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GROWTH AND GENERAL PHYSIOLOGICAL CONDITION OF THE *CYPRINUS CARPIO* L. SPECIES UNDER VARIOUS CONDITIONS OF ANTIECTOPARASITARY PROPHYLACTIC TREATMENT

Elena Rada Misailă, Costică Misailă, Gabriela Vasile, Vasile Vulpe

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INTRODUCTION

In modern aquaculture, fish is exclusively viewed as a more element or component of a system, which it influences to a sufficiently high extent and of which it is, in its turn, influenced from various perspectives. The multitude of bioaggressors simultaneously present in the living environment of the fish grown in captivity requires increasingly high standards of readiness and efficiency of the prophylactic and curative methods usually applied. In recent years, practical application of the principle according to which prevention of a pathogenic-type incidence is much more important than its curative treatment has become a "must" for all those involved in such fields (Ghittino, 1983; Misailă, 1998; Munteanu and Bogatu, 2003; Vulpe, 2007).

The present paper discusses the preliminary results of some investigations on the growth of one summer-old common carp fry, during the period of active feeding, performed in the year 2008, in two experimental ponds of the Farm Breeding Farm of Podu Iloaiei, district of Iaşi, in two variants: with and without any preventive antiparasitary treatment.

MATERIAL AND METHOD

The experiments were developed along 105 days (between June and September 2008), in two parking-wintering type basins (BI_5 and BI_6), each with a surface of 5, 500 m and average depth of water of 1.9 m. The common feeding source of water for both basins was the accumulation pond of Podu Iloaiei, so that the levels of aquatic macrophyte vegetation were comparable.

The working material was represented by a pre-developed common carp (*Cyprinus carpio* L.) fry, with an initial average weight of 400 mg / piece, each basin being populated - on June 5, 2008 - with 28, 000 individuals.

Feeding of the fish effectives was made with DIBAQ - type fodder. Between June 6 - July 6 2008, both batches were fed with the MICROBAQ 10 recipe, three times a day. This fodder contains 50% proteins with a digestibility of 92%, 20% lipids, 5% water, 0.5% cellulose, 10% ash, 13% non-nitrogenous extractive substances (NES), 1.5% total phosphorous and a raw energetic level of 5, 917 kcal/kg. In the second stage of the investigations, between July 7 - September 16, 2008, a DIBAQ CIPRINIDOS PLUS fodder occurring as 2 mm in diameter granules, was administered two times a day (between July 7 - August 31, 2008) and, respectively, as 3.2 mm in diameter granules - once a day (between September 1 - September 20, 2008). The fodder contains 44% proteins, with a digestibility of 85%, 7% lipids, 12% water, 4.2% cellulose, 12.5% ash, 18.8% non-nitrogenous extractive substances (NES), 1.5% total phosphorous and a raw energetic level of 4, 454 kcal/kg.

Variant A represents the reference batch, placed in basin BI_5, while variant B, from basin BI_6, is the experimental batch. No preventive antiparasitary treatments were applied to the reference, instead variant B was subjected to the following treatments:

- calcium chloride (3 kg/ha), preventively administered prior to basin filling with fish, and then weekly (10 - 12 kg/basin) starting from July 25;
- trichlorphone (0.3 mg/l water), administered only once, in the middle of July;
- oxytetracycline, as doses of 50 mg/kg living fish, administered daily in the fodder, for 6 days, in the beginning of August.

For determining the growth rhythm, the fish from the two batches was weighed, both in the beginning and in the end of the test, and also after each month of experiment.

For a correct estimation of the general physiological condition of the fish, blood samples have been taken over from 6 common carp representatives for each variant, the average levels of hemoglobin (Hb), the hematocryte (Ht) and the number of the red cell corpuscles (E) being determined, after which the derived erythrocytary constants were calculated (MCV - Ht x 10 / E; MCH - Hb x 10 / E and MCHC - Hb x

100/Ht). Hemoglobin concentration was determined by the visual colorimetric method, with a Gowers - Sahli hemoglobinmeter, the hematocryte - through centrifugation of the microhematocryte capillaries - for 1 - 2 min., at 12, 000 rpm, while the red cell corpuscles were numbered on a ML_4 microscope, with a Bürker - Türk hemocytometer (Misăilă and Comănescu, 1999).

