

UK REACH: Lead shot ammunition

Response to call for evidence

October 2021

[Wildlife and Countryside Link](#) (Link) is the largest environment and wildlife coalition in England, bringing together 62 organisations to use their strong joint voice for the protection of nature.

Introduction

- We welcome this call for evidence from UK REACH, to inform the preparation of a restriction report on risks to the environment and human health of the use of lead in ammunition in all habitats in Great Britain.
- We have provided responses to the questions where the expertise of our members can add relevant evidence. Our responses to the call for evidence questions, drawn from members of the Link Animal Welfare Strategy Group, include information on:
 - The quantity of lead ammunition used on shooting ranges and in hunting.
 - The impact of that usage on both human health and wildlife populations.
 - The growing availability of non-lead ammunition.
- The majority of the available data on lead ammunition covers the whole of the UK, rather than Great Britain. We have no reason to believe that Great Britain only data would differ significantly from that cited below.

Response to consultation questions

Shooting ranges

Please provide your best estimate of what is the quantity of lead ammunition used on these sites? (please split by lead shot and other projectiles, if possible)

Pain, Cromie, & Green's 2015 paper 'Poisoning of birds and other wildlife from ammunition-derived lead in the UK' provides an estimate of lead ammunition used in UK clay pigeon shooting:

"For target shooting, including clay pigeon shooting, the vast majority of the ammunition used is likely to be lead, probably to conform with International Shooting Sports Federation (ISSF) rules (Thomas and Guitart 2013). In 1991, it was reported that 220 million clay pigeons were used in the UK with at least one shot fired at each (B Carter, Clay Pigeon Shooting Association, pers. comm.; cited in Mellor and McCartney 1994). With a 28 g load commonly used to shoot clays and a number 8 cartridge (containing approximately 400 gunshot) this represented a minimum annual release of 6,160 tonnes of lead gunshot."¹

¹ http://www.oxfordleadsymposium.info/wp-content/uploads/OLS_proceedings/papers/OLS_proceedings_pain_cromie_green.pdf

Given that the popularity of clay pigeon shooting has been broadly sustained over the past three decades, and the sport currently comprises around 50% of all non-live quarry shooting², it seems likely that the overall amount of lead ammunition used at shooting ranges in the UK per year stands at well over 10,000 tonnes a year. Over 70% of UK ranges are outdoor³, meaning that the bulk of the lead ammunition used has the potential to make its way into the wider environment. Measures to prevent lead ammunition from outdoor ranges from leaching into the wider environment can be ineffective, with German research finding that 137 ranges in Lower Saxony were contaminated with 2,722 tonnes of lead.⁴

Please specify the quantity of lead ammunition used for hunting in GB

Pain, Cromie, & Green's 2015 paper 'Poisoning of birds and other wildlife from ammunition-derived lead in the UK' provides an estimate of lead ammunition used in UK hunting:

*"An estimated 28 million birds (gamebirds, wildfowl and pigeons) are shot annually in the UK (based upon PACEC 2006 and Aebischer 2013)...Each lead shotgun cartridge may contain between 100 and 600 lead gunshot depending on gunshot size, with a typical 30 g load containing approximately 300 individual number 6 gunshot. As gunshot leave the barrel of the gun they spread out thus even if the target is hit, most gunshot will miss. Only a small proportion of the gunshot from a single shotgun cartridge may be retrieved within a killed animal (see e.g. Cromie et al. 2010, Pain et al. 2010). Assuming an average of 3-8 shots per bird (based on shooting web articles and social media) and 30 g gunshot per cartridge this represents about 2,500 to 6,700 tonnes of lead gunshot fired at gamebirds annually."*⁵

Lead in game meat

Please provide data on lead in game meat that is shot and consumed in GB (for example, concentrations of lead in different types of game meat, the proportion of game (with species) that contain lead pellets or fragments and the size range/visibility of lead fragments).

Pain & Green's 2015 paper 'Risks of health effects to humans in the UK from ammunition-derived lead' estimates the total mass of gamebird meat eaten per year by the UK population to be 11,232 tonnes⁶.

