

# LEAD SHOT

## The Future?

PART I



WILLIAM POWELL  
*since 1802*

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# An Introduction

The main landowning and shooting organisations recently issued a press release, saying they are working towards a voluntary ban on all single use plastics, (including wads and cases), as well as a voluntary ban on lead shot, all within 5 years.

This prompted a response from the four UK Cartridge Manufacturers, who expressed concern that they were not consulted and who also said that it was totally unrealistic to achieve this, within the stated time frame. They set out their reasons why and it is clear that currently there is neither the availability of alternative shot on the scale required, but also, we are still a long way away from having the right technology, to develop "non-toxic" cartridges using steel without the use of plastic. We would add that the effect that the current pandemic has had, and will continue to have on cartridge sales and hence on the financial health of our UK cartridge business, does not bode well for them being able to self-finance additional R&D at this time, on alternatives to lead shot cartridges.

We at William Powell and at our sister company, JM Osborne & Co, have been watching this situation for the last year or so and we believe that many of the cartridges that we have been using for decades, will soon need to change. This is because we are firmly of the opinion that whereas currently 99.9% of all game in the UK are shot using lead shot, this will not be the case in the future. We are however, definitely not of the view that there is necessarily either the science, nor the logic to justify this.

The discussions about a move away from lead started some considerable time ago, initially because of evidence that wildfowl were ingesting lead shot. This led to the banning of lead shot over wetland areas and for duck/geese shooting in 1999 in England. However, there has been continuing pressure for a ban on using lead shot because lead is known to be dangerous to human health. For example, lead in petrol was banned due to it being in a gas form and as a result, it was easy for humans to inhale.

Whilst it was not at all unanimous, the Lead Ammunition Group (LAG) report in 2015 confirmed that they believed there was an issue with humans ingesting lead from shot game.

In reality, the actual risk appears to be very low indeed. This, however, is probably not going to be accepted as a particularly strong argument in lead shot's defence, especially by those who wish to see lead shot banned.

In 2019, the European Union decided to investigate whether lead should be moved from its hazardous to its toxic list by the ECHA across a wide range of uses. Given that approximately 60% of all shot game in the UK is exported to Europe, if Europe declines to accept game shot

using lead, this will mean alternative materials will need to be adopted by UK Guns, in order for game to be sold into the European marketplace.

The ECHA have just reported on the matter, and it is worth stating that lead is NOT included in this year's deliberations and will NOT be included in discussions over the next 12 months or possibly longer. We do however, believe that it will be on their agenda reasonably soon and as worrying, is the issue of the proposed ban on lead shot over wetlands, using a fuller definition of wetlands than at present, as well as introducing a buffer zone, (currently standing at 300m). If this were to occur, it would probably render lead shot illegal within 2 years on all Moorland, as well as over an estimated 50% plus of the UK Countryside!

Waitrose, announced in 2019 (perhaps precipitously), that they will not buy game to sell to their customers from 2020, which contained lead. We are told that Waitrose buy approximately 300,000 units of dead game a year (although this figure has recently been challenged), therefore some immediate changes are likely to be required to meet their demand for the coming season. In addition, the British Game Alliance have confirmed that most of the major food companies which are now proposing to buy shot Game, will only do so if there is a move away from lead. The combined purchasing power of these processors, could markedly improve the dead game industry.

Whilst we are now in the process of leaving the European Union, it seems rather unlikely that whatever course of action the European Commission decide on health grounds concerning lead in food for humans, the British Government is going to ignore. Indeed, a DEFRA Minister previously confirmed that the UK would be so bound in terms of Environmental matters.

For all these reasons, we do believe that very sadly, there is an inevitability of a move away from lead, at some point in the future. We do not believe that it is justified, but that does not mean (like the banning of hand guns), it will not happen. We are also aware of the arguments that some of the alternatives to lead, will create their very own problems. However, the fundamental question is, when will the changeover happen? If we are right in this view, which is obviously what the nine major Landowning and Shooting organisations think, what should the individual Game shot do now to prepare themselves for the change, whenever it comes?

