

Killing Effects of Lead or Alternative Ammo Materials in Hunting Rifle Bullets and Shotshells

Hans-Dieter Pfannenstiel



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Article 20a

Basic Law for the Federal Republic of Germany

Protection of the natural foundations of life and animals

Mindful also of its responsibility toward future generations, the state shall protect the natural foundations of life **and animals*** by legislation and, in accordance with law and justice, by executive and judicial action, all within the framework of the constitutional order.

*** - since 2006**



Most important question after a hunt:

Have all animals been killed according to the laws of animal welfare and hunting ethics?



„Heart Shot“

As a rule, a heart or thorax shot produces lesions of vital blood vessels, of the heart or of the lung.

Normally, the flight distance is very short after such a shot, and - most important - the animal is killed according to hunting ethics.



„Heart Shot“

If neither vital blood vessels nor the heart or the lung are hit, the flight distance may be rather long and the animal is not killed according to hunting ethics.

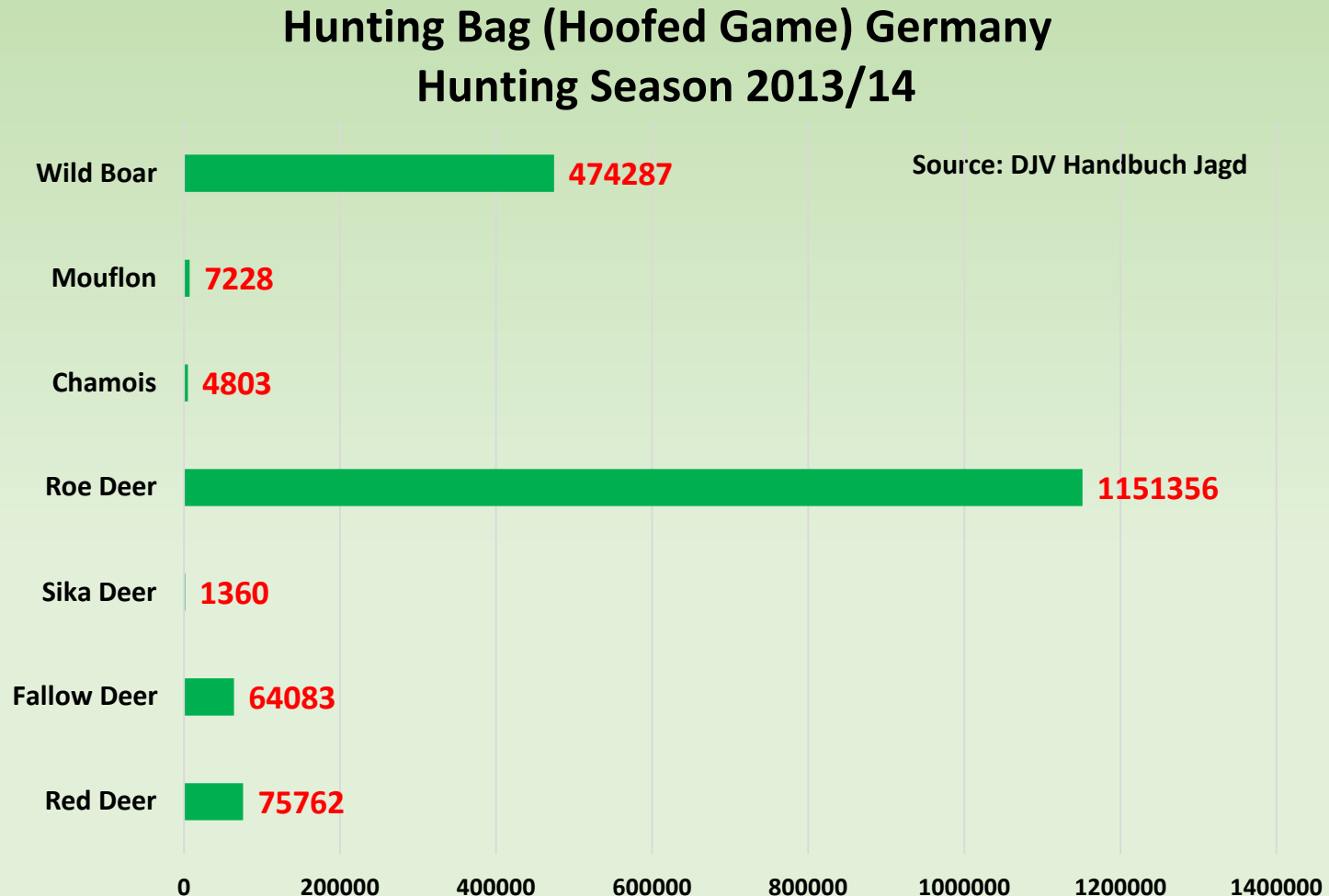
**Most important:
Where did the bullet hit?
What damage caused the bullet?**



According to hunting ethics this must not be the result after a hunt!



