



## **Situation Review: some new findings about lead shot in relation to CIGGA56.REC01**

### **SUPPLEMENTARY INFORMATION**

**In drawing up the above Resolution the CIC was not persuaded by any one line of evidence, nor was it necessarily entirely convinced by any particular evidence. Instead the strong persuasion came from the combination of the different lines of research and especially the way that evidence against lead had been steadily building, particularly since 2004, hence the priority of society to phase-out the use of lead for any purpose where it cannot be recycled. At the same time the research into the suitability of alternatives has looked increasingly fruitful, although remaining complicated.**

**The main sources of information are the papers published in the Proceedings of the Conference in May 2008 *Ingestion of Spent Lead Ammunition: Implications for Wildlife and Humans* Eds. R.T. Watson, M. Fuller, M. Pokras & G. Hunt. This is downloadable from [www.peregrinefund.org/Proceedings](http://www.peregrinefund.org/Proceedings) and it is strongly recommended that all interested in this subject should study this material. Here the Proceedings are referred to as Watson *et al.* (2009).**

#### Prevalence in game and wildlife has increased

Widening investigations have so far revealed lead ingestion in more than 130 species of bird, including many raptors as well as increasingly in mammals and reptiles. Studies also show a range of circumstances in which lead is ingested by wildlife. These include ingestion of shot from mud in wetlands or the soil surface by birds seeking grit or seeds, and the ingestion of shot and bullet fragments by scavengers from carcasses and discarded viscera of game mammals and birds. Mortality and chronic effects, including subtle effects on behaviour (Burger 1998) have been well documented for some time. Ingestion of bullet fragments and shot has been shown to be the reason the California condor could not sustain numbers where lead ammunition was available. In Europe there are similar concerns about eagles.

Among pheasants and partridges and some other game-birds relatively high levels of prevalence have been reported recently [Butler *et al.* 2005; CIC

2007 Newsletter 4:4-5]. In the past the prevalence of lead in these game-birds was considered half that of waterfowl, but where lead is no longer used in wetlands but still used to shoot game-birds the two groups have converged or even reversed their positions. Where lead shot has been banned in wetlands levels of lead in waterfowl have decreased (Stevenson *et al.* (2005) as has mortality (in Watson *et al.* 2009). The status of European waterfowl species is correlated with the average level of lead ingestion: species with the highest frequency of ingested shot, including non-quarry species are the most likely to have declined (R. Mateo in Watson *et al.* 2009). Lead contamination in two species of globally threatened waterfowl has been shown due to ingested lead shot (Svanberg *et al.* 2006), as also is the case in the red kite (Pain *et al.* 2007).

#### Medical health opinion is hardening

As recently as 1991 levels of less than 10µ/dL in human blood were considered safe, but recent work all suggests this was too high (Canfield *et al.* 2003; Gilbert & Weiss 2006; Hubbs-Tait *et al.* 2008; Jusko *et al.* 2009). Further evidence is reviewed by M. J. Kosnett (*in* Watson, *et al.*, 2009). Levels in some game-birds in Canada are considered to exceed food-safety guidelines (Kreager *et al.* 2008) with possible implications for humans eating large amounts of game such as the Inuit. In the UK, the Food Standards Agency (Heavy Metals Survey: [www.meatinfo.co.uk](http://www.meatinfo.co.uk) /12.1.07) has called for less lead to be used in shot to kill birds. The North Dakota Department of Health has issued warnings about lead in game-meat, including venison.

#### The bioavailability of lead

Some initial research suggested that lead used to kill game was not bio-available to humans (Haldimann *et al.* 2002). However since the research of Dewailly *et al.* (2001) evidence has grown that lead is bio-available as revealed by higher blood levels (Johansen *et al.* 2006; Hunt 2009).

#### Fragmentation

This is one reason why the bioavailability of lead is higher than once thought. Scheuhammer *et al.* (1998) first drew attention to this problem, after removing visually detectable lead shot; using radiography they found numerous small fragments in breast muscle of shot game-birds. This was confirmed by Tsuji *et al.* (2001) who also considered dietary implications. Again after visible lead shot was removed from game-birds, it was shown significant lead remained as small fragments or traces resulting from the passage of the shot (Johansen *et al.* 2001). Fragmentation of lead shot was also reported by Rodrigue (2005). Many fragments are too small to see, feel or sense when chewing (Hunt 2009).

#### Alternatives to lead

In its 9<sup>th</sup> Report in 1983, The Royal Commission on Environmental Pollution recommended that lead shot be withdrawn as soon as alternatives were available, adding "we believe that it ought to be possible for adequate,

though perhaps more expensive, substitutes to be developed for use in the UK within a very few years”.

Twelve alternatives have since been given approval by the US Fish & Wildlife Service but concerns have recently been expressed about those including nickel (Thomas *et al.* 2009). The US Army is giving a lot of attention to developing a new 'green' bullet based on alloys of bismuth that it hopes will be available by the end of the summer. The bullets most frequently used for shooting deer in many parts of the USA are made from copper. There is no firm evidence of serious problems to human or wildlife health, or safety and efficacy of these bullets. Steel shot are widely used in many countries for shooting waterfowl and game-birds. Evidence indicates that its use is not associated with elevated levels of wounding.

### Symposium

The ongoing developments with alternatives are the main reason that the CIC consider a new Symposium is required **to help hunters become part of the solution rather than part of the problem.**

### Future information

An article with further details will appear in the next CIC Newsletter and a full Bibliography will be available on the CIC website.

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