# So, what are your options?

We have set out below, some relevant facts as we at William Powell see them. Please remember this is a developing situation and we can only comment on how we currently see matters, but we do expect further changes and hopefully more clarity to occur going forwards. None of these details are set in stone, but what is, is that lead shot will almost certainly not be the main component in game cartridges at **some** point in the future. We must stress that we do not see the justification for this, but we do think it is a realistic assessment.

## What are the alternatives to Lead Shot?

There are currently 3 options:

**Steel (soft iron)** - [page 4](#)

**Bismuth** - [page 8](#)

**Tungsten Matrix** - [page 8](#)

The Cartridge manufacturers tell us that it is very unlikely there will be other realistic or suitable alternatives developed in the future, however much we might wish!



# Steel

Steel shot first came into the UK many years ago and was then generally regarded as less effective at range as lead, as it is only around 70% as dense as lead.

There have been significant improvements in steel cartridges in recent years and today's steel cartridges are a significant improvement on what we remember from twenty years ago.

Modern steel shot cartridges are actually "soft iron" and not steel and millions of them are made and shot in the USA, Scandinavia, Denmark and throughout Europe. However, its use in these markets is with plastic wads AND many of these cartridges are loaded to a much higher specification than can be loaded for the UK, which operate under current CIP regulations. Therefore, you must be very careful when comparing the steel shot cartridges which are available in the USA and elsewhere, with those currently available in the UK.

UK Wildfowlers have been using steel shot for years and generally seem to get on well with it, having adapted their shooting techniques. They also now have better products than were previously available, due in particular to technical advances in the powders being used in steel shot cartridges.

One of the problems with steel shot is that currently, it must be used in a shot cup to protect the barrels from direct contact, which would otherwise cause damage. This means that "felt" wads are not suitable, which they are for lead shot cartridges. In the main these shot cups are made of plastic, but other options are becoming available, such as Gamebore's fibre shot cup Silver Steel, Eley's PRO ECO, as well as other materials which are currently under development. However, it is fair to say that we are still a considerable way away from having available high-quality non plastic cases and wads, or indeed the quantity of high-quality steel shot which would be needed to make the change on any scale from lead to steel shot. For those who yearn to revert to paper cases, sadly they are not currently suitable for steel shot loads. It would therefore seem to be somewhat ironic, for toxic lead to be replaced with pollutant plastic shot cups and cases!

In addition, there are no "soft iron" shot cartridges available in the UK which are 2 ½" / 65 mm long in 12 gauge, at the moment. Why?

This is mainly due to the reduced payload necessary in a 2 ½" 12-gauge steel cartridge given the lower density of steel shot. For example, a 28g lead load would be reduced to around 19.5g using steel, which would make it pretty ineffective on Game.

Whilst modern steel (soft iron) cartridges loaded to CIP (the required UK regulations) are much better than they used to be, they are not as effective when shooting high birds as the equivalent lead shot cartridges. There is hope that CIP may change their current rules, so that higher performance steel shot cartridges could be made and be legal to use in the UK. If these were similar to the steel shot cartridges available in America, this would be a massive improvement and something we all need to work towards.

Standard steel cartridges, which are on sale in the UK now, are very effective at shooting mid height birds, as may be found on the vast majority of UK Game Shoots. The sort of traditional Pheasant shown flying out of woodland or Partridges over hedges, are perfectly capable of being shot using "standard" steel shot cartridges currently available, even though almost all are 70mm.

To make steel shot cartridges roughly as effective as lead, it is recommended to reduce the size of the shot by two sizes. Therefore, if you normally shoot 6 shot lead cartridges, shoot 4 shot steel ones.

## Q. What are the options for smaller gauges?

A.

Currently steel cartridges are not readily available in the UK for 16-bore, 28-bore or .410 guns. Tungsten Matrix and Bismuth cartridges are available for the majority of gauges but will be more expensive than we are used to.



