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Seasonality of Hematological Indicators of Fish Blood

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Annotation: This article presents a comparative analysis of biomorphological parameters of fish cultivated in various ecological regions of Uzbekistan. The studied indicators include standard body length (cm), total weight (g), eviscerated weight (g), individual absolute fecundity (thousands of eggs), and individual relative fecundity (eggs/g). The research was conducted across different months and districts. The results provide insights into how ecological factors influence the fecundity and biometric development of fish.

Keywords: gram, individual absolute fecundity, individual relative fecundity, eggs, silver carp.

Relevance of the topic. Along with other branches of animal husbandry, the demand of our people for fish and fish products is increasing. This, in turn, is leading to the rapid development of fisheries based on new innovative technologies and the widespread implementation of innovative methods of fish farming based on intensive technologies in the industry. As an example, a number of resolutions and orders of our Honorable President are being put into practice. In particular, in accordance with the Resolution of the President of the Republic of Uzbekistan No. PQ-4816 dated August 29, 2020 “On measures to support the fishing industry and increase its efficiency”, in order to support the fishing industry in the Republic, increase the efficiency of fishing and fishing farms, ensure the rational and efficient use of land and water resources in this area, and the widespread introduction of intensive technologies: Starting from 2020, the tax for the use of water resources for fishing farms breeding fish in artificial reservoirs will be calculated at the rates established for irrigation of agricultural land, based on the difference between the volume of water

withdrawn from water bodies and returned.

Research object and methods. Our experiments were conducted on carp fish kept in the fishery of the Akdaryo district of the Samarkand region and the fishery of the Kattakurgan district. For the experiments, 15 fish from each farm were selected on the principle of "similar pairs".

Results and their analysis. During the study, quantitative indicators of erythrocytes, hemoglobin, leukocytes and hematocrit were studied during morphological analysis of the blood of one-year-old fish of the experimental group. These indicators were obtained at the beginning and end of the vegetation period in the experiment.

Blood was collected from the heart of a fasted fish 10–20 minutes after the blood was collected from a well-oxygenated fish. The blood was removed by wiping with a dry cloth to remove mucus and then wiped with 70 0% ethyl alcohol.

Table 1. Leukocyte formula of carp fish in different months, %

Indicators	Norm	Research period			
		march	april	may	june
Red blood cells, * 10 12 / l	0,5-2,0	0,59±0,012	0,49±0,012	0,70±0,03	0,61±0,021
Leukocytes, * 10 9/l	4.9-8.1	4,75±0,31	5,2±0,32	4,1±2,1	5,1±2,01
Hemoglobin, g/l	30-100	43,1±3,1	53,0±2,116	48,0±2,11	44,1±2,1
(Hemoglobin saturation in erythrocytes) SGE, pr.	50-80	74,61	78.8	77.2	79,03

In our scientific research, the blood of different breeds of carp was studied through morphological analysis. The analysis of the data showed that at the end of the experiment, as a result of the increase in live weight of one-year-old carp, the number of erythrocytes in the fish increased. This number of erythrocytes in the 1st experimental group of carp was 4.11+0.113 in April; 3.99±0.32 in May; 3.88±0.52 in June; and in July it was 3.83±0.22, and as the weight of carp fish increased, their Neutrophil myelocyte indicators decreased.

When metamyelocyte neutrophils were studied, they were 4.14±0.26 in April; 4.70±0.28 in May; 4.80±0.33 in June; and 3.98±0.24 in July.

When reticulocyte neutrophils were studied, they were 2.65±0.16 in April; 2.78±0.12 in May; 2.81±0.35 in June; In July, it was 2.98±0.23, and as the weight of carp fish increased, their reticulocyte counts increased.

When segmented neutrophils were studied, they were 84±0.18 in April; 2.89±0.264 in May; 2.72±0.245 in June; and 2.62±0.19 in July, and it was observed that the segmented neutrophil indicators decreased with the increase in the weight of carp fish.

Pseudoeosinophils were 0.41±0.036 in May; 0.21±0.0117 in June, and were not detected in April and July.

Monocytes were 0.5±0.027 in April; 0.32±0.021 in May; and 0.15±0.011 in June, and were not detected in July.

When large lymphocytes were studied, they were 6.11±0.33 in April; 7.02±0.328 in May; 6.38±0.420 in June; and 6.21±0.29 in July, with the highest number of large lymphocytes in May.

When small lymphocytes were studied, they were 80.11±4.14 in April; 79.18±3.65 in May; 85.56±4.29 in June; and 83.19±3.23 in July, indicating different indicators based on changes in the bioecological environment at all stages of the growth and development of fish.