Pain et al's 2010 paper 'Potential Hazard to Human Health from Exposure to Fragments of Lead Bullets and Shot in the Tissues of Game Animals', quoted in the 2015 paper, found a mean lead concentration of 1.181 mg/kg in meals prepared from 121 wild-shot gamebirds of six species, with no significant variation among species. The paper noted that a "high proportion of tissue of both cooked and raw

² <http://www.shootingfacts.co.uk/pdf/The-Value-of-Shooting-2014.pdf>

³ Value of shooting paper

⁴ <https://wedocs.unep.org/bitstream/handle/20.500.11822/17413/Excerpt%20Lead%20ammunition.pdf?sequence=1&isAllowed=y>

⁵ http://www.oxfordleadsymposium.info/wp-content/uploads/OLS_proceedings/papers/OLS_proceedings_pain_cromie_green.pdf

⁶ http://www.oxfordleadsymposium.info/wp-content/uploads/OLS_proceedings/papers/OLS_proceedings_green_pain.pdf

gamebirds and raw venison (all excluding offal) had lead concentrations that exceed the EU ML of 100 ppb wet weight for lead in bovine animals, sheep, pigs and poultry". Wildfowl and Wetland Trust data analysed in the 2010 paper found 46.6% of bird carcasses studied had lead concentrations exceeding the 100 ppb EU threshold.

The 2010 paper also notes that "high concentrations of lead occurred in some meals prepared from birds in which no whole pellets or large fragments were apparent on X-rays. The only plausible mechanism for this is that lead particles remain in the meat after the removal of whole shot and large fragments"⁷

The 2015 paper estimates, in light of the amount of game meat consumed, the average quantity of lead in that meat and the impossibility of fully removing lead fragments before consumption that, "4,000-48,000 children could be at potential risk of incurring a one point or more reduction in IQ as a result of current levels of exposure to ammunition derived dietary lead. Numbers of adults potentially vulnerable to critical health effects appear to be smaller, but the available data are too sparse to be certain".

Substitution of lead in ammunition

What, if any, existing or emerging alternatives are you currently aware of? (Please specify below)

There is a growing list of alternatives to lead ammunition. A 2016 study by Thomas, Gremse & Kanstrup⁸ found 13 European companies marketing non-lead ammunition in a wide range of calibres and bullet types. A follow up study by Thomas & Kanstrup in 2019 found that this number had grown to 22.⁹ Thomas & Kanstrup found an additional 4 UK companies marketing non-lead rifle ammunition.

The European Chemicals Agency have assessed the benefits and socio-economics of changing to non-lead ammunition, concluding that

*"In recent years, several companies have created non-toxic shot from bismuth, tungsten, or other elements or alloys with a density similar to or greater than lead, and with a shot softness that results in ballistic properties that are comparable to lead."*¹⁰

Ammunition made from these substances is more expensive than lead shot, with BASF research cited by the European Chemicals Agency finding a cost of £1.30 per bismuth cartridge compared to £0.32 per cartridge for lead.¹¹ It should however be noted that, in the words of a 2015 paper on non-toxic ammunition availability, ammunition costs make up a very small proportion of hunter's budgets, as the "costs of the target animals and other related costs predominate"¹². Ammunition will comprise a higher proportion of costs for target shooters.

⁷ <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0010315>

⁸ <https://link.springer.com/article/10.1007%2Fs10344-016-1044-7>

⁹ <https://link.springer.com/article/10.1007%2Fs13280-019-01151-8>

¹⁰ <https://echa.europa.eu/documents/10162/1a42c9e1-e36a-65b0-da45-bc1ca093b632>

¹¹ European Chemicals Agency paper

¹² http://www.oxfordleadsymposium.info/wp-content/uploads/OLS_proceedings/papers/OLS_proceedings_thomas.pdf

Steel is also commonly used to make non-toxic shot and is comparatively priced or even cheaper than lead, coming to £0.38 per cartridge, as opposed to £0.32 per cartridge for lead.

What do you think availability of alternatives will be in the future? (Please give details on why you think this.)

