

Analyses of cadmium, dioxins, furans and biphenyls in meat, liver and kidney from cattle

Area of research interest: [Chemical hazards in food and feed](#)

Study duration: 2013-12-01

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Project code: FS102047

Conducted by: Food and Environment Research Agency

Summary

Cadmium (Cd) is a toxic heavy metal found both naturally in the environment and also as a result of industrial and agricultural processes. It enters the food chain via uptake by plants from contaminated soil or water, which in turn are consumed by animals. Due to its slow excretion, Cd accumulates overtime, primarily in the kidneys and liver, which can lead to renal dysfunction and bone demineralisation.

Research Approach

441 samples of muscle, liver and kidney from 147 cattle were taken directly from slaughterhouses throughout the UK between December 2013 and March 2014. The sampling included cattle from three different age groups: 48 cattle aged < 30 months, 51 cattle aged 30 to ? 72 months and 48 cattle aged over 72 months.

All samples were analysed for cadmium and other elements of interest (lead, arsenic, copper and selenium) using inductively coupled plasma-mass spectrometry (ICP-MS). 25 of the muscle and 25 of the liver samples (paired meat and liver from the same animal) were also analysed for dioxins, furans and biphenyls using high resolution gas chromatography-mass spectrometry (GC-MS).

Results

The highest Cd levels were found in kidney samples from the oldest age group (over 72 months), where seventeen (17) of these kidney samples contained Cd > 1.0 mg/kg, with an average level for this group of 0.89 mg/kg. Cattle from the youngest age group (< 30 months of age) contained the lowest Cd levels, with an average of 0.19 mg/kg and only one contained Cd > 1 mg/kg. The average Cd level for the middle age group (30 to ? 72 months) was 0.41 mg/kg and two contained Cd > 1 mg/kg. The middle age group also had the highest individual sample at 4.15 mg/kg.

All of the meat and liver samples tested for dioxins, furans and biphenyls were within maximum permitted levels.

Research report

PDF

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