RESULTS AND DISCUSSION

The comparative growth rhythm of the common carp fry evolves, in both variants, according to a curve with a trajectory characteristic to the age of the fish under analysis (Fig. 1). At the same time, the favorable effects of the treatments applied to variant B were noticed, the common carp of this variant evidencing a 333 times higher initial average value (RMWI), *versus* only 290, recorded in the reference. Consequently, as a result of the different growing rhythm values, in variant A, the growth increase is of 86.7 g/piece, while the value recorded in the treated batch reaches a value of 99.7 g/piece (Fig. 2).

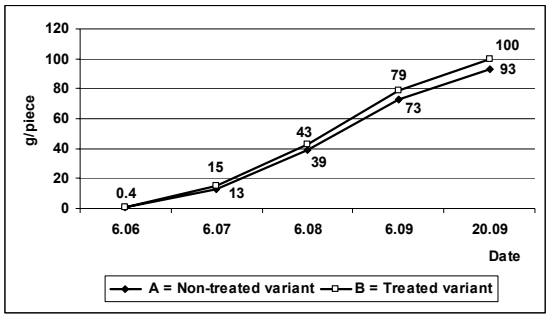

Fig.1. Evolution of the mean individual weight of the fish under investigation

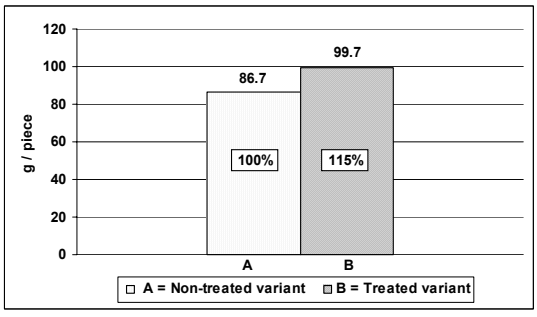

Fig.2. Comparative values of the growth increase in the common carp under study

A possible explanation for this differentiated behavior of the fish from the two variants might refer to a more restricted exposure of the organisms from variant B to the action of bioaggressors, such as ectoparasites, a higher amount of energy remaining thus available for plastic scopes, comparatively with the organisms from the reference, which consume part of the ingested energy for counteracting the parasitary stress. More than that, by their chronic mode of action, parasitary maladies induce long-term discomfort and metabolic disorders, some of them quite serious, with unwanted consequences even upon the capacity of food metabolic valorization.

Indeed, under (both quantitatively and qualitatively) identical foddering conditions, 1 kg of growth increase was registered from 1.543 kg consumed food in variant A, while in variant B, the treated one, the same growth increase was obtained with only 1.418 kg of fodder (Fig. 3), which may be interpreted as a 8.1% higher food conversion.

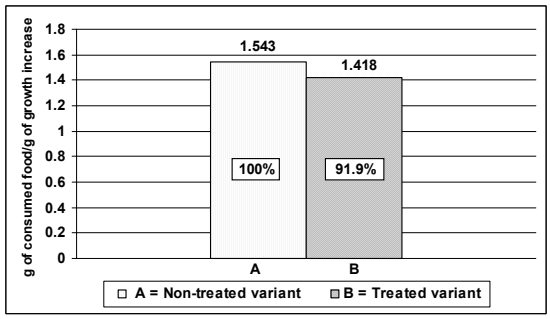

Fig.3. Food conversion in the common carp fry under experiment

The data expressing fodder consumption and the global growth increase permitted calculation of food bioconversion efficiency (EBH%), a 8.79% higher parameter in variant B, *versus* the reference, which therefore indicates that, in the treated batch, 70.5% of the distributed food was transformed into a growth increase, the value recorded in the reference being of only 64.8% (Fig. 4).

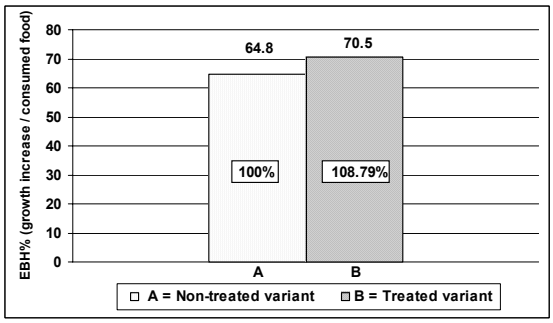

Fig.4. Values of food bioconversion efficiency in the common carp under study

Blood sample analysis suggests an additional hematological prosperity in the experimental variant, comparatively with the reference, an aspect even better evidenced by the values of hemoglobin concentration, which records 6.66% higher average values in variant B, *versus* the reference (Fig. 5), as well as by the number of erythrocytes which, in the experimental

batch, is 16% higher (Fig. 7). As to the hematocryte (Fig.6), the additional hematological prosperity from variant B is less obvious, this parameter evidencing comparable values in both groups of fish.