**Before you do anything,  
check your gun is suitable  
for shooting steel shot  
cartridges and if it is,  
which ones.**

Read on

# Steel continued...

Images illustrating proof markings on an Over & Under (left) and a Side by Side (right)



## Over & Under Proofing Marks

Explanation starting top left

Bore Size and Chamber Length in mm (12/76)

Date of manufacture (2019)

Manufacturers stamp (BR)

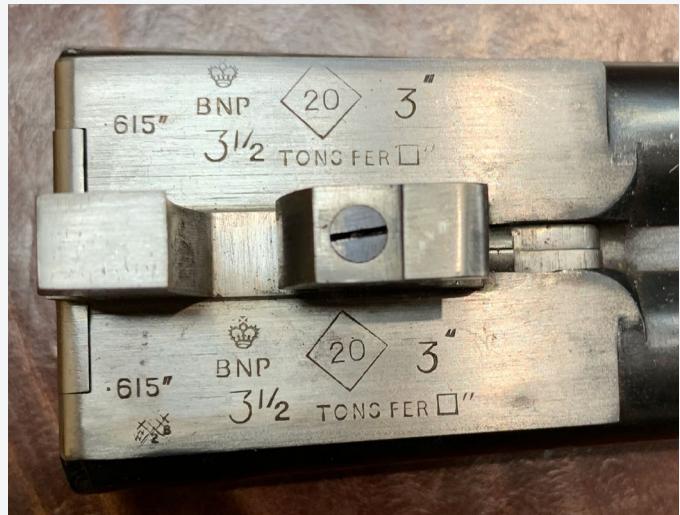
Serial Number (CO17124)

Nitro Proof - Outside of the UK (CIPS)

Italian Proof House Stamp (Crossed Guns with star above)

Fleur-de-lys - High Performance Steel Shot Proof (CIP)

Italian date stamp - 2019 (CU)



## Side by Side Proofing Marks

Explanation starting top left

Bore Diameter (.615")

Birmingham Proof House 1954 (BNP - 3½ TONS PER □")

Gauge (20 Bore)

Chamber Length (3")

Birmingham Mark (Crossed swords, showing the date code and the inspectors number who did the proofing)

*Unlike the adjacent Over and Under, this Gun is not, despite having 3" chambers, High Performance Steel Shot proof as it does not show the Fleur-de-lys stamp*

The images above show examples of the Gunmaker's stamps which can be found on both Over & Under and Side by Sides barrels. Once the Proof House stamp has been identified, use the table below to distinguish which proof house did the proofing and when. These will then tell you if you can use "Standard Steel" or "High Performance Steel" loads through your barrels. This is very important as the two are not at all the same!

**DO NOT**, under any circumstances unless your gun is High Performance steel shot proofed, shoot 3 shot or larger steel cartridges through it, and then only with a maximum of half choke. This is because steel shot is less soft (and malleable) than lead and therefore when it meets the choking in the barrels, will not "adapt" and hence may well cause damage to the barrels.

Again, using the table on page 7, please check carefully to ensure your gun and the cartridges you intend to use, are compatible.

We are also increasingly aware that some people now use 2 ¾" / 70mm cartridges in guns with 2 ½" / 65mm chambers. This "shorter" chamber length is what most side by side guns have, unless they were either built for wildfowling, live pigeon shooting or were built quite recently. This misuse occurs currently with the wrong sized lead shot cartridges being used.

Please be aware **THIS IS HIGHLY DANGEROUS.**

Please check and ensure you are using the correct ammunition in your gun and this includes with lead shot cartridges.