We are talking about 1.9 billion hoofed game killed in Germany during the hunting season 2013/14. This is not a side issue!



From the beginning there had been many reports from hunters that gave rise to doubts whether lead-free bullets are suitable to kill animals according to hunting ethic standards.



Full Metal Jacket Bullet

**Carl Gremse, MSc.
Prof. Dr. S. Rieger**



FINAL REPORT:

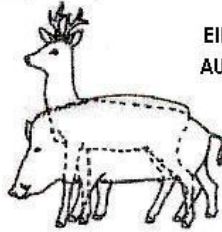
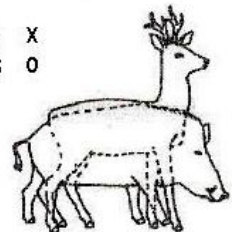
**„Ergänzende Untersuchungen zur Tötungswirkung
bleifreier Geschosse“**

**Supplementary examinations on the killing effect
of lead-free bullets**

December 2012

**Significance and meaningfulness of the results of
this study had been called in question since then.**

Killing Effects of Lead or Alternative Ammo Materials in Hunting Rifle Bullets and Shotshells

Patrone/Kal. : Geschossart Gewicht (g) : Lauflänge (mm) Industriell geladen Losnr. : Gewerbl. wiedergeladen: ☐ Selbst wiedergeladen: ☐ V ₀ : m/s		 Abschussbericht		Posteingang (nicht ausfüllen)			
		Name des Erlegers :		Fachhochschule Eberswalde Fachgebiet Wildbiologie /Jagd Prof. Dr. Siegfried Rieger Carl Gremse, M.Sc. Tel.: 03334 65 512 Mobil: 0170 581 88 24 Fax: 03334 65428 (Rücksendung) e-mail: cgregse@fh-eberswalde.de			
Reg.-Nr :		Strasse : Wohnort : Telefon					
		Jagdbezirk / OBF Nr. :					
Datum : Uhrzeit :		Jagdform : Ansitz : ☐ Pirsch : ☐ Bewegungsjagd: ☐					
 EINSCHUSS X AUSSCHUSS O  Wildmarken-Nr. _____ ☐ !  Lage des Schusskanals bitte durch Pfeil kennzeichnen							
beschossenes Wild		Aufbrechergewicht		Schussentfernung		Fluchtstrecke	
Rehwild	001	bis 10kg	007	unter 50m	013	am Anschuss	019
Rotwild	002	11-20kg	008	51-100m	014	bis 15m	020
Schwarzwild	003	21-45kg	009	101-150m	015	16-40m	021
Damwild	004	46-75kg	010	151-200m	016	41-75m	022
Sikawild	005	76-120kg	011	201-250m	017	76-150m	023
Muffelwild	006	>120 kg kg	012		018	> 150m m	024
Ausschussgröße (s. u.)		Schusszeichen (Anschuss)		Verletzte Organe		Organverletzungen	
ohne	025	Herzschweiß	031	Herz	038	normal	044
bis 20mm	026	Lungenschweiß	032	Lunge	039	stark beschädigt	045
21-35mm	027	Leberschweiß	033	Leber	040	nicht verwendbar	046
36-60mm	028	Pansen/Gescheide	034	Niere	041	Wildbretzustand	
61-100mm	029	Schnitthaare	035	Gr. Gescheide	042	gut	047
> 100mm mm	030	Knochensplitter	036	Kl. Gescheide	043	befriedigend	048
Bitte Maßband mitführen!		Wildbret	037			mangelhaft	049
Verhalten des Wildes vor dem Schuss		Verhalten des Wildes nach dem Schuss		Angaben zur Flucht- u. Schweißfährte		Sonstige Angaben 1	
ziehend	050	nicht gezeichnet	055	kein Schweiß	061	Hämatome /Blutergüsse	067
flüchtig	051	gezeichnet	056	wenig Schweiß	062	Rückgrattreffer	068
äsend / vertraut	052	nicht beobachtet	057	reichlich Schweiß	063	Rippentreffer	069
alarmiert / gestreßt	053	bleibt stehen	058	Schweiß regelmäßig	064	sonst. Knochentreffer	070
vor dem Hund	054	taumelt, bricht zusammen	059	Nachsuche erfolgreich	065	Schuss d. Hindernis	071
		Flucht	060	Nachsuche ohne Erfolg	066	Entfern. Hind. zum Ziel: (Art d. Hind. unten angeb.)	m
Sonstige Angaben 2:							
Gesamtbeurteilung (abschließend bitte unbedingt ausfüllen!)						Berichterstatter hat das Wild aus der Decke geschlagen	

