

# A weighty issue

**Malcolm Plant** looks at the move to replace lead shot and the alternatives, with a little history thrown in

Lead shot has been banned for shooting wildfowl for several years



“**M**ay you live in interesting times,” is said to be the translation of an

oriental curse, and means the opposite of how it reads. The first reported usage of the English version dates back more than 100 years to Joseph Chamberlain, a government minister, MP and mayor of that fine gun-making city, Birmingham. They were actually probably rather good times for the arms manufacturers of the second city, and Joe owned factories making screws there. Today, things are still ‘interesting’, so to speak.

## Lead and lead

Lead (*led*): a grey metallic element, soft and malleable with a density of 11.34gm per cubic centimetre. A weighty metal.

Lead (*lead*): the distance ahead of a moving

target that the point of aim of a gun must be placed, to ensure the shot intersects with and hits the target. This is sometimes known as forward allowance.

It was also known as deflection shooting by Spitfire pilots and the rear-gunners of Lancaster bombers during World War II.

## Heavy metal

So, let’s have a look at the mood music surrounding this heavy metal. I will come to shooting technique later.

Lead has been used for the manufacture of bullets for rifles, handguns and military arms for a very long time and its toxicity has been well understood for centuries.

Little hard evidence has been found and published of any damaging effects caused by this toxicity in its many shooting applications. There is obviously a damaging

effect if something is hit by the lead missile, but that is what it is designed to do.

Concerns about the toxicity of lead in recent decades have centred on its use in water pipes, petrol and paint. One difficulty is that lead compounds accumulate in



So-called steel shot is actually made from iron

animals and humans and are not excreted.

In petrol, lead compounds were added to gasoline to improve the combustion performance. In that application, every car

## Shooting technique



**Lead shot lodged in the flesh of a pigeon**

was distributing lead compounds into the air everywhere, which was of particular concern in cities.

In paint, another case of wide distribution, the exposure for young children through the chewing of toys and furniture resulted in the removal of lead from household paints.

Lead pipes were replaced by plastic; the hardness or softness of water has a significant effect on the uptake of lead by the water flow. Ah, plastic, I hear you say. Well, that's another problem, though polymers

were some of the greatest inventions of the 20th century.

### EU chemical usage

The European Chemicals Agency (ECHA) is responsible for overseeing the use of chemicals in the European Union and safety is one of its main concerns. It is currently reviewing the uses of lead.

In game shooting, the use of lead shot has been banned in wetlands for the shooting of wildfowl for several years, due to the dangers of ducks ingesting the metal when feeding. The theory being that the ducks die of lead poisoning and then wild animals or humans consume the ducks and are contaminated by the lead. Fishing with lead weights has been banned in the UK for a number of years.

Similarly, the proposition is that gamebirds, pheasants and partridges, shot with lead have contaminated flesh and possibly contain lead shot in the edible meat, which would poison human consumers. Also,

wild deer shot with lead bullets may have contaminated flesh.

I am not aware of any documented evidence that this poisoning of humans has actually happened during the 200 years that hunting with lead missiles has taken place, but I am prepared to be corrected.

This is where the thought processes of the European Union civil service differs from that of the UK's. Risk assessment has a slightly different slant. The EU has a 'precautionary principle', which suggests that if there is a risk (no matter how small) we should try to eliminate it.

### Time for a change?

A consortium of nine country land and sporting organisations, including BASC, the GWCT, Countryside Alliance and the CLA, have recently called for a voluntary move away from lead shot for game shooting within five years. They have also suggested that plastic cartridge cases should be

**“Lead shot has been a very good compromise for many years”**

recycled or made from recycled raw material. However, the UK cartridge manufacturers have pointed out strongly that the technical challenges to accomplish this will need considerably longer than five years.

So if we look at making shot pellets for cartridges, what are the technical possibilities? Most have been explored already in the past 20 years.

The shot material needs to be dense – so, the highest weight in the lowest volume gives the shot the maximum punch.

High density coupled with high speed of shot travel are the two attributes that provide the killing power for the humane despatch of tonight's pheasant dinner.

The diameter of the shot balls is important to transfer the killing punch (kinetic energy). A less dense material will need larger diameter shot to carry the energy.

But you can't get so many of the less dense balls into the volume of the cartridge case, so each material choice is a compromise. ➤



**Steel could easily be used for skeet and trap shooting**

It so happens that lead shot has been a good compromise for many years.

All the materials that are available with high densities are metallic elements, which are mined and processed from the Earth's crust. They are, in order of increasing density, shown in the table below.



### METALS WITH HIGH DENSITIES

Material	Density grams per cubic cm	Density compared with lead	Cost	Comments
Iron	7.87	69%	Low	Metal readily available
Bismuth	9.78	86%	High	Reasonable supply. Low toxicity
Lead	11.34	100%	Low	Reasonable supply
Tungsten	19+	170%	High	Quite rare. Powder in matrix shot
Uranium	19+	170%	High	Quite rare. Expensive
Gold	19+	170%	High	Rare. Expensive

So-called steel shot is actually made from iron rather than the harder steel alloys. While metallic iron is readily available, the cartridge manufacturers point out that large volumes of any of the alternative materials in round shot form, including iron, are not readily available, because the production facilities need to be built.

Iron, bismuth and tungsten shot have been used in low production volumes as replacements for lead ammunition for wildfowling for about 20 years.

To be realistic, for large volume, cost-effective shotgun shooting, we are talking about iron shot. The problem is that iron shot is not soft and malleable like lead; iron shot might wear and damage a gun barrel and being hard will not squeeze through the

choke of the barrel as easily as lead. So iron shot needs to be carried in a cupped wad to protect the barrel. For large volume production of cartridges, only plastic-cupped wads are currently available. Not an insurmountable problem but another challenge.

### How big are your balls?

If you currently shoot pigeon with No 6 shot lead cartridges, the experts' recommendation is to use iron shot that is two sizes larger; that is No 4 iron shot to get the kinetic energy punch of mass and speed.

However, if you use No 5 lead shot for higher pheasant shooting, you need to use No 3 iron shot and its larger balls for punch. When you get to these larger shot sizes, a

difficulty arises. The iron shot squeezing through the tight chokes of your gun barrels could cause damage. Gun and cartridge makers are already putting out lots of helpful guidelines, so watch out for the information.

### Target shooting

In shotgun clay target (and rifle target) competitions, the areas in which the shot lands are quite confined. For skeet and trap clay disciplines the distribution area of the balls of spent shot is perhaps 250 metres square in the direction of the target area. A similar situation for rifle ranges, at the target end of the range. This means that the lead could be collected and recycled.

I don't want to upset my skeet and trap shooting friends, but you could use iron. The competition would be the same for everyone. What concerns me more is that sporting clay shooting distributes shot pellets much more widely. I have never heard of any harmful effects of lead shot on sporting clay grounds, but beware of the 'precautionary principle'. Iron shot may be required.

### Shooting technique

Let us see where all of this goes over the next few years with regard to the design of cartridges and their use in all the variety of old and new shotguns. Iron shot with higher cartridge speed like the USA, for example? But don't worry, it won't influence your perception of lead (*lead*). Stick to good technique.

You may live in interesting times. ■

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The Institute of Clay Shooting Instructors was formed in the 1980s to provide qualified coaches with opportunities for further professional development, by the provision of seminars, workshops, practical activities and educational visits. ICSI coaches can be found at: [ICSI.org.uk](http://ICSI.org.uk)

