Lead Poisoning in Waterfowl

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FOREWORD

In June 1991, the city of Brussels, Belgium, was the location for the IWRB international workshop on Lead Poisoning in Waterfowl. This workshop brought together more than 100 participants from 21 countries, representing experts in the field of lead poisoning, government agencies, conservation and hunting organisations, and arms and ammunitions manufacturers. The aim of the workshop was to review the extent of the problem of lead poisoning throughout the world, and to identify possible solutions.

This collection of papers represents the final report of the workshop. It documents the great geographical extent of lead poisoning in birds from the deposition of spent gunshot. Lead poisoning has been recorded in at least 20 countries, and can be expected to occur wherever lead shot is used for hunting. In addition to the Anatidae, many other species of waterbirds as well as raptors, gamebirds and other terrestrial species, are susceptible.

The workshop concluded that the only effective solution to this problem, other than the cessation of hunting, was the replacement of lead shot with non-toxic alternatives. The workshop heard that much technological progress had been made concerning such alternatives, and that although certain problems still remained to be overcome, several countries had already successfully introduced legislation restricting the use of lead in favour of 'steel' shot.

I wish to thank the Belgian Ministry of Agriculture (Administration of Agronomic Research) for hosting this important workshop. For their cooperation in organising the meeting, I would also like to thank the Ministry of the Flemish Community, the Ministry of the Walloon Region, the Federation of the Hunting Associations of the EEC (FACE), the International Council for Game and Wildlife Conservation (CIC), and the Tour du Valat Foundation.

I am particularly grateful to the members of the organising Committee (Jean Renault, Yves Lecocq, Deborah Pain and Sarah McKean) for their hard work, and to Deborah Pain for her most professional work in editing these proceedings, which were prepared for final publication by Sharon Woodward of IWRB. I thank also Nicole Jacqué and Delphine Pierre for their help in running the workshop.

Additional thanks for support go to the US Fish and Wildlife Service for ensuring a strong input of the unique North American expertise on this matter, to Browning (Mr C. Binet) for organising the field demonstrations of non-toxic shot, to Dr J.P. Verhaegen of the Centre de Recherches Biologiques d'Harchies for hosting the workshop excursion, and to the German magazine "Wild und Hund" for providing additional funds for interpretation. Finally, I should like to thank the UK Joint Nature Conservation Committee for a generous grant for the publication of these proceedings.

The outstanding feature of this workshop was the unanimous commitment of all groups represented, to overcome what was perceived as a serious problem for waterfowl. This commitment, and the wide-scale follow-up that has occurred since the workshop gives me some hope that progress will now be made toward resolving this problem to the permanent benefit of our waterfowl.

Michael Moser
Director
International Waterfowl and Wetlands Research Bureau
January 1992

CONCLUSIONS

The workshop "Lead Poisoning in Waterfowl" was organised by the International Waterfowl and Wetlands Research Bureau (IWRB), at the invitation of the Belgian Ministry of Agriculture (Administration de la Recherche Agronomique), in cooperation with the Ministry of the Flemish Community, the Ministry of the Walloon Region, the International Council for Game and Wildlife Conservation (CIC), the Federation of Hunting Associations of the EEC (FACE) and the Tour du Valat Foundation.

The Workshop was attended by over 100 participants from 21 countries, including representatives of governments, hunting organisations, the arms and ammunition industry, and scientific experts on lead poisoning.

These conclusions were drawn together by a panel comprising the chairpersons and rapporteurs of the sessions, the coordinators of IWRB's Hunting Impact Research Group, and the Director of IWRB (see below). The conclusions were presented and discussed at the end of the workshop. Although not formally adopted as recommendations, the conclusions received the general support of the workshop participants.

In addition to the conclusions from the main workshop sessions, a small Working Group, drawn mainly from the arms and ammunitions manufacturers, was convened to consider whether it was possible to produce non-toxic cartridges for all European shotguns. The conclusions of this Working Group were presented to, and discussed by, the workshop participants, and are attached as Annex A.

