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PECULIAR FEATURES OF ACCUMULATION OF MASS AT UNDERYEARLINGS AND TWO-YEAR-OLD FISHES OF RAINBOW TROUT

The purpose. To study growth of rainbow trout and productivity of mixed fodder at merchantable growing of this fish in basin fishery with use of river water. **Methods.** Fish was grown using the technique of growing rainbow trout. **Results.** Features of accumulation of mass by fish depending on seasonal fluctuation of temperature and saturation of water with oxygen are fixed. Parameters of aquatic environment for the most efficient accumulation of mass by two-year-old fishes of rainbow trout as well as use by fish of mixed fodder are specified. At the temperature of water 18°C and density of the oxygen dissolved in it not below 8 mg O2/l growth rate of a fish was maximum, and the feeding ratio did not exceed 0,84. **Conclusions.** Technological environment of basin farm was favorable for deriving merchantable output of rainbow trout for 8 months.

Key words: rainbow trout, temperature of water, density of oxygen, accumulation of mass, feeding ratio.

Topicality. Breeding of salmon fish is a leading place in the world aquaculture, as it allows for a relatively small period of time (10-24 months) to receive delicatessen products with a commercial weight of 0.3 to 3kg. The value of salmon food is also recognized in Ukraine, which is confirmed by the high market price for this fish.

The main object of salmon breeding in Ukraine is rainbow trout - Oncorhynshusmykiss (Walbaum 1792) [1-4]. It is the representative of the ichthyofauna of fresh water in the western part of North America, from southern Alaska to California. Over the past 130 years, rainbow trout has taken an important place in aquaculture around the world.

Demand for this fish is due to high taste and dietary qualities of meat and high content of polyunsaturated fatty acids in the products produced from it. The interests of producers in this direction of salmon aquaculture contribute to the plasticity of rainbow

trout to the environment, its ability to efficiently consume and pay artificial feeds, to produce delicious red caviar, which is a domestic alternative to the traditional caviar of Pacific salmon.

In the world aquaculture, the production of rainbow trout products has reached significant volumes. According to the FAO, in 2008, 31449 tons were produced in Denmark, 32270 tons in France, 32007 in France, 32005 in Germany, and 37800 in Italy, 75316 in Norway, and 13090 in Chile, 14911 in Chile, and 91519 in Iran in 5-6 units.

The current state of trout management in Ukraine is experiencing a new stage of regeneration after a 20-year decline. Today in the country about 1500 tons of commodity trout are grown annually. However, the needs of the Ukrainian consumer market in salmon fish are currently about 8.5 thousand tons, of which the share of rainbow trout is about 3 thousand tons [7-8]

Trout is picking up the high content of oxygen dissolved in water. The consumption of oxygen by the rainbow trout is directly proportional to the water temperature and is inversely proportional to its mass

Analysis of recent research and publications. According to the results of scientific research and the rich practical experience of growing rainbow trout, it was established that the highest growth rate, provided the optimum content of dissolved oxygen in water, occurs at a water temperature within the range of 15-200C. However, in fact, without signs of inhibition, fish can live in fluctuations of temperature from 0 to 250 ° C, provided saturation of dissolved oxygen in the water within 80-100%.

According to experts from the Danish company "Biomar", one of the world leaders in the production of mixed fodders for salmon fish, the limits for the saturation of dissolved oxygen in water are allowed to be 42-91%, depending on the water temperature [9], for the growth of rainbow trout. However, a number of researchers argue that the most favorable for the growth of this fish is the 100% level of saturation of water with oxygen [10-14]

The purpose of the study is to assess the growth rate and the picking up of rainbow trout in different conditions of the basin cultivation.

Material and methods of research. The research was conducted in December 2014 - August 2015 on the basis of the farm "Sloboda-Banilov", located in the village of Vyzhnytsya district of the Chernivtsi region.

According to the technical characteristics of the production base, this economy belongs to the basin type of fish farms. The total working area of the pools is 1100m^2. Water supply of swimming pools is independent and straightforward.