The number of leukocytes in the blood of carp was observed to be normal, but the number of donor leukocytes in the leukocyte formula was slightly increased. This leads to an increase in the general resistance of the body of carp. In our studies, the presence of leukocytes of various types in the peripheral blood of carp is characterized by a decrease in the number of leukocytes relative to phagocytes. This is explained by the physiological characteristics of carp.

This carp is characterized by the presence of the following elements in the peripheral blood: myelocytes and neutrophils, metamyelocytes, network neutrophils, segmented neutrophils and pseudoeosinophils were detected in experiments.

Neutrophils took the second place in the leukocyte formula in terms of percentage, and their share did not change from the physiological norm.

In the experiment, it was determined that the biochemical parameters of the carp's blood serum were normal, and when we studied the amount of protein in their blood, we observed that the amount of protein in the experiments we conducted varied slightly not only in the fish, but also in fish of the same species.

Table 2. Leukocyte formula, %

Indicators	Research period			
	april	may	june	july
Neutrophil myelocytes	4,11+0,113;	3,99±0,32	3,88±0,52	3,83±0,22
Metamyelocytes neutrophils	4,14±0,26	4,70±0,28	4,80±0,33	3,98±0,24
Ribbed neutrophils	2,65±0,16	2,78±0,12	2,81±0,35	2,98±0,23
Segmented neutrophils	3,84±0,18	2,89±0,264	2,72±0,245	2,62±0,19
Pseudoeosinophils	-	0,41±0,036	0,21±0,0117	-
Monocytes	0,5±0,027	0,32±0,021	0,15±0,011	-
Large lymphocytes	6,11±0,33	7,02±0,328	6,38±0,420	6,21±0,29
Small lymphocytes	80,11±4,14	79,18±3,65	85,56±4,29	83,19±3,23

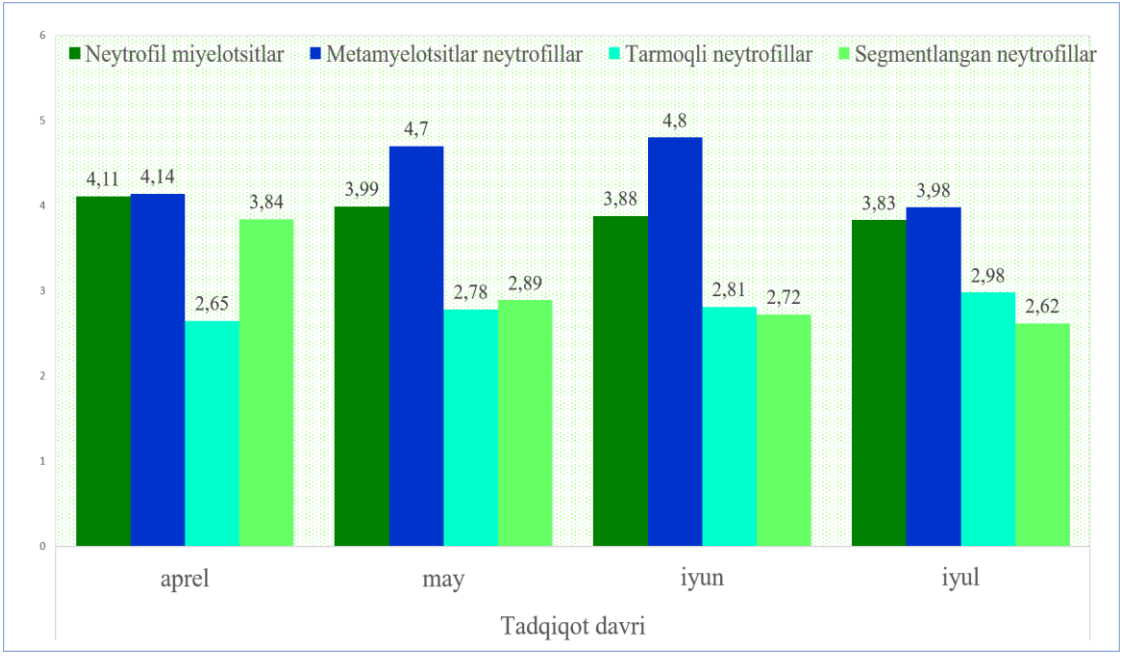

Figure. Leukocyte formula of carp fish in different months.

Conclusion

In conclusion, these indicators of fish are closely related to metabolism and are determined by the

intensity of feeding. Protein deficiency in the fish body leads to infectious and non-infectious diseases and leads to damage to the kidneys and other organs in the body of carp.

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