These comments deal only with lead poisoning in birds and do not involve consideration of other causes of mortality.

1. Lead Poisoning: The Problem

1.1 Lead is a highly toxic and widely distributed environmental pollutant. All recorded effects of lead on living organisms are negative.

1.2. Most incidents of lead poisoning in birds result from the ingestion of spent gunshot. Lead poisoning of waterbirds has been recorded in at least 21 countries. Evidence suggests that wherever lead shot is used for hunting over wetlands (and to a lesser extent other habitats) lead poisoning will occur. As shot densities increase, the prevalence of lead poisoning is likely to increase. An important secondary problem is poisoning of raptors and other birds that feed on the flesh of animals containing imbedded lead shot.

1.3. The deposition of spent lead gunshot is proven to be the source of considerable mortality for waterfowl. A wide range of other bird species are also poisoned but the magnitude of losses are less adequately known. Mortality is difficult to estimate due to factors influencing lead ingestion and toxicity, inadequate reporting of lead poisoning when it occurs, and the poor visibility of lead poisoned birds. Mortality estimates are considered to be conservative: they do not include; (i) increased vulnerability of lead-poisoned birds to hunting; (ii) increased susceptibility of lead-poisoned birds to disease; (iii) increased predation of lead-poisoned birds; and (iv) other secondary factors.

1.4 Large scale waterfowl die-offs from lead poisoning are exceptions to the usual "invisible" expression of this disease despite being recorded in at least 8 countries. Differences in environmental conditions, bird densities, and other factors have resulted in large scale die-offs being more frequently recorded in the United States than Europe. World-wide, most birds dying from lead poisoning do so in daily events involving small numbers and are not noticed due to high rates of predation and scavenging.

1.5 Lead poisoning is an international rather than national or local problem, since it concerns migratory species. Countries using non-toxic shot, or those with low hunting intensities, may still import lead-poisoned birds from elsewhere.

1.6 Adequate biological knowledge exists clearly to document the toxicity of lead for birds and to conclude that exposure to lead shot is widespread.

1.7 Lead as an environmental contaminant is receiving increased attention in many countries because of its detrimental effects on human and animal health. The issue of lead in the environment will continue to grow. Difficulties are seen in retaining productive uses of lead in closed situations that pose no significant environmental threats because of an expanding public concern about the toxic effects of lead. Strong efforts to reduce atmospheric and other forms of lead pollution are having major effects on reducing those sources while lead shot from hunting and target shooting continues unabated in many areas. The volume of lead shot being deposited is by itself significant despite being far less than that from industry and motor vehicles and is an increasing area of focus by those opposed to hunting and shooting sports. Therefore, it is folly to try and minimise the contribution of lead shot as an environmental pollutant in comparison with other sources of lead; such a position reduces the credibility of hunters and sportsmen regarding their environmental ethics, and can only enhance the position of those opposing shooting sports.

2. Lead Poisoning: The Solutions

2.1 The wise use of non-toxic shot is the only measure, other than cessation of hunting, proven to be effective in restricting the availability of lead shot to waterfowl over broad geographic areas and for prolonged periods of time. Data from the United States clearly demonstrates the rapid replacement of ingested lead shot by non-toxic shot when this alternative is selected.

2.2 Other measures designed to restrict the availability of lead shot such as hunter codes of practice, land cultivation and management of water levels, have limited applications, are

expensive to maintain and have not been proven to have long-term effectiveness. Providing supplemental grit can be of value but has not prevented lead poisoning from occurring; planting food to reduce the toxicity of lead by dietary means is of unproven value and without an adequate knowledge base for field application; treatment of lead intoxicated birds is extremely expensive and only marginally effective; attempts to coat lead pellets with various materials (including plastics) to prevent the absorption of toxic amounts of lead from ingested shot have all failed due to the harsh environment of avian gizzards and stomachs.

2.3 Measures to alleviate the toxicity of lead for birds have high costs and are not effective in preventing reoccurence of exposure. As with disease in man and domestic animals, prevention is far more cost-effective and lasting than treatment and control of disease.

