

# **LEAD IN GAME MEAT**

## **Bio accessibility of fragments of metallic lead.**

Conclusions from a study carried out by Christer Holmgren (Swedish Environmental Agency Consultant) and Prof Ulf Qvarfort (Deputy Research Director, Swedish Defence Research Agency).

### **Results.**

The study recently performed by two Swedish experts entitled "The lead-in game" shows results which question what has been published up to now on the subject, in particular as regards the amount of lead eventually ingested that can be absorbed by the human body.

The study has been carried out with reference to wild boar meat hunted with soft point lead bullet ammunition in a regular hunting session.

Computer-tomography and X-rays techniques have been used to guarantee a precise identification of the lead fragments distribution around the channel of the wound. In addition, the gastrointestinal digestion simulation in vitro was conducted to measure the amount of metallic lead which, once ingested, is transformed into bio accessible compounds and therefore potentially absorbable by a human body.

The analysis shows that the fragments of lead are concentrated in a radius of 4.5 cm from the channel of the projectile passage, with a minor amount dispersed in a radius between 4.5 and 10 centimetres: these animal parts are regularly and completely eliminated with the usual practices of slaughter.

A further evidence of the study demonstrates that the amount of fragments of lead accidentally present in the meat which is converted to bioavailable lead compounds (therefore potentially absorbable by the human body) is about 1% of the amount of metallic lead present in the flesh. The percentage of lead bioavailable which is statistically absorbed by the human body is varying from 20% in adults and 50% in children.

The combination of these two parameters indicates that only 0.2% of the lead fragments ingested by adults is absorbed during its passage through the gastrointestinal tract, while 0,5% is the quantity absorbed by children.

In a scientific report published in 2012, the European Food Safety Agency (EFSA) highlights that food sources through which the European population is more exposed to lead intake are those consumed more frequently, like cereals, dairy products, vegetables and drinking water.

Referring specifically to tap water, we found that the limit of lead recommended by EU is 10 µg per liter.

At the same time, a report edited in 2012 by the German Bundesinstitut für Risikobewertung (BfR) says that wild boar meat is one of the most lead contaminated food in Europe, with a content of 4,7 mg. per kg, as a result of the use of lead in ammunition.

The results of the Swedish study shows that the exposure from consumption of 3 kg of such meat is 100 times lower: it is equivalent to the exposure from one week consumption of tap water respecting the lead limits defined by EU Authorities.

## Details and additional considerations.

\* Lead is one of the most used metals in the world and can enter the human body by contact or through the intake of food (65%), water (20%) and air (15%).

All foods, water, drinks both alcoholic and soft (including tea and coffee), spices and food supplements contain bioavailable lead ions in varying amounts.

The European Commission has set maximum limits for the bioavailable lead quantity allowed in various food groups in order to protect consumers from exposure to harmful levels, while currently there are no official limits defined for game meat.

\* The use of lead ammunition for hunting is usually considered risky for the health of the hunters, their families and all those who consume game.

It must anyway be considered that the ammunition bullets are made with metallic lead that, even if ingested in finely fragmented form, is not directly absorbable by the human body during the digestive process, because only lead in "ionic bio accessible compound form" can be absorbed by the human body.

\* The mentioned BfR report shows that the wild boar meat contains an average of 4.7 mg / kg of lead, in the form of metallic fragments.

The results of the Swedish study demonstrate that only a maximum percentage of 1% of the lead fragments ingested is transformed in bio available form during the passage through the gastrointestinal tract.

A correct calculation on the potential lead assumption must thus consider only the bioavailable part of mentioned amount.

Considering that only one per cent (1%) of 4.7 mg / kg can be released in the gastrointestinal tract, we can affirm that for a woman of 60 kg the exposure is equivalent to 0.039 µg / kg bw / day, while for a 70 kg man is the value of 0.036 µg / kg body weight / day.

These values correspond to approximately 6% of the limit established by EFSA for RP2 disease risks, which is of 0.63 µg / kg of body weight / day.

\* The limit defined by the European Union for the presence of lead in meat commonly used for human consumption (other than wild) is 0.1 mg / kg.

This value relates to meat as well as other foods without of presence lead fragments and refers to the lead present in ionic form, then entirely bioavailable.

This means that approximately twice the value of exposure comes from consumption of meat other than game, related to the consumption of an equal quantity of wild boar meat with a content of 4,7 mg/kg of metallic lead.