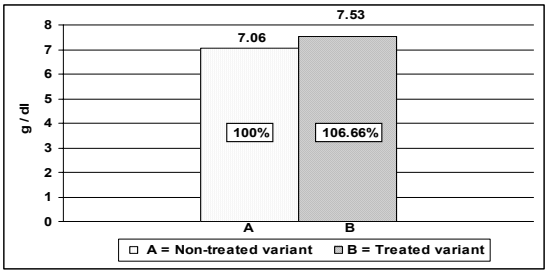

Fig.5. Hemoglobin (g Hb/dl blood)

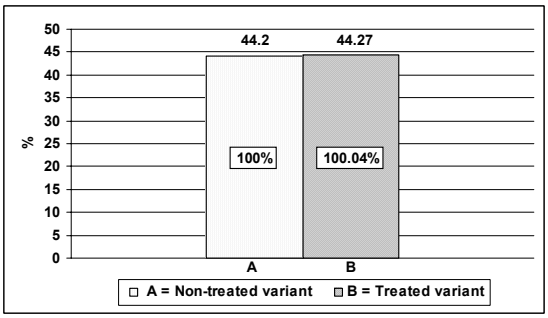

Fig.6. Hematocryte (%)

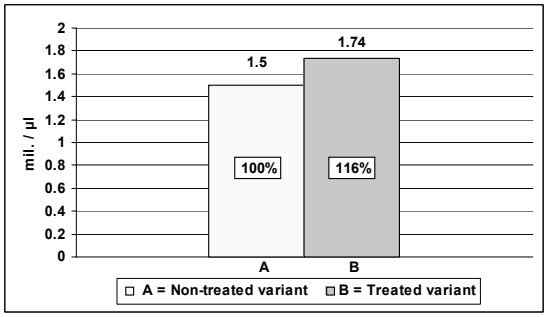

Fig.7. Number of erythrocytes (x 10^6/µl)

The values of the derived erythrocytary constants appear as precious parameters in the diagnosis of various types of anemia (if present in the fish populations), as well as for a correct estimation of the direct adaptation of the breathing function in the fish subjected to temporary stress conditions.

The data obtained show that, in the treated variant, the fish adapts more easily its breathing function, comparatively with the reference, for counteracting the parasitary stress by enlarging the surface of gaseous exchange (Figs. 7 - 8).

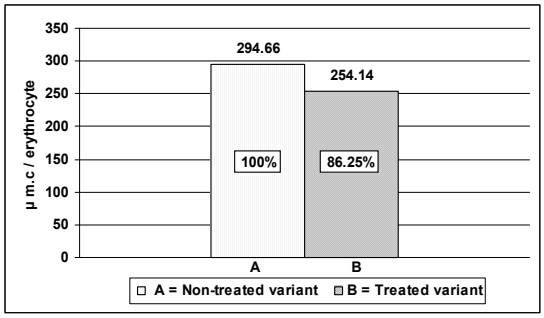

Fig.8. Mean cell volume (µm^3/erythrocyte)

Indeed, in the experimental variant, the erythrocytes are 16% more numerous than in the reference, and also 13.75% smaller in size than the same reference.

This actually represents an adaptation response of the organism, according to which the total exchange surface will be larger in the treated variant, which may be also observed from the positive correlation with the growth rhythm and food conversion.

The MCH and MCHC values agree with those obtained for the mean cell volume, with the level of hemoglobin, attesting a better physiological vigor in the fish from the variant to which preventive antiparsitary treatments had been applied (Figs. 9 - 10).

