Mercury, lead, arsenic and cadmium in fresh and frozen farmed shrimp and pond water from three shrimp farms

Mercúrio, chumbo, arsênio e cádmio em camarões frescos e congelados coletados em três fazendas

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Trace metals are not obvious pollutants present in shrimp farm effluents. However, some trace metals are present as natural components in aquafeeds, as impurities in fertilizers or as active principles of pesticides, which can be accumulated in shrimp tissue. It were analyzed 90 muscle samples of fresh and frozen farmed shrimp and pond water collected in three farms in Brazil, between September 2008 and March 2011. It were determined total mercury concentrations by a flow injection mercury system and, lead, arsenic and cadmium concentrations by graphite furnace atomic absorption spectrophotometry. Mercury levels in the farmed shrimp ranged from 0.01 – 0.18 mg.kg-1 in fresh shrimp, and from 0.002 – 0.008 mg.kg-1 in frozen shrimp (wet weight). A similar behaviour was observed to lead concentrations, since frozen shrimp presented markedly lower lead concentrations (0.30 – 0.89 mg.kg-1) than fresh shrimp (0.92 – 2.89 mg.kg-1). In the case of arsenic, were observed concentrations of 0.01 – 0.77 mg.kg-1 in fresh shrimp muscle, and were no detected concentrations of this trace metal in muscle of frozen shrimp (Limit of detection of 0.002 mg.kg-1). The shrimp freezing process consists of a preliminary washing thoroughly in chlorinated water (5 ppm) to remove any remaining mud or sand, and to reduce bacterial contamination. The shrimp are drained as much as possible and are then ready for freezing through quick-freezing tunnel (individually quick frozen). There is no evidence indicating that this process contributed to the reduction of trace metals levels in frozen shrimp, but is clear that lead, arsenic and mercury levels are markedly lower in frozen than fresh shrimp. It was observed low concentrations of trace metals in pond water and also in shrimp muscle. In relation to the monitored years, in 2008 it was observed a slightly higher concentration of all trace metals in fresh shrimps compared to other years. Episodes of intensive precipitation caused recurrent devastating floods in the region in 2008, and caused harm to farms evaluated. Thus, increased concentrations of these trace metals in the rainy season may be related to resuspension of particles deposited in the sediment of the bottom in the ponds and therefore available for incorporation into these trace metals by aquatic biota. It can be concluded that farmed shrimp in Brazil is safe for human consumption. Thanks go to CNPq/MAPA/SDA 577906/2008-9 for finantial support and scholarships conceded.

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Total mercury in feed, muscle and liver of farmed Nile tilapia

Mercúrio total em rações, filés e fígado de tilápia do Nilo de pisciculturas

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Fish consumption is considered the most important source of contaminant exposure for humans beings, and farmed fish can be exposed to contaminants via feed supply. Total mercury concentrations (THg) were determined in the muscle, liver and feed of farmed Nile tilapia (juveniles and adults) from four different fish farms (net cage and pond systems), by a flow injection mercury system. Mercury concentrations observed in muscle and liver were lower than the values recommended by Brazilian regulatory agency (Anvisa) for fish of 500 µgTHg.kg-1 and fish farm NC1 showed the highest THg concentrations when compared to the other fish farms. There are reports of strong gold exploration around 1987 in this region, where more than 100 ferries worked in mining this metal. The low THg concentrations found in muscle of farmed tilapia in this study confirm the low tendency of these fish to accumulate Hg, since they are less exposed to this contaminant than wild tilapias. Other factors, such as higher growth rate and shorter life span when compared to wild fish can contribute to marked reductions in THg concentrations. Body lipid content can also influence contaminant concentrations accumulated in an organism. Lipid concentrations in the present study in fish muscle ranged from 0.7 to 4.3%, noting that lipid levels were higher in NC than in PS fish farms. Thus, higher THg concentrations in the muscle tissue with lower lipid concentrations (PS farms) were observed. The low THg concentrations found in the analysed fish feed (5.2 – 33.2 µg.kg-1) can be also responsible for the low concentration in fish muscle. Therefore, continuous monitoring of contaminant concentrations in fish feed is necessary due to variations in the use of ingredients, which cause variations in the concentrations of undesirable substances in commercial feeds. In relation to tissue analysis, a statistically significant difference ($P < 0.05$) between Hg accumulation in liver and muscle was observed, where the liver presented the highest concentrations. Regarding fish age difference, a statistically significant difference ($P < 0.05$) was observed when comparing Hg accumulation between adults and juveniles, with larger fish having higher THg concentrations than smaller fish. Differences in bioaccumulation rates can be related to the different nutritional needs of fish in different life stages. Thus, fish age is an important factor, due to changes in food supplies, as well as the increased exposure time of the animals to Hg.

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Development of an immunoassay for the differential diagnosis of trypanosomosis of veterinary interest: A preliminary proteomic survey of *Trypanosoma evansi* trypomastigotes using lc/ms/ms approach for differential diagnostics

Desenvolvimento de um imunoensaio para diagnóstico diferencial da tripanossomíase de interesse veterinário: Um levantamento preliminar da proteômica de tripomastigotas de Trypanosoma evansi usando a abordagem LC/MS/MS para o diagnóstico diferencial

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The veterinary trypanosomes *Trypanosoma evansi* and *Trypanosoma vivax* are parasites that affect many animals species such as horses, camels and bovines causing significant economic losses to livestock industry around