STEEL SHOT update

CHARLES DUFF REPORTS ON THE LATEST DEVELOPMENTS

Having returned some months ago from a rather short but fruitful trip to the land of the free and the home of the brave, I came up to speed on what is the present state of play *vis-a-vis* the replacement of lead shot with 'green' alternatives, a.k.a. the 'steel shot curse'. Local wingshooters are well aware that for some time now it has been a legal requirement in the USA, Canada, England, parts of Western Europe, some of Scandinavia and Australia that no lead shot be used in waterfowling.

The canny Scots and careful Welsh, with the advantage of devolution from Whitehall, have opted to wait and see before making fools of themselves.

To recap, the problem surfaced in the USA where the wildfowl follow four distinct fly-ways on their annual migration to and from the Palearctic breeding grounds. There are huge numbers of hunters and vast numbers of birds, thus over the last couple of centuries an awful lot of lead has landed in and around the waterways. However, it has been shown that, with the density of lead being what it is, any shot landing on soft mud entombs itself pretty deeply, very quickly.

The problem arises where the water is shallow and has a rock, shale or similarly impervious bottom. Then the shot can readily end up in the gizzards of feeding ducks and geese. There is no question that it is possible for ingested lead to be absorbed into the system of a duck, because of the grinding that its food receives in the gizzard, and the acids present in the gut.

But to ingest enough to cause a problem would require the bottom of the watercourse to be within dabbling duck range, thus about half a metre at the most. Many well-known American sportsmen are also on record as having never found a duck that was actually dying from lead ingestion. How many pellets, and over what length of time, are required to incapacitate a waterbird were questions that no one was able to answer. An in-depth study of the actual absorption of lead through the gastro-intestinal tract of wildfowl would not be amiss.

Let us consider the possible alternatives to lead shot. The density of lead is 11.4 g/ml. 'Chilled' shot is a lead/antimony and/or tin amalgam of about 10 to 10.75g/ml. Molybdenum is the next heaviest at 10.2 g/ml; bismuth weighs in at 9.88 g/ml; iron is only 7.86 g/ml. Tin is somewhat less dense at 7.3 g/ml and antimony is very much the lightest at 6.68 g/ml. Steel shot is actually ordinary common-or-garden-variety soft iron. But the **costs** of these metals, once converted into shot, vary from 2 to 10 times that of chilled lead shot. Tin is a lighter weight possibility, although it can be used in alloys with zinc. Tungsten is six and molybdenum is five times the cost of lead, and bismuth at least four times. 'Steel' is about double.

So the Americans initially focused on steel shot as the next cheapest substitute. However, the effects of a change to steel shot —dammit let's call a spade a spade — **iron** shot are severe. Firstly you can pack away all those lovely old guns that do not have chrome-lined barrels. Secondly you can also put any old or new guns choked more than half-choke into storage, or have them bored out. Iron shot treats tight chokes very unkindly, since it is entirely non-compressible. Most guns of more than half-choke tested showed distinct pressure rings in the barrels within 500 shots. Another problem was that, to get anywhere near the same performance, it was necessary to go up at least two sizes of shot, if not more. In fact most ducks are now taken with iron #2s.

Thus to get a good number of pellets into the pattern, it was necessary to increase the shot load markedly. This of course means more powder and more recoil, which means a a longer cartridge, thus longer chambers. Three inch and even three and-a-half inch magnum cartridges are thus produced to get enough steel shot into the charge to make a halfway reasonable pattern. Size 6 is the smallest iron shot made, but #4s and #2s predominate for medium sized birds, whilst BBs, TTs and Ts are used for geese.

So a gun specifically designed for steel is almost mandatory, and most of these are excessively heavy as the barrels have been made much thicker than