Throughout the research period, the level of saturation of water by oxygen at the entrance to the pool was 60 to 85%, depending on the temperature of water and the intensity of water exchange, and at the root of the pool, respectively, decreased to 50 - 55%. Reducing the concentration of oxygen dissolved in water is due to its active consumption of rainbow trout, which, by its biological characteristics, belongs to oxyfilic fish. According to the basic hydrochemical parameters, water of the source of water supply of the basin economy meets the regulatory requirements for growing rainbow trout [10].

Materials for research were those years, single-year-olds and two-year-olds of rainbow trout grown on the farm. The feeding of fish was carried out by the specialized artificial feed for salmon fish produced by the Danish company "Biomar". During the growing season, the water temperature decreased to 30C in winter and did not grow above 200C in the summer.

The cultivation of fish was carried out in accordance with the technology adopted for rainbow trout [14].

During the research period, thermal and oxygen regimes were monitored. The general chemical analysis of water was carried out according to Alokin's method [15]. The water temperature was measured twice a day (morning and noon). The oxygen content in water was determined daily using an oximeter. Control catches to determine the pace of growth and physiological state of the fish were carried out everywhere. The weight of fish was determined on electronic scales.

Results of the research and their discussion. Growing rainbow trout began in December and completed work in August, due to the implementation of product two-year-olds. The initial average weight of fish was 50g. Fluctuations of the mean monthly water temperature and the content of oxygen dissolved in water during the research period are presented in Fig. 1

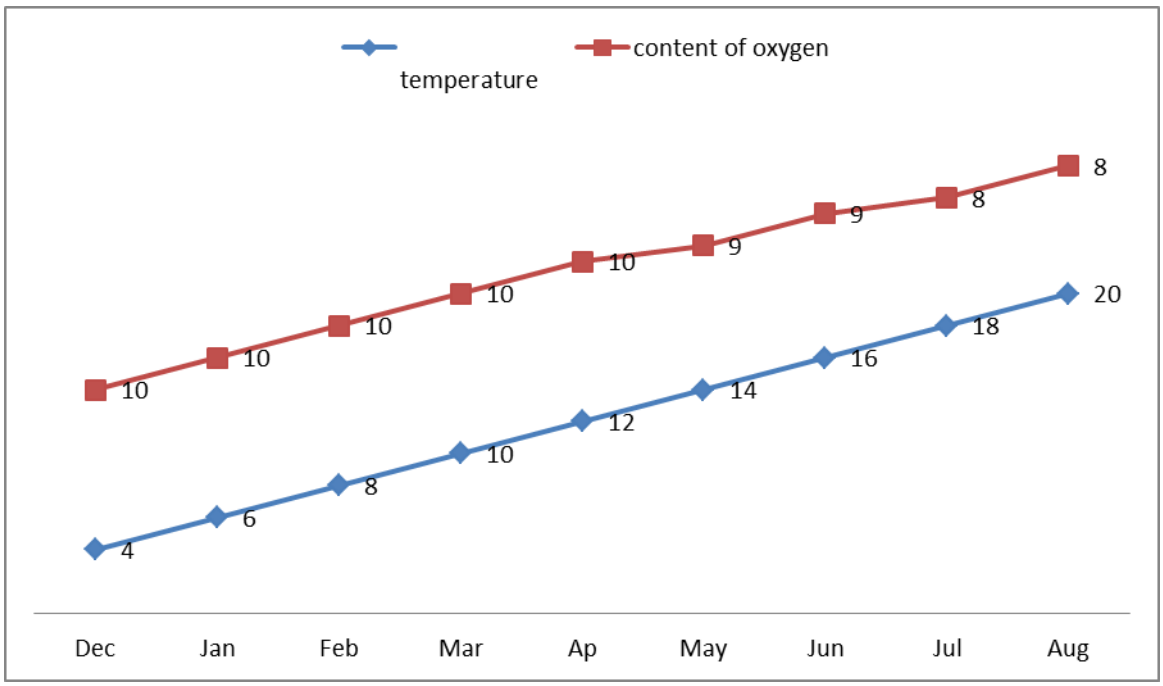

Fig. 1. Dynamics of water temperature and dissolved oxygen content in water

As can be seen from Fig. 1, the temperature of water during the period of growing fish increased from 2.5 to 18. 50 C, and on separate days in July and August warmed to 210C. It is natural that with increasing water temperature the saturation of water with oxygen decreased and on separate days was 55%. As the supply of a water supply source to the fish industry occurs mainly due to atmospheric precipitation and melting of the snow, it is characterized by seasonal variations in power, due to which the water exchange in August was minimal.

