

Cadmium Accumulation and Depuration Characteristics through Food Source of Cage-Cultivated Fish after Accidental Pollution in Longjiang River

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Abstract : Heavy metal pollution accidents, frequently happened in this decade in China, severely threaten aquatic ecosystem and economy. In January 2012, a basin-scale accidental Cd pollution happened in Longjiang River in southwest China. Although water quality was recovered in short period by emergency treatment with flocculants, a large amount of contaminated cage-cultivated fish were left with the task of preventing or mitigating Cd contamination of fish. In this study, unpolluted *Ctenopharyngodon idellus* were fed by Cd-contaminated macrophytes for assessing the effect of Cd accumulation through food exposure, and the contaminated *C. idellus* were fed with Cd-free macrophytes for assessing the ability of Cd depuration. The on-site cultivation experiments were done in two sites of Lalang (S1, accidental Cd pollution originated) and Sancha (S2, a large amount of flocculants were added to accelerate Cd precipitation) in Longjiang river. Results showed that Cd content in fish muscle presented an increasing trend in the accumulation experiment. In S1, Cd content of fish muscle rose sharply from day 8 to day 18 with higher average Cd content in macrophytes and sediment, and kept in the range of 0.208-0.308 mg/kg afterward. In S2, Cd content of fish muscle rose gradually throughout the experiment and reached the maximum level of 0.285 mg/kg on day 76. The results of the depuration experiment showed that Cd content in fish muscle decreased and significant changes were observed in the first half time of the experiment. Meanwhile, fish with lower initial Cd content presented higher elimination constant. In S1, Cd content of fish significantly decreased from 0.713 to 0.304 mg/kg in 18 days and kept decreasing to 0.110 mg/kg in the end, and 84.6% of Cd content was eliminated. While in S2, there was a sharp decrease of Cd content of fish in 0-8 days from 0.355 mg/kg to 0.069 mg/kg. The total elimination percentage was 93.8% and 80.6% of which appeared in day 0-8. The elimination constant of fish in S2 was 0.03 which was higher than 0.02 in S1. Collectively, our results showed Cd could be absorbed through food exposure and accumulate in fish muscle, and the accumulated Cd in fish muscle can be excreted after isolated from the polluted food sources. This knowledge allows managers to assess health risk of Cd contaminated fish and minimize aquaculture loss when considering fish cultivation after accidental pollution.

Keywords : accidental pollution, cadmium accumulation and depuration, cage-cultivated fish, environmental management, river

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