The 2015, 2016 and 2019 papers cited above all strongly suggest that the availability of non-lead ammunition is not limited by production, but by demand at the national, regional and local levels. That demand grows when regulation is placed on the use of lead ammunition, growing the market for alternatives.

Denmark, where lead-free ammunition been required for all shotgun hunting and non-Olympic target shooting since 1996, is a case in point. As a result of the extensive lead ammunition restrictions, Danish ammunition dealers offer Europe's broadest selection of nonlead cartridge types. One example is Korsholm, who offer 15 different brands of nonlead shot cartridges (n different calibres, each with a selection of 3-5 different shot sizes. Another example of this trend can be found in Italy, where a recent partial ban on lead ammunition has resulted in the market share of alternatives for lead increasing by 50%.¹³

We can expect the availability of non-lead ammunition to increase, as more and more authorities (including the EU) progress new restrictions on lead ammunition.

Impact of voluntary agreement

Please provide any evidence of a reduction in the use of lead ammunition since the voluntary agreement came into place in February 2020

In February 2021, a year after the agreement to phase out lead ammunition by 2025 began, Green et al published a paper looking at the impact of the agreement. A study of 180 pheasant carcasses shot from game meat between October 2020 and February 2021 found that 99% had been killed using lead ammunition¹⁴. This strongly suggests that the agreement, with 20% of its timeframe already passed, has failed to achieve a meaningful reduction in lead ammunition use.

The failure of voluntary action to end the use of lead ammunition is not surprising. Voluntary, industry-led action is rarely an effective means of achieving environmental goals. An extensive RSPB study of voluntary environmental action concluded that such agreements "*will rarely be an effective substitute for regulatory or fiscal measures in seeking to achieve public policy objectives*".¹⁵

¹³ Information from European Chemicals Agency Paper.

¹⁴ <https://conservationevidencejournal.com/reference/pdf/8858>

¹⁵ https://ww2.rspb.org.uk/Images/usingregulation_tcm9-408677.pdf

It was the failure of a 1995 voluntary ban on the use of lead shot in wetlands in the UK that led to the introduction of wetlands-focused regulations in 1999.¹⁶ It seems highly likely that regulation will again be needed to achieve a transition away from lead ammunition across all habitats.

To the best of your knowledge, what steps have been taken to phase out lead ammunition? (for example has a shooting range you attend encouraged you to switch)

We are aware that some of the organisations behind the 2020 agreement have produced guides to using non-lead ammunition.¹⁷ Beyond this, it is not clear what other actions have been taken. A response by BASC (one of the agreement signatories) to the Green et al 2021 paper failed to specify any further actions to be taken in response to the of lack of progress in year one, suggesting instead that “*good change comes about slowly*”.¹⁸

Whilst shooting organisation work to encourage a switch in shooter behaviour through guidance is welcome, these approaches do not have a track record of success. The 1999 ban on using lead shotgun ammunition for shooting wildfowl and/or over wetlands continues to be widely flouted, despite twenty years of shooting organisation guidance designed to encourage compliance. A 2021 paper from Pain et al suggests that 70% of duck in England are illegally shot with lead shot, in direct contravention of the 1999 ban.¹⁹

To the best of your knowledge, what are the plans for further reduction in use? (for example has any organisation you are involved with organised events to test lead free ammunition)

We are not aware of any further action planned by shooting organisations to reduce lead ammunition use.

It is worth noting that the BASC public response to this call for evidence suggests that new regulations should only be brought forward once “*effective and affordable types of sustainable ammunition are available in sufficient volumes*”.²⁰ As set out in our earlier answer, only regulation will generate the demand to produce sufficient quantities of effective non-lead ammunition.

