

Biting the Bullet: A Call for Action on Lead-Contaminated Meat in Food Banks

Samantha Totonì, MPH, James P. Fabisiak, PhD, Val R. Beasley, DVM, PhD, Jon M. Arnemo, DVM, PhD, John H. Schulz, PhD, Martha A. Terry, PhD, and Jim Peterson, PhD

ABOUT THE AUTHORS

Samantha Totonì, James P. Fabisiak, and Jim Peterson are with the Department of Environmental and Occupational Health, University of Pittsburgh School of Public Health, Pittsburgh, PA. Val R. Beasley is with the Department of Comparative Biosciences, College of Veterinary Medicine, University of Illinois at Urbana-Champaign, Urbana. Jon M. Arnemo is with the Department of Forestry and Wildlife Management, Inland Norway University of Applied Sciences, Koppang, Norway, and the Department of Fish, Wildlife, and Environmental Studies, Swedish University of Agricultural Sciences, Umeå, Sweden. John H. Schulz is with the School of Natural Resources, University of Missouri, Columbia. Martha A. Terry is with the Department of Behavioral and Community Health Sciences, University of Pittsburgh School of Public Health.

Each year in the United States, food banks receive more than one million kilograms of donated hunted game meat. The National Rifle Association's (NRA's) Hunters for the Hungry initiative has established programs in more than 40 states for hunters to take their harvested game animal to a meat-processing facility and indicate intent to donate the resulting processed and packaged meat to a local food bank. Most donated game meat is ground deer meat (venison); other donated game includes wild hog and goose.

Even though the presence of ammunition-derived metallic lead fragments in donated firearms-hunted meat has been recognized for more than a decade, the vast majority of donated hunted meat is not inspected to discard meat containing lead fragments.¹ An underlying lack of food safety standards for adulterated

donated food increases risks to low-income recipients, who are already disproportionately affected by elevated blood lead levels (BLLs).² Primary prevention is needed for this overlooked source of lead exposure.

LOW-LEVEL LEAD

Primary prevention is recognized as the most effective way to address the epidemic of lead poisoning in the United States.³ The current blood lead reference level recognized by the Centers for Disease Control and Prevention is 3.5 micrograms per deciliter ($\mu\text{g}/\text{dL}$). The blood lead reference level is not intended to represent a toxicity threshold or to identify the lowest BLL requiring intervention; it is a tool to prioritize communities with the most need for primary prevention of exposure and evaluate the effectiveness of

prevention efforts. Adverse neurologic and behavioral outcomes in children have been associated with BLLs below $3.5 \mu\text{g}/\text{dL}$.⁴ Low levels of lead also pose risks during pregnancy and development in utero, with effects that include spontaneous abortion, preeclampsia, intrauterine growth restriction, premature delivery, and stillbirths.⁵

Lead Ammunition-Contaminated Meat

Contamination of hunted meat occurs because of expanding lead core rifle bullets capable of releasing millions of fragments on impact with the harvested animal.⁶ The resulting fragments of lead are commonly too small to see with the naked eye or to sense when eating. Shotgun ammunition is another common source of lead in hunted meat. A strong body of scientific research demonstrates that lead-based ammunition frequently contaminates hunted meat and increases BLLs of humans and animals who consume it.^{1,7-9}

Lead-contaminated hunted meat has been identified as the most poorly acknowledged and addressed example of food lead contamination, and scientists have called for this source of lead exposure to be acknowledged and addressed with health-protective measures.^{8,9} A 2013 consensus statement of experts in human, environmental, and wildlife toxicology supports reducing and eventually eliminating the introduction of lead into the environment from lead-based ammunition, emphasizing that shooting lead ammunition into the environment poses significant risks of lead exposure to humans and wildlife.¹⁰ In 2016, Arnemo et al. found that more than 99% of 570 scientific

articles about environmental and health consequences of lead in ammunition raised concerns about lead toxicity.⁷ The authors highlighted that nonlead ammunition is as effective as lead-based ammunition and is comparably priced. They concluded that the same rationales used to remove lead from gasoline and paint should be applied to lead-based hunting ammunition.