2.4 The majority of lead poisoning is a result of recently deposited lead shot (1-2 seasons). Conversion to non-toxic shot prevents further build-up of lead shot. Also, it has been shown that ingestion of steel (soft iron) shot can have beneficial effects on reducing the toxicity of ingested lead shot.

2.5 Because of the long-term persistance of lead shot in the environment it remains a continual threat for birds when environmental conditions facilitate ingestion of that shot. Currently, there are no environmentally sound methods for effective removal of this shot from wetlands. This remains an area where research is needed to achieve the full benefits of conversion to non-toxic shot.

2.6 There is a lack of information regarding the safety of steel shot loads for hunters and target shooters. It was requested that a list of recommendations be compiled by the arms and ammunition manufacturers regarding steel shot use. These recommendations need to be readily available to sportsmen so they may make informed judgements regarding the selection of arms and ammunition loads.

2.7 Recently manufactured shotguns have characteristics of barrel hardness and other factors that make them compatible with steel shot use. Experience in other countries and testing of firearms in the United States has not resulted in evidence of gun damage that has compromised the safety of hunters. However differences between firearms and ammunition require that this matter receives additional evaluations for Europe. For older guns the condition of the gun as well as barrel hardness and breech pressures generated by the ammunition being used must be taken into consideration. Standards need to be developed that will allow all firearms and ammunition to be evaluated against a common scale for safety assessment.

2.8 The issue of crippling rates is highly complex. The 15 shooting trials conducted in the United States during the past 30 years have produced variable results. Because of difference between these trials they are not comparable with one another. For some, lead has outperformed the steel load used in the trial, for others steel has produced fewer cripples, and in the majority the results have been mixed. **However, when evaluating this issue from a perspective of waterfowl losses, one must compare losses due to crippling from steel with losses due to crippling from lead, PLUS deaths from lead poisoning, PLUS losses due to the sublethal effects of lead on waterfowl survival.** In addition, poisoning of non waterfowl species must be included in the evaluation of the effects of using lead shot for waterfowl hunting. Crippling from steel loads is highest when hunters first start shooting these loads and then declines with experience.

2.9 There are many side issues associated with the use of steel shot; (dental problems, saws in woodland areas, ricochets etc.). However, it is important to recognise that these are side issues of low importance relative to the main issue of the magnitude of losses from lead poisoning and lead as an environmental pollutant. Impacts associated with steel shot can be overcome if the magnitude of individual events warrant corrective actions.

3. Lead Poisoning: Implementing the Solutions:

3.1 Steel shot loads can be used as effectively as lead for waterfowl hunting, if adjustments are made by hunters to allow for the differences in these two types of ammunition.

3.2 Various options for legislative mechanisms to phase out lead shot were considered. Implementing non-toxic regulations on a hot-spot basis has not proved practicable in the United States or Denmark. This approach is still being used in Canada as part of an implementation strategy to achieve more comprehensive coverage in the future. Banning the sale and import of lead shot would prevent remaining permitted uses. Taxing of lead shot has been considered in certain countries but, in these situations, this possibility has been overtaken by a general ban on the use of lead shot. To be effective, a taxation option would require a large price differential between lead and non-toxic shot. Banning the use of lead shot for types of hunting is the most practicable approach. Use needs to be defined to include the possession of lead shot in the relevant hunting situations.

3.3 Voluntary bans in the United States have not resulted in major reductions in the use of lead shot and lack effective means of enforcement. However, voluntary bans may have a role in the implementation of phased-in reductions in the use of lead shot.

3.4 National conservation legislation and international treaties involving migratory birds, endangered species, and environmental quality have served as a source for support and mechanisms for implementation of non-toxic shot use. However differences in national approaches to legislation must be taken into account.

3.5 It is essential to have an effective information, awareness and education programme prior to, and during, the implementation of a lead shot replacement programme. This should include definition of the problem, an explanation of the options considered for the solution, and hands-on

demonstrations for hunters to see for themselves the efficacy of non-toxic shot. In an international context, associations of hunting bodies should assist and coordinate information flow on research and development of non-toxic shot-types, and monitor and report on progress in replacement of lead shot.