Impacts

Please provide information on the frequency and extent of lead poisoning observed in terrestrial wildlife (including predatory and scavenging species) in GB

Pain, Cromie, & Green’s 2015 paper ‘Poisoning of birds and other wildlife from ammunition-derived lead in the UK’ estimates that 50,000-100,000 wildfowl in the UK (c. 1.5-3.0% of the wintering population)

¹⁶ <https://www.newscientist.com/article/mg15420760-700-crunch-time-for-lead-shot-ban/>

¹⁷ <https://basc.org.uk/lead/guide-to-using-non-lead-shot/>

¹⁸ <https://basc.org.uk/a-five-year-transition-not-a-one-year-solution/>

¹⁹ https://www.researchgate.net/publication/352361054_Evidence_of_widespread_illegal_hunting_of_waterfowl_in_England_despite_partial_regulation_of_the_use_of_lead_shotgun_ammunition

²⁰ <https://basc.org.uk/two-year-lead-ammunition-review-the-call-for-evidence/>

are likely to die during the shooting season as a direct result of lead poisoning. The paper suggests that lead poisoning mortality amongst gamebirds is on a similar scale, with many more animals (including wildfowl, gamebirds and scavenger birds) evading death but still suffering from significant sub-lethal effects including weakened immune systems.

The paper sets out two main lead poisoning exposure pathways for wildlife - direct ingestion of spent gunshot, primarily by wildfowl and terrestrial gamebirds, and ingestion by predators and scavengers of lead gunshot, bullets, or fragments from these, in the flesh of their prey. Whilst the first pathway has been the most studied, evidence is accumulating regarding the second. A 2020 study by Taggart et al found that most of the lead acquired by Buzzards (to both lethal and sub-lethal effect) was probably obtained by consuming game animals shot using lead shotgun ammunition.²¹

The scale of lead poisoning mortality and ill health amongst key wild species is such as to inhibit the delivery of the Government's new Environment Bill target to halt the decline in UK species abundance by 2030.²² The decline in UK bird populations²³ is unlikely to be halted as long as 50-100,000 wildfowl per year die from lead poisoning.

The scale of lead poisoning is further illustrated by the number of wild animals the RSPCA admits to its wildlife centres. Between January 2007 and September 2021, the RSPCA admitted 341 swans with suspected lead poisoning. Most birds that ingest lead ammunition suffer some effects as a result of absorbing above background levels of lead. Clinical and pathological changes observed in admitted birds include lethargy, weight loss and emaciation, muscular atrophy, anaemia, vomiting, harmful impacts to the kidney and liver, paralysis and reduced muscle coordination.

Impacts of a possible restriction on businesses, hunters and shooters

Please provide data on key economic parameters, for example profit-loss, turnover, number of people employed, current share of products containing lead, etc

It is important to highlight that the outlets through which lead-shot game can be sold in the UK are dwindling. In 2019 Waitrose announced an end to sales of lead-shot game in its supermarkets. In a particularly significant move the National Game Dealers Association, which is responsible for a significant proportion of the game sold in the UK, committed in 2021 to ensuring that all their game would be sourced from lead-free chains by 1st July 2022. The Countryside Alliance responding to the NGDA announcement by acknowledging that "*the continued use of lead shot has become a growing obstacle for the game market*".²⁴

By the time any restrictions are progressed, following the REACH process (due to conclude in early 2023), lead-shot game will be difficult to legally sell, both in the UK and in the EU (due to the further

²¹ <https://www.sciencedirect.com/science/article/abs/pii/S026974912036317X?via%3Dihub>

²² <https://www.gov.uk/government/news/landmark-environment-bill-strengthened-to-halt-biodiversity-loss-by-2030>

²³ <https://www.bto.org/our-science/publications/developing-bird-indicators>

²⁴ <https://www.countryside-alliance.org/news/2021/4/tim-bonner-game-dealers-put-2022-deadline-on-lead>

restrictions now being progressed across all member states²⁵). The commercial impact of restrictions arising from the UK REACH process is therefore likely to be limited.

For questions or further information please contact:

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This response is supported by the following Link members:

FOUR PAWS UK

Born Free

League Against Cruel Sports

Humane Society International UK

RSPCA

The response is also supported by the following organisations who are not Link members:

OneKind

Trees for Life

²⁵ <https://www.endseurope.com/article/1706391/echa-puts-forward-full-ban-lead-ammunition>