

CORRELATIONS BETWEEN THE PROTEINEMY AND GLYCEMY OF SOME CYPRINIDS AND THE ANTIPARASITARY TREATMENTS APPLIED

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Key words: cyprinids, proteinemy, glycemy, antiparasitary treatments

Abstract: The paper analyzes the modifications produced in some biochemical indices (proteinemy and glycemy), determined in the blood of certain one year-old culture cyprinids, namely: common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*Aristichthys nobilis*), subjected to some prophylactic antiparasitary treatments. The experiment was performed between April 2007 and April 2008, in 0.5 ha ponds, each basin being populated with 79% common carp (245 g/piece), 11% silver carp (475 g/piece) and 10% bighead carp (425 g/piece). In the reference pond, no treatments were applied, while the experimental variant was prophylactically treated both in the moment of pond's filling (April 2007) and during the growing period, with **trichlorfon**, applied in preventive doses of 0.1 mg/L, in two steps, and **calcium chloride**, 2 kg/ha, twice a week, respectively. The concentration values of the biochemical indices were determined one year after the experiment (March-April 2008). The results obtained attest that the preventive anti-ectoparasitary treatment applied to the three fish species has positive effects on their physiological condition, generally, on proteinemy and glycemy - especially. In the treated silver carp, spring proteinemy is 23% lower, while glycemy is 35% lower - comparatively with the reference. In the treated common carp, the two biochemical indices show an increasing tendency, with 19% in proteinemy and 27% in glycemy - respectively.

INTRODUCTION

The researches devoted to the evolution of some biochemical parameters, such as blood glucose, proteinemy etc., in culture fish are justified by their significance for estimating the general health condition of the animals, as well as the possible conditions of the food, technological and parasitary stress (Kebus *et al.*, 1992; Barryet *et al.*, 1993; De Dominis *et al.*, 1993; Bau *et al.*, 1994; Rehulka, 1996). Some investigations have evidenced important modifications of such indices under conditions of severe hypothermy and over-density stress, in culture cyprinids (Misăilă *et al.*, 2005). Consequently, the biochemical response of common carp, silver carp and grass carp to such stress conditions is manifested in a 27.7 - 94.8% increase of glycemy (comparatively with the initial values) and in a 2.8 - 27% decrease of proteinemy, respectively.

The preventive application of some antiparasitary treatments in the basins of the pre-development and growth of such fish is expected to bring about a higher functional prosperity of the general physiological condition of the treated fish, comparatively with the non-treated ones, as a result of the running diminution of the parasitary stress.

Generally, the normal concentration values of seric proteins in culture cyprinids from the third growth summer range between 3.1 - 4.7 g/dL, a direct correlation being sometimes established between the proteinemy values and the health condition of adult common carp populations (C₂₊) from various ponds (Patriche, 2007). Consequently, if the values of proteinemy are >3g/dL, the common carp is healthy, while values < 3g/dL show that the fish is potentially ill and, finally, proteinemy values below 1.8 g/dL serum indicate affected organisms. For the moment, the existing data provide no values for younger fish (first and second growth summer).

As to the values of glycemy in adult cyprinids, they oscillate - according to the same authors - between 40 and 90 g/dL serum, certain correlations being again suggested between the glycemy levels and the quality of the fodder, starvation condition of the fish, growing density etc.

The present paper describes the preventive antiparasitary treatments applied as early as the moment of ponds populating, the biochemical response of the fish being compared for the two variants: with and without treatment application, on considering the values of proteinemy and glycemy, dosed both in the end of the growing period (November) and in the end of the cold season (April).

MATERIALS AND METHOD

The investigations - developed between April 2007 and April 2008 at the Research and Development Station for Aquaculture and Aquatic Ecology of Iași - were performed on two parallel variants of an experimental pattern. The

batches were put into two ponds (each with a surface of 0.5 ha), each of them populated with a polyculture formula, including: 79% common carp (245 g/piece), 11% silver carp (475 g/piece) and 10% bighead carp (425 g/piece).