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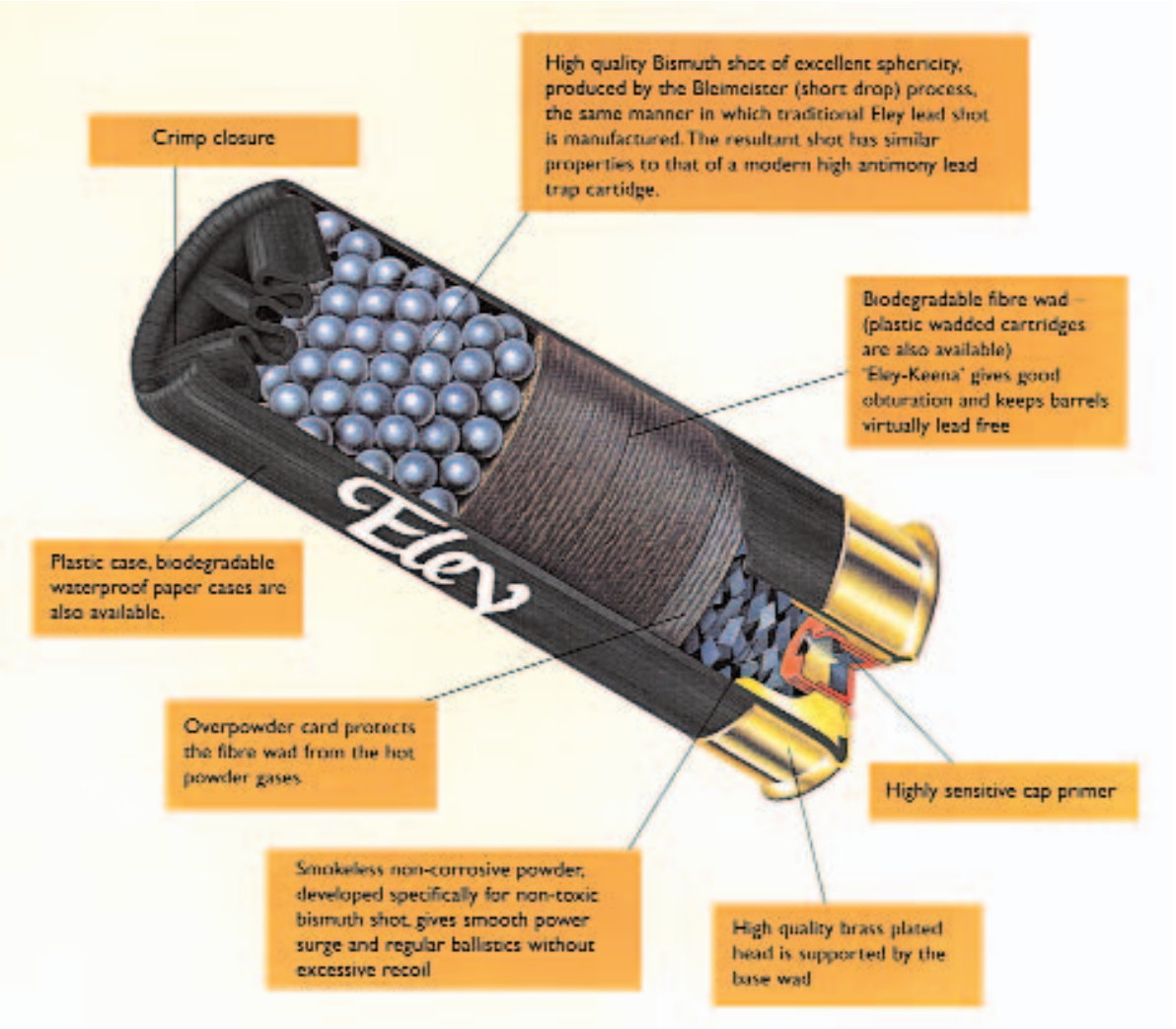

normal, and the Yanks don't make light guns anyway. There is not as yet much choice of side-by-sides or over-and-unders, though there are plenty of ugly pump-actions and some even uglier semi-autos. Sadly, this has tended to make the Yank hunters regard their new shotguns purely and simply as tools. Thus stainless steel, plastics and minimum maintenance predominate, and waterfowling guns are now almost all covered with camouflage finishes. Polished steel, artistic engraving, careful balance and highly-figured walnut remain locked up in the gun safe.

I think that initially the American gun writers did their audiences no real favours in trumpeting the so-called advantages of steel. Now, with some years of real field experience behind them, the serious hunters are rejecting it and it would seem that bismuth is the only really acceptable alternative, because the tungsten shot is also non-compressible and costs the same.

There is now absolutely no question that the knowledgeable shooters in the USA rapidly rejected iron shot. Only those who cannot afford the more expensive alternatives, or only shoot birds a few times a year, are still using iron. All in all, iron shot has been, and will remain, a comprehensive disaster.

Thus, spurred on by the British and informed Americans, the manufacturers tried frantically to find better alternatives. Bismuth, tungsten and tin were all researched. But of these, only tungsten is heavier and all are very much more expensive than lead. The only metals denser than lead are the very rare osmium, tungsten and depleted uranium, none of which are exactly easy to procure nor cheap! The Kent Cartridge Company of Canada produces tungsten-polymer shot and the Federal Cartridge Company also market a tungsten/iron mix of 91 percent density, but neither of these have proved to be a solution. Swartklip, jointly with Eley, now market a bismuth/tin load in South Africa. The major advantage of bismuth is that it is almost as compressible as lead, so old and tightly choked guns will digest it without deleterious effects. On the Brinnel hardness scale, iron shot is 110, bismuth is 18 and pure lead comes in at 12. Also, of course, the shot sizes and charge weights can remain the same as before and pattern density is relatively unaffected as well. Winchester also presents a Bismuth/Tin alternative which has received favourable reviews from the gun-writers who have used it.

If a northern hemisphere wingshooter wants to remain legal and retain the guns and shot sizes that he knows well, in my opinion, the only answer is Bismuth shot. There is a cost complication: It costs three times more than lead.

However, we must remember that plastic cases and wads are pretty well non-biodegradable. Livestock can ingest these and end up with severe constipation. Joking aside, this can certainly kill, and loosing a valuable cow can turn the friendliest farmer into a xenophobe.

More and more people are indulging in wingshooting, and whilst it is relatively easy to pick up cartridge cases, the wads are a different story (if seen, they should be picked up!). If you are using bismuth, felt wads are a valid environment-friendly option. However, one little-realised fact is that, because felt or fibre wads are necessarily several thousands of an inch larger than the barrel diameter, the resistance is considerably more than that of plastic wads. Thus recoil is appreciably heavier. With lightweight game guns this can change a tolerable field load into a finger and shoulder bruiser. Plastic wads that degrade in sunlight are available, and whilst this is an eventual answer to littering, the process takes much too long to prevent ingestion by animals. **Δ**