The table above illustrates 'standard' and 'high performance steel' proofing marks from London and Birmingham proof houses from 1954 to 2020

CIP / UK	STANDARD STEEL	HIGH PERFORMANCE STEEL
London 2020	CIP N NP 	CIP  NP 
Birmingham 2020	CIP N BNP 	CIP  NP  BNP 
London 2006	 NP STD 	 NP     SUP
Birmingham 2006	 BNP STD  	 BNP     SUP
London 1989	 NP 850 BAR	
Birmingham 1989	 BNP 850 BAR	
London 1954	 NP 3 TONS PER □"	
Birmingham 1954	 BNP 3 TONS PER □"	

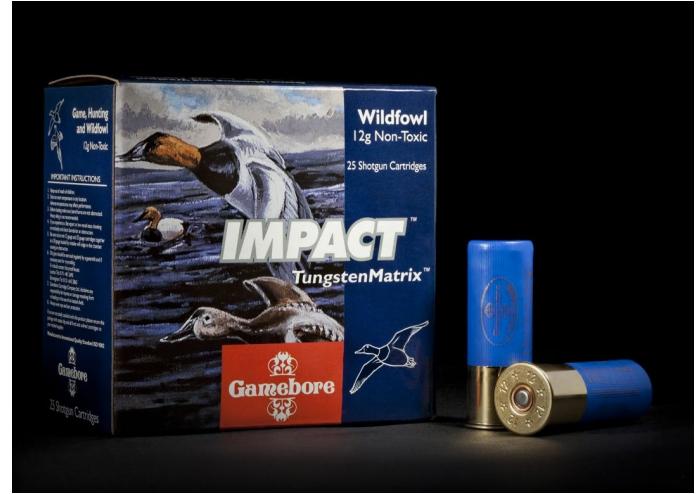
This table shows whether your gun is safe to use with the two different types of steel shot cartridges. Please note that there are different proof marks from both Proof Houses going back to the 19<sup>th</sup> Century and the above are relatively recent examples.

**NO** steel shot cartridges should be used through any gun with Damascus barrels and under no circumstances, should **ANY** gun be shot which is out of proof.

We would also suggest that guns originally made for use with black powder, but which have been reproofed for nitro, should be checked very carefully by a qualified and experienced gunsmith or the Proof House, before using with **ANY** steel cartridges.

Please note that currently steel cartridges are not readily available in the UK for 16, 28 or .410 guns. Owners of these calibre guns will have to use one of the available shot alternatives, as discussed below.

The current price of an average lead shot game cartridge (65mm and with a 30-gram load) is between £0.30 and £0.35. The current price of a similar steel loaded cartridge is £0.23 to £0.28. These are based on 32gram of steel and a plastic wad.



## Bismuth

Bismuth cartridges, which are about 85% the density of lead, have been around for some time and were initially thought of as not very effective when compared with lead.

Again, modern Bismuth cartridges are significantly better than they used to be. Some manufacturers (Gamebore in particular), now have a process which ensures the shot is malleable like lead and improves effectiveness, but an increase in one shot size (from 6 to 5 for example) is recommended, to compensate for the lower density and to increase lethality.

Our overall view currently is that Bismuth cartridges are the logical alternative to lead cartridges for old English Side by Side shotguns, perhaps with thinner (but still nitro proofed) barrels. They will also be ideal for 16 or 28 bore guns. These cartridges will be perfectly good for shooting at "normal" height game (including Grouse). We do not however, think that Bismuth cartridges, along with non High-Performance steel cartridges, are at all ideal for shooting extreme high birds. There is no doubt that shooting using steel or Bismuth cartridges, as opposed to lead, does take some getting used to. Please do not think that you will shoot exactly the same (or to the same standard), if you change from lead shot cartridges to one of the alternatives, because most people will not immediately do so. Instead they will need to practice getting used to the change in load, speed and probably recoil. With practice they should, provided the quarry is at "normal" height, shoot to much the same standard as they did before with these alternatives, once they are thoroughly acclimatised to their new type of cartridge.

The current price of a 30 gram 5, 12 bore Bismuth cartridge is £1.20. There is no issue with using Bismuth cartridges through guns choked more than half.