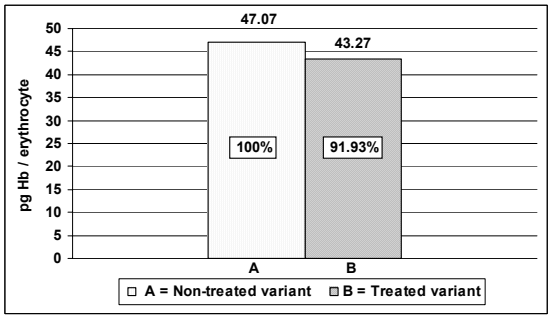

Fig.9. Mean cell hemoglobin (pg Hb/erythrocyte)

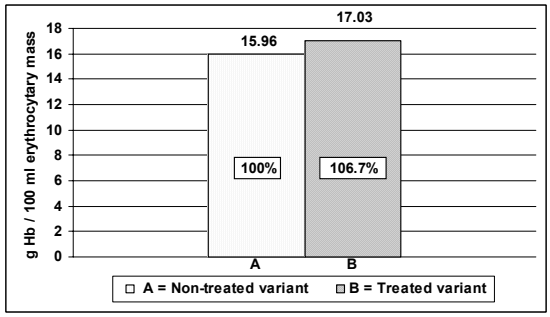

Fig.10. Concentration of mean cell hemoglobin (g Hb/100 ml erythrocytary mass)

ABSTRACT

In the present paper the authors presents the results of fish growing during the 2008 year summer, in the two experimental ponds from the Fishing Farm Podu Iloaiei – Iasi, with and without anti-parasite treatments. at variant 1 (the control) no preventive anti-parasite treatments were accomplished, while at the variant 2 both different treatments were realized: with chloride lime before population (3 kg/ha) and weekly during July 25-September 1 (10-12 kg per basin) and triclorphone, in a unique dose 0,3mg/l water and oxitetracicline in the food for 6 days, from the beginning of August (50 mg/kg fish).

After 102 days from the experiment, at variant 2, the crap sapling registered an supplementary increase of 8,7% and an efficiency of food conversion higher with 8,79% comparative with the control.

In physiological plan, we observed higher level of hematological prosperity at fish from the variant with the treatment comparative with the control. So, the average level of hemoglobin is 6.66% higher when comparing with the control, and the number of erythrocyte with 16%.

The fishes from the variant B proved an enhanced adaptive efficiency of respiration.

At this variant we took in consideration a higher respiratory surface comparing with the control, by totalizing the surface of a higher number of globules with a more reduced individual volume. The parasite infestations with protozoa and metazoan were significant reduced (- 8%) at variant 2 comparing with the control.

CONCLUSIONS

1. The 105 day-long experiment applied to one summer-old common carp fry evidenced an additional growth increase of 15% for the variant subjected to antiparasitary treatments.
2. In the treated fish, the metabolic valorization of food was more efficient than in the reference, food conversion showing 8.1% lower values, while the EBH% level was 8.79% higher than in the non-treated variant.
3. The effect of the preventive antiparasitary treatments upon the general physiological condition of one summer-old common carp induces a higher level of hematological prosperity than in the non-treated fish, the average value of hemoglobin being 6.66% higher, while the erythrocyte number was 16% higher.
4. The additional physiological vigor of the fish from the treated basin is also reflected in a higher adaptation capacity of the breathing function, by a larger surface for gaseous exchanges, a case in which a 16% higher number of red cell corpuscles and a 13.75% lower mean erythrocytary volume was recorded, comparatively with the reference.

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AUTHORS' ADDRESS

MISĂILĂ COSTICĂ - "Alexandru Ioan Cuza" University of Iaşi, Carol I Bvd., 20 A, Faculty of Biology, Laboratory of Biochemistry and Molecular Biology, Romania, e-mail: cmisaila@uaic.ro

MISĂILĂ ELENA RADA - Research and Development Station for Aquaculture and Aquatic Ecology, CP 847, OP 3, 700508 Iaşi, Romania, e-mail: rada2007misaila@yahoo.com

VASILE GABRIELA - "Alexandru Ioan Cuza" University of Iaşi, Carol I Bvd., 20 A, Faculty of Biology, Laboratory of Biochemistry and Molecular Biology, România, e-mail: gabriela.vasile@uaic.ro

VULPE VASILE - "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine, Mihail Sadoveanu Alley, 3, Faculty of Veterinary Medicine, Iaşi, Romania, e-mail: vasile_vulpe@yahoo.com