Despite the well-established scientific basis for regulation of lead ammunition for hunting, the topic has been politicized by misinformation campaigns portraying concerns about ingesting lead ammunition as a product of anti-hunting agendas.¹¹

Lead Contamination in Donated Hunted Meat

Donated hunted meat is a vital source of protein distributed by food banks at a time when food bank use remains far above pre-COVID-19 pandemic levels.¹² Published evidence of lead-contaminated meat in food banks has existed for more than a decade (Figure A, available as a supplement to the online version of this article at <https://www.ajph.org>).¹³ Investigations in multiple states have confirmed the presence of lead in donated meat. The US Department of Health and Human Services found that 15% of donated one-pound ground venison packages sampled from Wisconsin food banks contained visible lead fragments in x-ray analyses. The report estimated that the average concentration of lead in contaminated packages would cause BLLs to rise above 10 µg/dL in 80% of children who eat two meals of such meat per month.¹⁴

Removal of lead-contaminated meat from the supply chain before it reaches

food banks or consumers is an act of primary prevention. The Minnesota Department of Agriculture provides a model annual inspection program of firearm-hunted meat as well as a model funding strategy, a one-dollar surcharge on the sales of some types of hunting permits.¹⁵ Between 2014 and 2019, the agency's annual inspection program for donated firearm-hunted meat discarded an average of 9% of packages because of lead contamination observed via x-ray. This prevented more than 1925 kilograms of lead-adulterated venison from reaching Minnesota food banks.¹ The volume of hunted meat donated to food banks in several states is much greater than in Minnesota; in 2020, Missouri and Pennsylvania combined had more than 181 000 kilograms of donated meat.^{16,17} According to the Hunters for the Hungry initiative, which facilitates the establishment of game meat donation programs, the five states with the largest volume of hunted meat donated to food banks are Missouri, Pennsylvania, Virginia, Ohio, and Iowa.¹ Missouri, Pennsylvania, and Ohio are among states with an especially urgent need to increase primary prevention measures because they are among the six states with proportions of elevated BLLs more than double the national rate.¹⁸

When food banks provide lead-contaminated meat, they increase risks to populations associated with elevated BLLs. The 95th percentile childhood BLL for children aged 1 to 5 years is significantly higher in poorer families in the United States.² Children absorb approximately four to five times as much ingested lead as adults from a given source. Donated lead-contaminated meat has the potential to combine with structural issues of inequity and

inequality that result in racial and ethnic disparities in early childhood BLLs.²

In 2019, the United Kingdom's largest national retailer of wild game acknowledged risks posed by lead-adulterated meat with labels reading, "Based on public health advice vulnerable groups, in particular children, pregnant women & women trying for a baby, should not consume this product due to the possible presence of lead shot residue."^{8(p6)}

A Lack of Oversight and a Need for Action

The frequent lead contamination of firearms-hunted meat highlights the need for requiring hunting with non-lead ammunition to protect human health. However, such regulations would not eliminate the risks posed by uninspected firearms-hunted meat. Lead contamination of hunted meat will continue to be a problem where illicit use of lead ammunition continues. Food safety regulations are needed to address this dietary source of lead in food banks.

The US Food and Drug Administration (FDA) has not set a legal limit for lead in meat as it has in bottled water.¹⁹ European Commission Regulation 1881/2006 set the maximum allowable level of lead in the meat of bovine animals, sheep, pigs, and poultry at 0.10 milligrams per kilogram; scientists have called for this level to be applied to game meat as well. Lead-contaminated game meat has frequently been observed to exceed this standard.⁹

Although liability immunity laws exist to protect charitable organizations, there are no laws designed to protect recipients of donated uninspected meat harvested with lead projectiles. The issue of inspecting donated hunted

meat in any state typically has no official agency oversight. Most states have adopted the FDA Food Code, which does not address donated food.²⁰

Consequently, FDA standards for food adulteration are applied inequitably. Consumers of store-bought food are regularly protected from foods contaminated with small pieces of metal, an act that is not controversial. For instance, in May 2022, the FDA announced the Mars Wrigley confectionery company's voluntary recall of candy varieties "due to the potential presence of a very thin metal strand embedded in the gummies or loose in the bag."²¹ The recalled products were removed from store shelves.