## Tungsten Matrix

Tungsten Matrix has almost identical properties to lead in terms of density and cartridges made using this material, we believe are just as effective as lead shot cartridges, including at high birds. If cost is not an issue, then Tungsten Matrix cartridges can safely be used in old English shotguns again irrespective of choking. These are very good, but much more expensive cartridges, but with a performance very like lead.

The current price of a 32 gram 5, 12 Bore Tungsten Matrix cartridge is £2.23.

# So, what do you need to do now?

There is **NO** immediate rush to do anything as lead cartridges have not been banned by the authorities and are likely to be available to use to shoot game for some time to come.

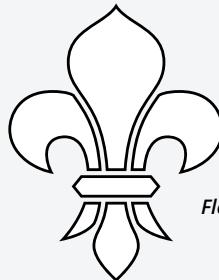
However, we consider it prudent to think about it now and to plan for the future, particularly if you were thinking of what gun you intend to use in the longer term. It is clear that some guns now in use, are not suitable for shooting **ANY** steel cartridges and only a very small proportion are safe to shoot High Performance steel cartridges through.

Please do not think that the way to get around the problem is to buy thousands of lead shot cartridges "to see you out", as when their use is stopped, it will probably be illegal to use them, or even if it is not illegal, the Game shot will not be able to be used in the human food chain. The biggest driver to move away from lead shot will almost certainly be from the dead Game perspective. We foresee a time, probably not more than 3 to 4 years away, when most shoots will not allow lead shot cartridges to be used.

It is in our view, far better to look at the alternatives now, to include looking at what guns you use and then make the change when necessary, to protect our sport and ensure its future for everyone.

**It is therefore very important that you get your Guns checked out by a competent Gunsmith if you are in any doubt as to what cartridges you can safely shoot. In summary therefore;**

1. If your gun is proved for High Performance Steel Cartridges, the barrels will be marked with a 'Fleur-de-Lys', showing the gun has been tested to High Performance steel proof pressures.



*Fleur-de-Lys symbol*

2. If your gun does not carry the 'Fleur-de-Lys', it should have Nitro proofed markings. There are many marks for the Nitro proofing in the UK; one for each Proof House used in Birmingham and London. Again, we have shown these below but only dating back to 1954.

All of the above marks, show that guns bearing them can shoot "Standard" steel cartridges, provided the gun is in proof and does not have Damascus barrels. However, these guns cannot be used with High Performance steel shot cartridges.

**CIP**  
**S**

*For more modern guns with nitro proof barrels from outside of the UK, these will have a mark of CIP with an S underneath showing they meet CIP proof.*

London 2020	CIP  N NP	Birmingham 2020	CIP  N BNP
London 2006	 NP STD	Birmingham 2006	 BNP STD
London 1989	 NP 850 BAR	Birmingham 1989	 BNP 850 BAR
London 1954	 NP 3 TONS PER □"	Birmingham 1954	 BNP 3 TONS PER □"

3. Knowing this, you must consider the chamber length of your gun, to ensure you are not going to buy or use cartridges which are too long for the chamber. The chamber length is also stamped in the same area, normally in the format of 12-65 or 12/70 for modern guns and old English guns usually have a stamp of 2 1/2" or 2 3/4".

4. Remember, there is currently NOT a Steel Cartridge available in the UK, which is suitable for any 65mm chambered 12 Bore.

5. If your gun is not "High-performance" steel shot proofed, (i.e. does not have the 'Fleur de Lys' mark), you should **NEVER USE** High Performance steel shot cartridges through it.

6. Shotguns bearing any London or Birmingham proof symbols from 1954 onwards, can safely shoot standard steel cartridges as long as the chamber and chokes are suitable. For shotguns proofed pre 1954, the situation is not at all clear and as a result, guidance should be sought from either Proof House. If you wish to use Bismuth or Tungsten Matrix cartridges through a Nitro proofed gun, you can do so without any alteration to your chokes, however tight they may be.