11371 questionnaires (Abschussbericht) had been evaluated
 19.7% lead bullets,
 80.3% lead-free bullets;

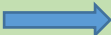
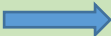
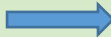
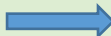
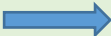
12 different calibers,
 64 different bullets;

Flight distance was taken as measure of killing effect, because energy output in the hit animal was not known, and no vet. pathol. examinations were carried out;

Shooting in ballistic soap was performed to analyze terminal ballistic properties of different bullet types;

Definition
 „Grenzgeschwindigkeit Jagd“;

Gremse & Rieger, 2012: Final Report

Total number of animals killed		11278 – 100 %
Pb/Pb-free ratio		2222 – 19.7 % Pb 9056 – 80.3 % Pb-free
Average shot distance		
State Forest Brandenburg		67 m
Federal Forest		84 m
Average shot distance		
BDB (Professional Hunters Germany)		139 m Reed Deer 90 m Wild Boar

Gremse & Rieger, 2012: Final Report

Weight Classes of Killed Animals		
Weight	Total Number	Percentage
< 75 kg	10985	97.4 %
75 – 120 kg	248	2.2 %
> 120 kg	45	0.4 %

Gremse & Rieger did not publish average shot distances for different weight classes!

Dr. sc. forens., Dr. med. h. c.
Beat P. Kneubuehl
Universität Bern
Institut für Rechtsmedizin

25.02.2013

Gutachten

zum Abschlussbericht der HNE Eberswalde
Fachgebiet Wildbiologie; Wildtiermanagement &
Jagdbetriebskunde

Dr. sc. forens., Dr. med. h. c.
Beat P. Kneubuehl
Diplom-Mathematiker



Dr. Beat Kneubuehl evaluated the Gremse & Rieger paper

From Dr. Kneubuehl's summary

„Grundlage dieses Abschlussberichts war eine umfangreiche Datenerhebung zur Tötungswirkung von Wild beim Abschuss. Der vorliegende Abschlussbericht wertet diese Material nur auszugsweise aus (Bewertung durch ... berücksichtigt, bedingte ... jedoch nicht zur ... verwendete Literatur

Revisions of the Gremse & Rieger Paper have been criticised by Dr. Kneubuehl as well!!

... Problem der ... ist. Wertes wird eine „Grenzleistung ... , deren Wert wegen der in unzulässiger ... Grundlage sehr fraglich erscheint. Wegen dem fehlenden Nachweis der Richtigkeit dieser Grenzleistung gelten die berechneten zulässigen Einsatzentfernungen der verschiedenen Geschosse weder als nachgewiesen noch als widerlegt“.

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Accordingly, the Gremse & Rieger Paper does not justify a ban of lead containing bullets!

...wird eine „Grenzleistung... deren Wert wegen der in unzulässiger... Grundlage sehr fraglich erscheint. ...m fehlenden Nachweis der Richtigkeit dieser Grenzleistung gelten die berechneten zulässigen Einsatzentfernungen der verschiedenen Geschosse weder als nachgewiesen noch als widerlegt“.

More comparative studies concerning the killing effect of rifle bullets are necessary!

Best solution:

Animals killed during a hunt are submitted to a veterinary pathologist to determine the primary cause of death!

