200 g.

5. In fact, the unit cost of production was 17.94 hryvnias, the selling price was 22 hryvnias. Profits are 74,700 hryvnias. The level of profitability is 23%. According to the project, the cost will be 22.49 hryvnias, which is 4.55 hryvnias. higher than the actual. The selling price will be from 30 hryvnias and above, it is slightly higher than the actual price - this is due to the increased final weight and quantity of carp. The profit will be 223,000 hryvnias, the level of profitability is 33%.

Suggestions. 1. To intensify production by standardized feeding, application of mineral and organic fertilizers, to carry out liming and reclamation works.

2. Install gratings on top to prevent low-value fish species (crucian carp, perch, ruff) from entering feeding ponds and large predators that fall from the upper pond and eat up a significant portion of valuable aquaculture facilities.

3. To stock up with a stock weighing at least 50 g, to prevent overspending on fish stocking material, as well as to use pike larvae when stocking, to control garbage fish.

4. Mow rough vegetation to prevent the formation of dead zones.

5. To mechanize production as much as possible to reduce labor intensity of processes, to build winter ponds for keeping of marketable fish.

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THE EFFECT OF PROBIOTIC ON HEMATOLOGICAL PARAMETERS AND CHEMICAL CONTENT OF BROILER CHICKENS MEAT

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Abstract

A study of morphological and biochemical indexes of blood of chickens-broilers is undertaken for the use of the investigated addition of probiotic Entero-active on the basis of lactics of sort of Lactobacillus and Enterococcus.

The experiment was conducted to examine the influence of probiotic preparation on the mineral contents of the broiler chicken muscles. It is proved that additional feeding of probiotic Entero-activ to broiler chickens increases retention of mineral elements of the fodder. To study the effect of probiotic on chicken meat the contents of minerals in the experimental poultry meat was researched. The studies proved that the additional use of the studied probiotic supplements with food of broiler chickens allowed increasing phosphorus contents by 4.7%, magnesium by 3.9% and iron by 46.5% in the pectoral muscles compared with the control group. The use of probiotic for broilers feeding has increased phosphorus by 4.7%, calcium by 4.1 times, iron by 70.5%, zinc by 5.4%, magnesium by 31.5% and copper in 4.2 times in thigh muscles of poultry. Thus, consumption of probiotic preparation by broilers in various doses improves the mineral compound of meat carcasses this meat is also considered as free range food. It was proved that probiotic increases the synthesis of such essential amino acids in the pectoral muscles as lysine by 1.66%, histidine by 0.03%, arginine by 0.38%, threonine by 0.07%, valine by 0.16%, methionine by 0.33%, leucine by 0.1% and phenylalanine by 0.17%. The increasing of level of lysine and histidine respectively by 0.05 and 0.08% is observed in the thigh muscles of broilers under the influence of probiotic.We have proved that the optimal dose for broiler chickens is 0.25% for the age of 1-10 days, 0.1% for the age of 11-28 days, 0.05 % for the age of 29-42 days, the percentage is for broiler chickens feed weight.

Keywords: broiler chickens, probiotic, feeding, hematological parameters, muscles, mineral elements.

INTRODUCTION

The supplying of people with qualitative foodstuffs is one of the most actual problems nowadays. Prohibition of antibiotics use as growth stimulators on the territory of EU countries concerning livestock was accepted as an answer for appearing of antibiotic-resistant microorganisms both to animals and people who consumed different animal products. So, fitobiotics, enzymes, probiotics and prebiotics, and other dietary supplements replaced antibiotics [2, 5, 6, 9, 11].

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