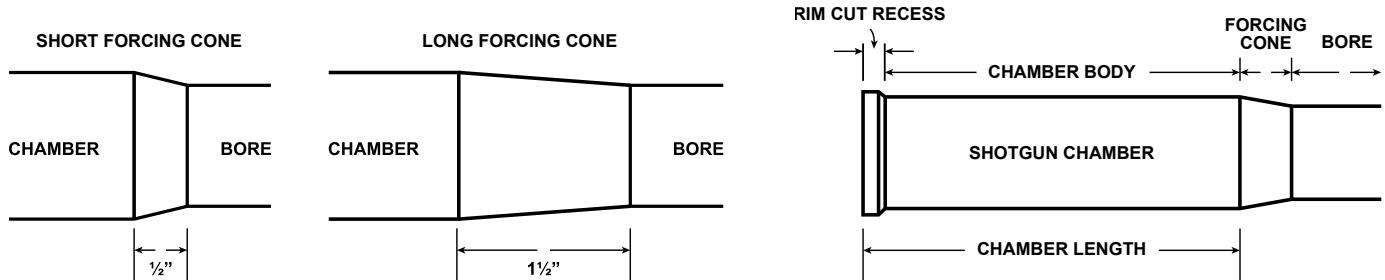
7. We have attached the latest recommendations regarding the use of steel shot from BASC and would strongly advise that you make yourself familiar with this advice.

# Forcing Cones and Chamber Length Alterations

Forcing cones are the part of the barrel from the end of the chamber (where the cartridges sit) to the start of the barrel of the gun. In some older guns, this was very steep and was designed to house the old paper cased rolled turnover cartridges. Modern cartridges have crimp closure and these also need chamber space for the crimp to open into.

Some people think that increasing the length of the cone or even the chambers themselves is a good idea. However, this means removing metal from the chamber to the bore and any removal of metal in this part of a gun, is likely to reduce its strength in a critical area. We would strongly advise taking expert advice from either a qualified and experienced Gunsmith or the Proof House before carrying this out.

Your safety and the safety of those around you is paramount and please be aware, that if you undertake this work to your gun, it will mean the gun will need to be resubmitted to Proof – and it might fail!



*This illustrates, in proportion, the difference between the two types of forcing cones.  
While there are variations, of course, the dimensions shown are average.*

*Standard shotgun chamber with short forcing cone.*

## Q. Can you alter your gun's chamber lengths?

- A.** The short answer is yes, this can be done, **BUT** you must get it done by a very competent Gunsmith, and the gun will again need resubmitting to proof. and so **PLEASE** do **NOT** contact us until our Gun room is reopen, which will be advertised on our website.

## **Q. Can you get your existing gun High Performance Steel Shot Proofed?**

**A.**

The answer is possibly yes. However, it really will depend on the design, construction, probably the age and definitely the condition of each gun, as to whether a gun which is currently nitro proofed, will stand being re proofed for High Performance steel shot. We have heard worrying estimates of how many "old" English side-by-sides are likely to fail when they are steel shot proofed, from one in three, to one in eight. We are only recommending that relatively new and very sound guns, with plenty of barrel wall thickness and an excellent fit between the action face and the barrels, are sent to be High Performance steel shot proofed. Please remember that in most instances, when a gun fails being reproofed, it is then unuseable and is almost certainly of little or no value.



## Our Next Briefing Note

We will in due course, be issuing another briefing note on different aspects of steel shot, including the effects of shot size, choking and patterns, particularly comparing the difference between steel and lead shot cartridges. This will help you decide which steel or other non-toxic cartridges, might suit your gun and your shooting requirements, in the future.

## Advice

If you want to discuss any of this when we are re-open, please come and talk to us in our Gunroom at Carrs House, or call us on **01295 235233**. Please do not do so, until the current “lockdown arrangements” are over. We would love to help you going forwards, but currently have only limited staffing and so **PLEASE** do **NOT** contact us until our Gun room is reopen, which will be advertised on our website.



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