

Department of the Interior

U.S. Fish and Wildlife Service

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



WATERFOWL HUNTING WITH STEEL SHOT

It is estimated that about two million ducks die in the United States each year from lead poisoning that results when the birds swallow spent shotgun pellets while feeding. The decision to require non-toxic shot in selected areas was made only after intensive studies of the problem, extensive public debate on available courses of action to reduce lead poisoning, and publication by the U.S. Fish and Wildlife Service of a final environmental impact statement.

The use of steel shot applies only to the hunting of ducks, geese, swans, and coots because the hunting of these species is believed to be the source of most of the lead shot deposited in wetland areas.

How Much Lead Collects in the Soils of Hunting Areas?

A density of one pellet per square foot is not unusual in wetlands and three or four pellets per square foot can be found in some popular hunting areas.

What Happens When Waterfowl Swallow Lead?

Lead pellets swallowed by waterfowl pass through the upper digestive tract to the gizzard where they are converted to a soluble form and absorbed into the bloodstream. Lead causes a reduction in oxygen

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Washington, D.C. 20240
1978

supplies to all tissues. It interferes with the body's ability to breakdown glucose or other carbohydrates, leading to weight loss. Lead disrupts the production of hemoglobin, and anemia is the likely result. The imbalance in blood chemistry impairs the functioning of the liver and heart and causes damage to these organs. The external symptoms seen in birds are emaciation as severe as 40 percent loss of weight, wing droop, refusal to eat, a tendency to seek isolation and cover, and loss of the ability to walk or fly.

How Many Waterfowl are Picking up Lead?

Approximately 100,000 waterfowl gizzards have been examined from throughout the United States. On a national scale, approximately 7 percent of the ducks shot by hunters contain lead shot in their gizzards.

Duck wings collected nationwide from each of the four flyways were tested for lead in the bones in 1972 and 1973. Young birds less than seven months old were selected for the study because of their limited period of exposure. Lead residues in the bones of these ducks were closely associated with the incidence of spent shot in the gizzards of ducks collected throughout the United States.

Is Steel Effective in Bagging Birds?

Field tests have shown little difference in the effectiveness of standard 1 1/4 ounce lead shot waterfowl loads and 1 1/8 ounce steel shot loads. It is possible to compensate for a difference in density of iron and lead by increasing the velocity and size of steel pellets - a number 2 steel pellet corresponds in weight to a number 4 lead pellet. Steel pellets are harder than lead pellets and suffer essentially no deformation when they are fired. The result is a tighter and more consistent pattern, a shorter shot string, and pellets that deliver their energy to the target more efficiently than lead pellets. Tighter patterns and shorter shot strings make steel shot slightly less tolerant of aim-error than is the case for most lead loads.

What About Barrel Damage?

The potential problem of barrel damage with steel shot is one of choke expansion which, when it occurs, appears as a slight ring-bulge near the muzzle. Tests indicate that the degree of choke expansion varies with different types and models of shotguns. For most shotguns, choke expansion under full choke constriction either has not occurred or has been sufficiently slight as to have no significant effect on gun performance.

There is no evidence that choke expansion poses any safety hazards beyond those normally existing with any ammunition. A slight change in patterning might result from choke expansion, but the tests indicate that such changes are usually very minor and may actually result in slight increases in pattern density. Moreover, choke expansion is not a problem unique to steel shot. In some guns it was found to occur also with lead shot, although to a lesser degree. The potential for choke expansion is greater in guns with full-choke constrictions than those with modified or improved cylinder constrictions. Shotgun owners can write or contact the manufacturers of their guns for more specific facts about the impact of steel shot on individual guns models.

Steel Shot is More Expensive

During the 1976 and 1977 hunting seasons steel loads were sold at a wide range of prices. The price per box of 25 shells averaged about \$3 more than the price of comparable lead loads. This difference in price will likely be less as production increases over the next few years, but prices for steel loads are expected to remain slightly higher than prices for lead loads.

Availability of Steel Shot Loads and Components for Hand-Loading Steel Shot

In 1976 and 1977 adequate supplies of steel shot loads could be found at most locations where non-toxic shot was required. This was not true for all locations, however. It is reasonable to assume that

these distribution problems will not recur as the retail stores become aware of the demand for this product.

Components for hand-loading steel shot are not generally available, and it is not recommended that other components be substituted for these. Instructions for hand-loading steel shot are being prepared and the proper components should become available soon.

Is There an Alternative to Steel?

The search for alternatives to lead shot has involved more than a dozen attempts to find a non-toxic, ballistically efficient, reasonably priced, and soft surfaced material which precludes barrel damage to shotguns.

To date, steel shot is the only material that meets most of these criteria. The U.S. Fish and Wildlife Service, however, will continue to consider substitutes as they are developed.

Does Steel Shot Reduce Lead Poisoning of Waterfowl?

The rate at which steel shot is replacing lead shot in the digestive tracts of waterfowl has been measured at many locations. The results are encouraging. It appears that recent deposits of lead shot are the primary source of lead in waterfowl, not the accumulation of lead shot over many years. At some locations over half the shot found in the gizzards of ducks is steel shot after only one year of shooting steel shot. At other locations it appears that the full benefits to the waterfowl resource will be realized after three to five years of non-toxic shot use.

The Service has plans to conduct another survey of lead deposits in the tissues of mallards. This will be a national survey similar to the one conducted in 1972-73. In that survey approximately a third of the immature mallards had elevated levels of lead in their bone tissues. Our goal is to significantly reduce these levels over the next five years. This can only be achieved with the cooperation and understanding of waterfowl hunters in the selected non-toxic shot zones.