**Institut für Pathologie und
Gerichtliche Veterinärmedizin**
Veterinärplatz 1, 1210 Wien,



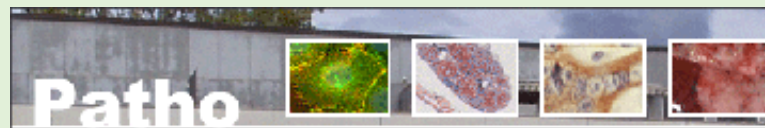
Institut für Tierpathologie
Robert-von-Ostertag-Straße 15
14163 Berlin

Best solution:

Animals killed during a hunt are submitted to a veterinary pathologist to determine the primary cause of death!



Institut für Tierpathologie
Länggass-Str. 122
Postfach 8466
CH-3001 Bern
Tel.: +41 31 631 2394



A veterinary pathological examination is the only way to determine which injuries caused by the shot led to the animal's death and how long it took to die after the shot.



Best solution:

Animals killed during a hunt are submitted to a veterinary pathologist to determine the primary cause of death!

Apparently this is only a theoretical way because

- 1. a vet. pathol. institute would be busy for years even if only 1 % of the yearly hunting bag would be examined,**
- 2. it would be impossible or at least extremely difficult to collect the animals for examination,**
- 3. and the costs would exceed every reasonable measure!**



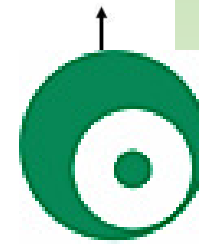
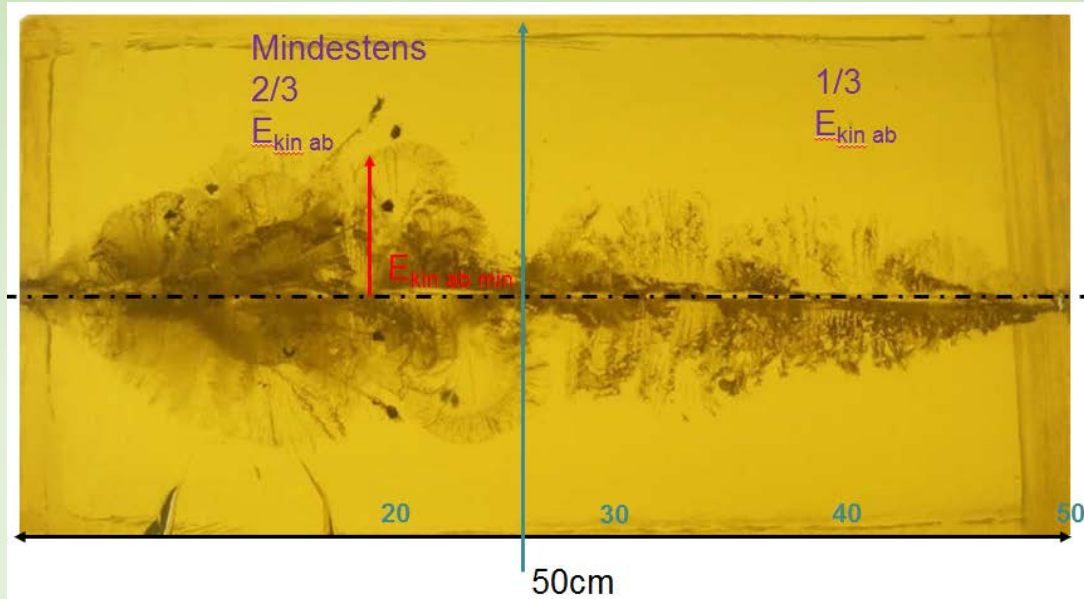
Alternative:

Shooting in ballistic media under controlled conditions!



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Shooting in ballistic media under controlled conditions!



DEVA

Deutsche Versuchs- und Prüf-Anstalt
für Jagd- und Sportwaffen e.V.

We have to keep in mind:

Killing animals according to hunting ethics is demanded by the Basic Law for the Federal Republic of Germany!

The results of different studies and the experience of many hunters do not justify a ban of lead containing bullets at present!

Some notes regarding shot

In German States (Bundesländer) and also in member states of the EU it is no longer allowed to use lead shot along rivers, ponds, and in wetlands.

In Norway, the general ban on lead shot was lifted by the Parliament on Feb. 3, 2015 (79 votes pro, 16 votes contra).

