

As and Hg assessment of cattle exposure in pasture lands around the Estarreja Chemical Complex (Aveiro, Portugal). Preliminary results near the S. Filipe sewage outlet

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Chemicals of potential concern (COPCs) are chemicals which are present at a site and occur at concentrations which are or might be of health concern to exposed humans or animals. The Estarreja Chemical Complex (Aveiro, Portugal) is one of the most problematic portuguese sites with high levels of COPCs. This study was performed to assess the exposure of cattle to As and Hg in pasture lands around the Estarreja Chemical Complex (ECC) in order to evaluate animal health risks. Composite soil samples of 10 pasture lands (topsoil layer) and respective available forage plants (*Avena sativa* L., *Avena strigosa* Schreb, *Gaudinia fragilis* (L.) Beauv., *Holcus lanatus* L.) were collected at south of the ECC, in the proximity (<1 km) of the S.Filipe sewage outlet.

The sampled soils present in the loam-clay fraction (<63 μ m) As (17to>10000mg kg⁻¹) and Hg concentrations (0.1to>100mg kg⁻¹) that exceed in the same sites the Canadian soil guideline values (12 and 6,6mg/kg, respectively) set for any land use (agricultural, residential/parkland, commercial). The sampled forage plants (shoots and leaves) present As concentrations ranging from 1.7 to 254.7 mg kg⁻¹ dry weigh and Hg concentrations between 0.02 and 4.73 mg kg⁻¹ dry weigh, which are similar to those found in literature for plants grown in contaminated sites. Unfavorable health effects of such high As and

Hg concentrations in soils and forage plants could be expected in farm animals. In pasture lands, cattle (cow/ox) exposure to these elements was evaluated considering the following routes: direct ingestion of soil particles (Dingsoil) and forage plants (Dingfood), and inhalation of resuspended particles through the mouth and nose (Dinha). The estimated combined exposure dose (Dingsoil+Dingfood+Dinha), take into account site-specific data as hours, days, weeks in a year of cattle exposure as well as soil and food ingestion and inhalation rates for cattle. The results of this exposure range from 0.013 to 1.19 mg kg⁻¹ day for As and from 1.5E-4to 0,037 mg kg⁻¹ day for Hg. The estimated assessment indicates that exposure to ingestion of forage plants was the predominant route. If the ingestion of water (As:797.2 μ g/L, Hg:1.8 μ g/L for one sample collected in the area) was also considered, the combined exposed dose would reach maximum values of 1,94 mg kg⁻¹ day for As and an equal dose concentration for Hg. These preliminary results suggested no potential animal health effects as such values are lower than the maximum tolerable dietary levels recommended for domestic animals. However for the samples with higher As and Hg in soil (>10000mg kg⁻¹ and >100mg kg⁻¹, respectively) the expose doses were underestimated and did not support the previous analysis.

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