3.6 It is important for authorities in countries to decide on timescales for replacement of lead shot and rigourously adhere to implementation schedules so that manufacturers and dealers can plan their programmes accordingly. Establishment of timescales should consider the availability of steel shot in each situation.

3.7 Hunters in countries requiring non-toxic shot use have found that there are few negative aspects of steel shot. They have gained public support and an enhanced image regarding their responsibility for, and willingness to do something positive about, environmental problems.

3.8 The use of steel shot should be incorporated in hunter training programmes and examinations in countries where these exist.

3.9 In some countries, a phased implementation of non-toxic shot appears to be a more readily acceptable method, even if the period of phase-in is short. In any case, implementation measures should involve government agencies, hunters organisations and the arms/ammunition industry, working in close partnership.

4. Lead Poisoning: Current Status of Measures Taken and Priority Actions

Information was collected through national report questionnaires as well as input during the workshop. 20 countries gave information which can be summarised as follows:

4.1 Previous estimates of the amount of lead falling into wetlands from gunshot, at least in Europe, have been too conservative.

4.2 Lead poisoning of waterfowl from countries for which no investigations had previously been carried out shows similar patterns to those already documented. Lead poisoning is a potentially serious but under-investigated problem for a wide range of non-waterfowl avian species (including raptors and endangered species).

4.3 Awareness of lead poisoning has increased significantly worldwide over the last 5 years. However information programmes still need to be initiated or further developed in many countries, particularly in association with the introduction of non-toxic shot.

4.4 Six countries already have (or have established a schedule for) legislation banning the use of lead shot either in certain regions or nationwide for waterfowl hunting or all hunting (Australia, Canada, Denmark, Netherlands, Norway, USA). Several other countries have made voluntary moves or are considering legislation concerning the change from lead to non-toxic shot (eg Sweden, USSR).

4.5 A range of constraints associated with the use of non-toxic shot were perceived prior to the workshop. Countries where non-toxic shot is already in use suggested that these problems have been, or can largely be overcome.

SUMMARY

Lead is a highly toxic environmental pollutant. Extensive measures have already been taken in many countries to reduce the input of lead into the environment from sources such as petrol, paints and waterpipes. Adequate research has been undertaken to conclude that lead deposition from gunshot results in significant mortality worldwide for many bird species, particularly those associated with wetland habitats. The only realistic solution to address this problem is the use of non-toxic gunshot. Appropriate technology is now available for ammunition manufacturers to produce non-toxic cartridges for use in both new and old guns, including guns of European origin. This will require the use of appropriate cartridges and the reproofing of some shot guns, as well as comprehensive hunter education and awareness programmes.

The successful replacement of lead by non-toxic shot calls for the establishment of goals and constructive partnerships between government agencies, ammunition manufacturers and hunting organisations.

The lead poisoning problem is unusual in that the source of the problem is discrete and is easily eliminated through the use of non-toxic shot. It is a problem for which the solution can benefit birds, the environment and the hunter. With the use of non-toxic shot, lead poisoning of birds will eventually be eliminated, the deposition of this toxic substance into the environment will be reduced, and hunters will be taking very positive and practical action to promote the wise use of natural resources.

The following individuals participated in the working group that drew together these conclusions from the workshop:

Bjarne Clausen (Ministry of the Environment, Denmark), Milton Friend (United States Fish and Wildlife Service, USA), Yves Lecocq (Féderation des Associations de Chasseurs de la CEE), Wolfgang Krüper (DEVA: Deutsche Versuchs und Prüf-Anstalt für Jagd und Sportwaffen E.V.), Michael Moser (International Waterfowl and Wetlands Research Bureau), Deborah Pain (The Tour du Valat Foundation, France), Michael Pienkowski (Joint Nature Conservation Committee, United Kingdom), Glen Sanderson (Illinois Natural History Survey, USA), Rollin Sparrowe (Wildlife Management Institute, USA), Jacques Trouvilliez (Office National de la Chasse, France).

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