The magnitude of the increase in the weight of rainbow trout is closely related to the temperature of water, and its changes have a pronounced seasonal nature (Table 1).

1. Growth of two-year-old rainbow trout from 01.12. 2014 by 20.08.2015 (averaged data for 1 instance of fish)

	Growth per month, kg	Number of days	% increment	Daily gain, kg	Average weight, kg
December	0,005	31	9,09	0,0002	0,055
January	0,008	31	11,76	0,0003	0,068
February	0,013	28	14,94	0,0005	0,087
March	0,019	31	16,67	0,0006	0,114

April	0,025	30	16,67	0,0008	0,15
May	0,039	31	19,12	0,0013	0,204
June	0,055	30	19,50	0,0018	0,282
July	0,074	31	19,07	0,0024	0,388
August	0,072	20	14,46	0,0023	0,498

As can be seen from the table, in January the pace of growth of rainbow trout was minimal, because at low water temperatures the fish was inactive and reluctant to eat fodder. The average daily gain of the rainbow trout was only 9.09% at the minimum daily feed rate (0.6% of the weight of fish). The growth of the size of the increase in fish began in February (11.76%) and peaked in June (19.50%). The decrease in the growth in August was due to the low flow rate of the source of water supply, the reason for this was the dry summer 2015. (see Figure 2).

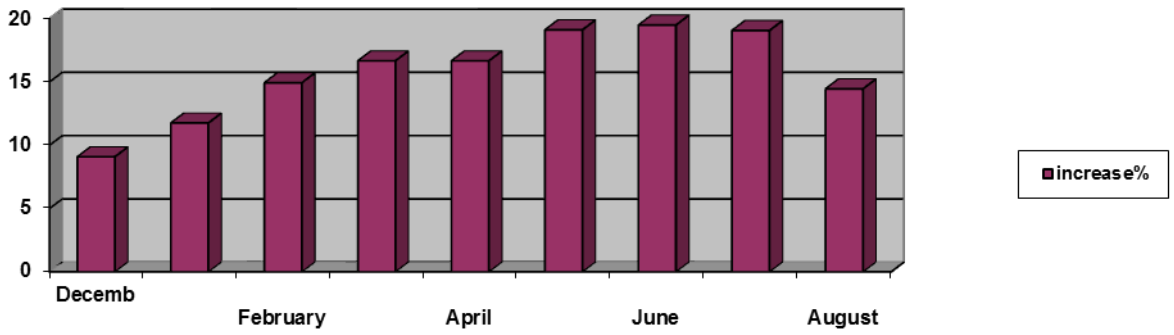

Fig. 2. Average monthly increment of average weight of fish (%)

The absolute average daily gain of the rainbow trout mass reached its peak in July (see Figure 3).

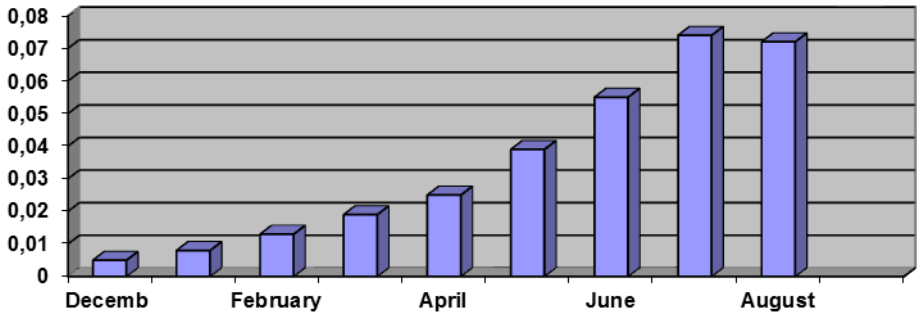

Fig. 3. Growth of the average weight of two-year-old rainbow trout, kg

The pace of the daily gain of mass reached its peak in July, but in August it decreased (Fig. 4).