In the reference batch, the experiment involved no antiparasitary treatments, while the experimental variant was prophylactically treated both in the moment of ponds filling (April 2007) and during the whole growth period, with preventive doses of 0.1 mg/L tichlorfon, administered in two steps and calcium chloride (2 kg/ha), twice a week, respectively.

Fish feeding consisted of a granulated concentrated fodder, prepared according to the SAPROFISH 32/SA-1 receipt, the daily administered ratio representing 3-5% of the existing piscicultural biomass. Fodder composition was represented by 32% brute protein, 7% cellulose, 13% humidity and 8% fats. The ratios were periodically updated, on the basis of the control weighing results, performed monthly, by the polling method.

In the end of the experimental period, five fish from each species have been taken over, both from the reference, and the experimental pond, after which blood samples were collected.

Glycemy was determined by the methods with orto-toluidine (Artenie *et al.*, 2008), and proteinemy by the refractometric method, on an ABBE type refractometer (Artenie and Tănase, 1981).

RESULTS AND DISCUSSION

As generally known, proteinemy and glycemy represent especially important parameters, both for evidencing the nutritional condition of fish under certain experimental conditions, and for correctly evaluating the thermal, nutritional and parasitary stress conditions, once known that glycemy is probably the most suggestive index applied in the diagnosis of stress and of its severity, as well.

The results of the investigations, graphically plotted in Figures 1 and 2, may be compared as a function of both the experimental moment (November and April) in which proteins and blood glucose were dosed, and the experimental variant (with or without treatment) considered for analysis.

As to the first situation, one may observe that, in the spring determination, the values of proteinemy (Fig. 1) are higher than the autumn ones, for all species and all variants. Thus, in the case of common carp, the increase of spring proteinemy is 37-57% higher than the autumn values while, in the case of silver carp, the increase is less pronounced (of 3-27%), the bighead carp registering the highest increase (29-88%). A possible explanation might be that, in April 2008, water temperature had already attained values at which fish active feeding was quite intense, comparatively with the values recorded in November, the fish from both variants rapidly restoring their blood protein reserves.

Another observation refers to the fact that, each time, the values of such increase are higher in the reference than in the treated batch. Apparently, such differences are unusual, nevertheless they come from the percent values recorded in spring and autumn, seen as lower - in absolute value - in the untreated than in the treated fish.

A similar analysis on the evolution of glycemy (Fig. 2) shows an important increase in the spring values, comparatively with the autumn ones, both in the common carp and silver carp from the reference batch (60-133%), and in the treated batch (52-63%), comparable values being observed in the case of bighead carp.

As to the second motivation (experimental variant), it is estimated that proteinemy takes higher values in the treated batch comparatively with the reference, in both experimental moments, *i.e.*, 18-19% higher in common carp and 11-62% higher in bighead carp, respectively. In silver carp, the reference values are comparable with those of the experimental variant, even 5-23% higher. A possible explanation for the higher proteinemy in common carp and bighead carp may be related to the additional physiological comfort installed, through reduction of the parasitary stress.

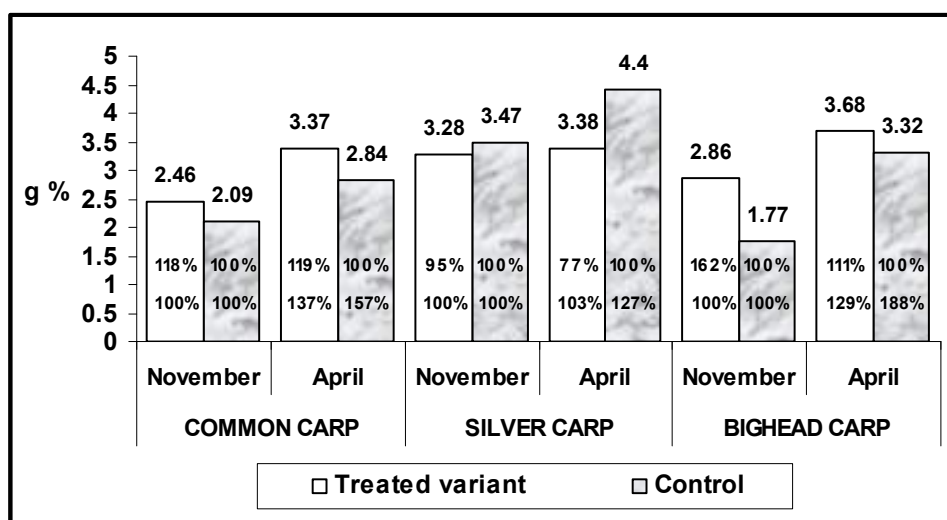


Fig.1. Proteinemy in the fish under experiment

* The top percents represent the comparison as a function of the experimental variant (with or without treatment)
 ** The bottom percents represent the comparison as a function of the experimental moment (November and April)

