Centre for Cyanobacteria and their Toxins

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"Cyanobacterial water blooms: effects, consequences and management"

BOOK OF ABSTRACT

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DO CYANOBACTERIAL WATER BLOOMS INFLUENCE THE FISH MUSCLE QUALITY?

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The objective of this work was to evaluate the influence of cyanobacterial water blooms on muscle composition of the common carp (*Cyprinus carpio*) and the silver carp (*Hypophthalmichthys molitrix*). Fish were reared under natural conditions without additional feeding. Experimental fish were placed into cages in store-ponds with cyanobacteria water blooms for 28 days. Control fish were placed into the cages in store-pond without cyanobacterial water blooms. After exposure they were placed to the pure water for the same time. Samples of muscle were taken every week. Indices of chemical muscle composition (dry matter, proteins, fat and ash matter), content of fatty acids (FA) and amino acids (AA) were determined. The contents of microcystins in water and in muscles, liver and skin of fish were monitored, too.

The highest content of microcystins in water was at the start of the experiment (7.4 $\mu g.L^{-1}$). It was lower (3.7 $\mu g.L^{-1}$) at the end of the exposure. The muscle of the silver carp and the common carp contained the highest amount of microcystins (4 and 1.6 ng MC-LR g^{-1}, respectively) in the 2nd week of exposure. Then and after transfer into the clean water the amount of microcystins decreased. The highest content of microcystins in the liver was about 10 times higher than in the muscle, but the peak concentration occurred later in comparison with the content in muscle. There were minimal changes of chemical muscle composition indices in the common carp exposed to cyanobacterial water bloom compared to control group. Muscle composition changes in the silver carp were more pronounced. Changes included also the spectrum of fatty acids and amino acids. There was a marked drop in fatty acids, in particular mono as well as polyunsaturated ones. The drop in the n-3 (including EPA and DHA) levels led to a lower ratio of n-3/n-6. Considering the spectrum of amino acids, there was a significant rise in the level of cystine, methionine, threonine and proline and a drop in serine, glutamic acid, alanine, leucine, lysine and arginine. When experimental fish were transferred into fresh and clean water, the values returned partly to normal. The trend was the same as in study by Kopp et al. (2006): no significant changes in the common carp and significant changes in the content of fatty acids and amino acids in silver carp. The authors also describe increase of total fat, dry matter and weight of the silver carp exposed to cyanobacteria. We can summarize that the changes are typical for the silver carp, for which water blooms of cyanobacteria present indispensable part of feeding content. Thus the changes in muscle composition of the silver carp are more pronounced in comparison with the common carp that do not digest cyanobacterial water blooms at all. The changes are dependent on the structure of water blooms and can negatively influence the muscle composition of the silver carp.

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