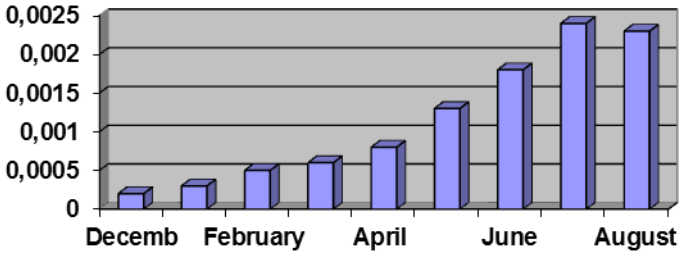

Fig. 4 Average daily gain of two years, kg

One of the most important indicators that determine the economic efficiency of intensive rearing of fish is the value of the conversion rate of feed, in this connection, leading world producers are constantly working on improving feed formulations, which will allow to reduce feed costs to a maximum extent to increase the mass of fish. According to the control catches, the values of the feed factor of the production feed were calculated throughout the research period (Table 2).

2. The values of the feed factor when growing rainbow trout

Date	Number of fish, ex	Average weight of fish, kg	Total weight of fish, kg	Number of feed forage, kg	Feed factor
01.12.2014	10000	0,050	500	-	-
10.12.2014	9997	0,052	519	34	1,79
20.12.2014	9967	0,055	548	36	1,24
01.01.2015	9947	0,060	596	54	1,13
10.01.2015	9926	0,063	625	27	0,93
20.01.2015	9912	0,068	674	40	0,82
01.02.2015	9897	0,074	732	60	1,03

10.02.2015	9884	0,080	790	60	1,15
20.02.2015	9868	0,087	858	60	0,88
01.03.2015	9852	0,095	935	60	0,78
10.03.2015	9820	0,104	1021	76	0,88
20.03.2015	9811	0,114	1118	80	0,82
01.04.2015	9804	0,125	1225	90	0,84
10.04.2015	9797	0,137	1342	120	0,77
20.04.2015	9791	0,150	1468	120	0,95
01.05.2015	9779	0,165	1613	150	1,03
10.05.2015	9765	0,183	1786	200	1,16
20.05.2015	9753	0,204	1989	215	0,99
01.06.2015	9665	0,227	2193	260	1,27
10.06.2015	9639	0,253	2458	260	0,98
20.06.2015	9616	0,282	2701	260	1,07
01.07.2015	9593	0,314	3012	260	0,84
10.07.2015	9583	0,350	3354	260	0,76
20.07.2015	9566	0,388	3711	260	0,73
01.08.2015	9551	0,426	4068	260	0,73
10.08.2015	9538	0,463	4416	260	0,75
20.08.2015	9525	0,498	4743	260	0,80

As can be seen from the data in Table 2, the feed factor during the growing season has undergone significant changes, according to the temperature of the water in which the fish were grown. It is known that the digestible energy of the feed is most effectively used by the rainbow trout at a water temperature of 180C [16], hence, the feed rate was the lowest (0.73) in July, when the water entering the basins was small, on average a month higher the indicated temperature. The highest fodder ratio was in the first decade of December. Obviously, the main factor that reduced the rate of growth of fish and, accordingly, increased the value of the feed rate, was a low water temperature. In addition, during the first month of growing in the fish pools, they suffered from stress resulting from sorting and planting for cultivation.

Conclusions and perspectives. According to the results of the study, it can be concluded that two-year-old rainbow trout, which was grown in the basins of the farm Sloboda-Banilov, in general, had satisfactory rates of body weight gain and efficiently used artificial fodder. Thus, the feed rate of production feed produced by the Danish company "Biomar" for the entire period of research did not exceed 1.0 at a feed amount announced by the producer in the range of 0.9-1.0.

Taking into account the features of the Sloboda-Banilov fishing industry, related to the seasonal nature of the production of rainbow trout and a certain dependence on the debit of a source of water supply in the summer, it is possible to recommend for the household - to shift the terms of the inflow of the pools of young rainbow trout a month earlier to receive commodity fish until the end of July, avoiding the unfavorable August

growth of water temperature and exacerbating the problem of quality water supply of the pools

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