Glycemy, instead, records a non-uniform evolution, more exactly, in the case of common carp, the values registered in the treated batch are higher than in the reference, both in autumn (+33%), and in spring (+27%), suggesting the existence of some additional energetic reserves, comparatively with those of the reference. In bighead carp, mention should be also made of a +12% increase in glycemy, in November, in the treated batch, *versus* the reference, while, in spring, the glycemy values in the treated bighead carp decrease with -6%, such a diminution being observed - in the treated silver carp - both in autumn (-7%), and in spring (-35%).

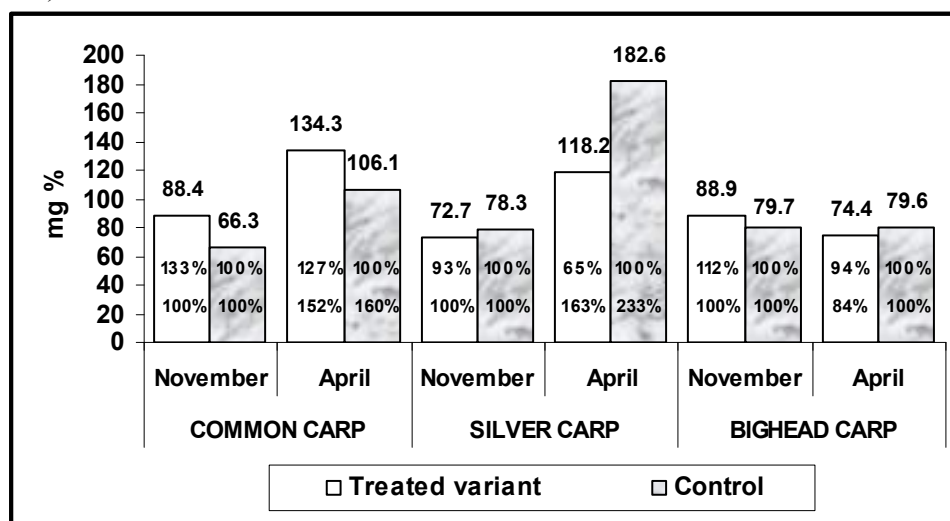


Fig.2. Glycemy in the fish under experiment

* The top percents represent the comparison as a function of the experimental variant (with or without treatment)
 ** The bottom percents represent the comparison as a function of the experimental moment (November and April)

The higher glycemym values recorded in the two species of Asian cyprinids from the untreated batch suggest a more intense stress condition in the untreated fish and a more difficult adaptation to the wintering conditions of our country.

CONCLUSIONS

1. The levels of proteinemy and glycemym in the three species of cyprinids under investigation range between the normal variation limit cited in the literature of the field for three year old-ages, any increase in glycemym over these values, in fish from the second summer, being also a consequence of the post-wintering stress.

2. In April, proteinemy evidences higher values than in November, for all species and in all experimental variants, the fish rapidly restoring the blood protein reserves, under conditions of an early initiation of active feeding.

3. The evolution of the glycemym values shows an important increase in spring dosage, comparatively with the autumn one, especially in the common carp and silver carp from both experimental variants.

4. Proteinemy attains higher values in the treated batch, comparatively with the reference, in both experimental moments, especially in common carp and bighead carp, which is the result of the additional physiological comfort induced by a more reduced parasitary stress.

5. In the two species of Asian cyprinids from the untreated batch, the values of glycemym are higher than those recorded in the treated variant, which suggests a possible intensification of the stress conditions in untreated fish, as well as a more difficult adaptation to the wintering conditions of our country.

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