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Assessing the Levels of Heavy Metals (Pb, Hg, and Cd) in Native Fishes of the Saimareh River and Farmed Fishes in Ilam Province, Western Iran

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ABSTRACT

Introduction: Heavy metals tend to accumulate in fish tissues, making fish effective biological indicators for environmental contamination. As fish occupy higher levels in the food chain and represent a key component of the human diet, monitoring their health is critical for food safety. This study aimed to evaluate the concentrations of lead (Pb), mercury (Hg), and cadmium (Cd) in native fish species from the Saimareh River and farmed rainbow trout in Ilam Province, western Iran.

Methods: A total of 30 randomly selected samples, including native fish from the Saimareh River and farmed rainbow trout from Ilam Province, were collected for analysis. Samples were washed with distilled water, dried at 105°C for 24 hours, and weighed. Heavy metal concentrations were measured in dry weight using a PG Instruments AA990F atomic absorption spectrophotometer. Data were analyzed using STATA version 18.

Results: In farmed rainbow trout, Pb concentrations ranged from 0.007 to 0.19 µg/g dry weight (mean: 0.079 µg/g), while in native fish, levels ranged from 0.015 to 0.16 µg/g (mean: 0.1 µg/g). The mean concentrations of Hg and Cd in farmed rainbow trout were 0.033 and 0.037 µg/g, respectively. In native fish, the respective values were 0.023 and 0.013 µg/g. The average body weight was 1400 g for farmed rainbow trout and 1314 g for native fish. Heavy metal levels in both fish types were below international guidelines established by FAO, WHO, and national Iranian standards. A statistically significant positive correlation was found between fish weight and Pb concentration in farmed trout ($P < 0.05$).

Conclusion: The concentrations of Pb, Hg, and Cd in both farmed and native rainbow trout from Ilam Province were within acceptable safety limits, posing no significant health risk to consumers. These findings support the safety of consuming these fish species from a heavy metal contamination perspective.

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