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Press release of the Study "Lead in Game Meat – Bioaccessibility of metallic lead fragments" by Prof. Christer Holmgren and Prof. Ulf Qvarfort, presented at the WFSA Plenary Session 2013.

LEAD IN GAME MEAT

Bioaccessibility of metallic lead fragments

The recently published Swedish study of "Lead in game meat", shows that the bioaccessible part of metallic lead fragments in the gastrointestinal tract is insignificant from a health perspective. The results from the investigation show that only 1 - 2% of accidentally ingested lead fragments can be converted to absorbable forms in the stomach. And in the intestinal tract less than 0.05% is converted.

The use of lead ammunition for hunting is thought to pose a significant health risk to hunters, their families and other consumers of wild game. The average concentrations of metallic lead likely to be present in game meat, especially in wild boar, as estimated by the EFSA and BfR, is considerably higher than the limits set by the EU for meat from cattle.

However, lead metal, even in a finely divided form, cannot, if ingested, be absorbed directly into the body. It is only water-soluble lead compounds or free lead ions which can be absorbed into the body's organs, tissue, blood and bone, and in this form only 20% can be absorbed by adults on average (EFSA, 2010).

The release of bioavailable lead in the gastrointestinal tract

The results of the study published today have been obtained by *in vitro* simulation. This means that tissue samples taken directly from, and around, the wound channel of wild boar shot in normal hunting conditions were subjected to a chemical process similar to that which takes place in the human digestive system.

Existing reports state that wild boar in general, in Germany and more widely in Europe, have on average 4.7mg/kg of metallic lead in the edible meat parts of carcasses.

Assuming an annual consumption of 18.2 kg of meat (91 servings of 200 grams), this means that a woman who weighs 60 kg would be subjected to an additional exposure of 3.92 mg / kg bw / day in addition to exposure from other foods. For a man weighing 70 kg, the result would be 3.35µg/kg bw / day (BfR, 2010).

Compared with the EFSA's reference point for risk of chronic kidney disease, (an intake of 0.63 mg / kg bw / day), these would be unacceptably high values.

The estimated level of lead found in wild boar meat is, however, related to the use of lead ammunition – with lead largely in the form of metallic fragments. Consequently, the calculation of additional lead exposure from eating game meat must take into consideration the amount of bioavailable lead which can, in reality, be released in the digestive system from those fragments.

The accurate way to calculate lead exposure

A recalculation based on the results from the study published today shows that only one percent (1%) of 4.7 mg/kg can, in fact, be taken up by the body. So for a woman weighing 60 kg, this translates to 0.039 μ g/kg bw / day. And for a man weighing 70 kg, this translates to 0.036 mg / kg bw / day. This corresponds to \approx 6.2% of the current EFSA reference point of 0.63 μ g/kg bw / day.

The EU has set a limit for lead in beef of 0.1 mg / kg. There is no solid lead fragments in this type of meat. It is directly bioavailable lead in ionic form, found in beef, as in other every day foodstuffs.

If wild boar meat (with 4.7 mg of metallic lead / kg) is replaced with beef (with a concentration of 0.1 mg bioavailable lead/kg) lead exposure for a 60kg woman would be 0.083 mg / kg bw / day and for a man would be 0.071 μ g/kg bw / day.

This exposure is double, compared to the same consumption by weight of wild boar meat with 4.7 mg/kg metallic lead fragments.

The study published today clearly shows that there is very good reason to take into account the degree to which metallic lead in lead fragments can, in reality, become bioavailable to humans in the digestive system, when calculating exposure to lead from game meat. Without doing so, the calculation of risk to health from the consumption of game meat will be overstated.