If the FDA Food Code was applied to donated food, meat containing lead fragments would be consistent with the definition of adulterated food: "It bears or contains any poisonous or deleterious substance which may render it injurious to health,"^{22(p255)} and "shall be discarded or reconditioned according to an approved procedure."²³

Ammunition-derived lead fragments are added to the meat through the use of lead projectiles. This is a distinction from other lead-contaminated foods that are not considered adulterated "but in case the substance is not an added substance such food shall not be considered adulterated."^{22(p255)} For instance, the FDA emphasizes that lead often enters the food supply in plants that have absorbed lead from soil, and it cannot be completely removed from plant tissues by processing steps.¹⁹

The most reliable form of primary prevention from lead-adulterated meat is the consistent use of nonlead ammunition for hunting. The removal of packages of meat with radiographically evident lead contamination would substantially reduce exposures, but

meat contaminated with lead particles too small to be detected via x-ray would remain in the food supply.⁹ Restricting donations of hunted meat to animals that were harvested only with nonlead ammunition or during the archery season is likely a more effective primary prevention approach.

Regulatory oversight linked to primary prevention programs could eliminate this source of lead exposure for recipients of donated hunted meat. Attempts to achieve this are likely to be met with pushback. In 2017, the NRA encouraged members to oppose an ultimately unsuccessful amendment to an Oregon House bill that would have deemed donated game meat unfit for human consumption if it contained visible lead ammunition. The NRA claimed that the amendment under consideration by the Oregon Senate Committee on Environment and Natural Resources was an antihunting attempt to demonize lead ammunition based on faulty science.¹

The politicization of lead ammunition has the potential to stall progress on preventing exposure to this dietary source of lead. But even in the absence of reliable long-term solutions through effective laws and regulation, informed actions by food banks could substantially reduce exposures to this source of dietary lead in the short term. Recent concerns about chronic wasting disease, a highly contagious disease found in captive and free-ranging deer, illustrate the power of food banks to address loopholes in food safety related to hunted meat. In 2019, the potential for donated meat to be infected with chronic wasting disease-inducing prions, which have a largely unknown zoonotic potential, prompted some food banks in Pennsylvania to reject meat from untested deer harvested in

chronic wasting disease management areas of the state.²⁴ A similar, direct path to primary prevention for donated lead-contaminated meat would be a coordinated effort among food banks to require that donated game meat was (1) harvested during archery season, (2) harvested with nonlead ammunition, or (3) radiographed and found to be free of visible lead fragments.

CONCLUSIONS

Low-income families relying on food banks are already disproportionately affected by elevated BLLs. Game meat donated by hunters is a source of valuable nutrients for recipients of donated food, but risks from adulteration with lead ammunition should be addressed through primary prevention. This is an avoidable dietary source of lead exposure.

Packages contaminated with x-ray-visible lead fragments can be discarded before distribution to food banks. Donations of hunted meat can be restricted to the archery season or to animals harvested with nonlead ammunition. Food safety standards for adulterated donated food and requirements for hunting with nonlead ammunition are needed. This public health issue extends beyond donated meat to millions of Americans in the hunting community, who regularly consume meat from game harvested with lead ammunition. We call for primary prevention actions to address this neglected environmental justice problem. **AJPH**

CORRESPONDENCE

Correspondence should be sent to Samantha Toton, Department of Environmental and Occupational Health, 130 Desoto St, Pittsburgh, PA 15261 (e-mail: skc35@pitt.edu). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints" link.

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CONTRIBUTORS

S. Totoni led the writing and analysis. J. P. Fabisiak and J. Peterson provided significant advisory input into conceptualization and critical editing. V. R. Beasley, J. M. Arnemo, J. H. Schulz, and M. A. Terry contributed substantively to the writing and editing processes.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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