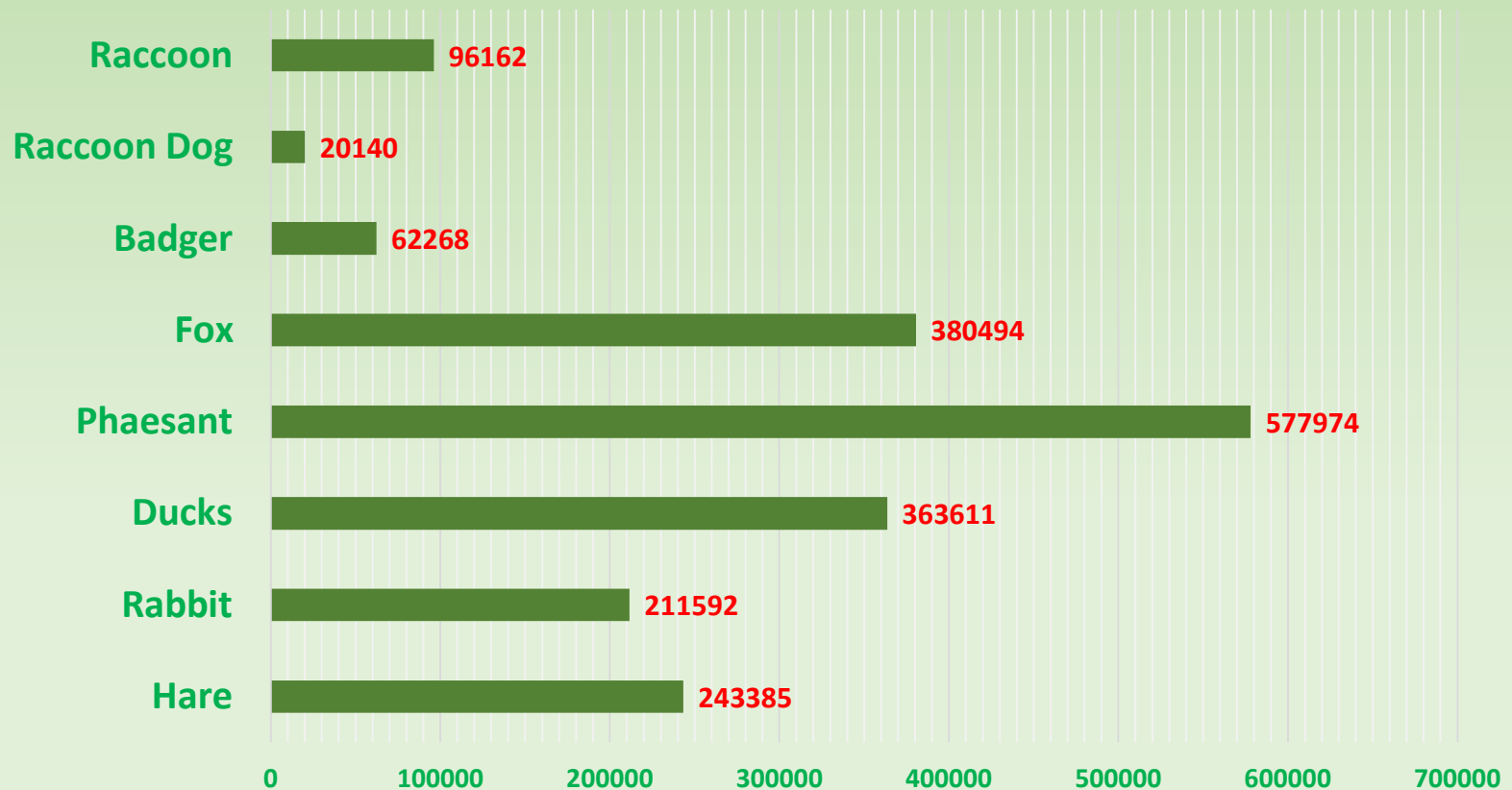
Some notes regarding shot

The Norwegian Parliament justified the decision as follows:

Lead was the most suitable element for hunting ammunition. No other material covered a similar broad range for hunting purposes and was as clean and efficient as lead. The lead free alternatives often caused harm and injury for game and were dangerous for hunters. On the other hand, danger for the environment und human health, which was suspected when using lead ammunition could not be substantiated in detail by present studies.

In Germany, **1 955 626** animals of the below listed species have been harvested during the hunting season 2013/14, at least **1.3 billion using shot**

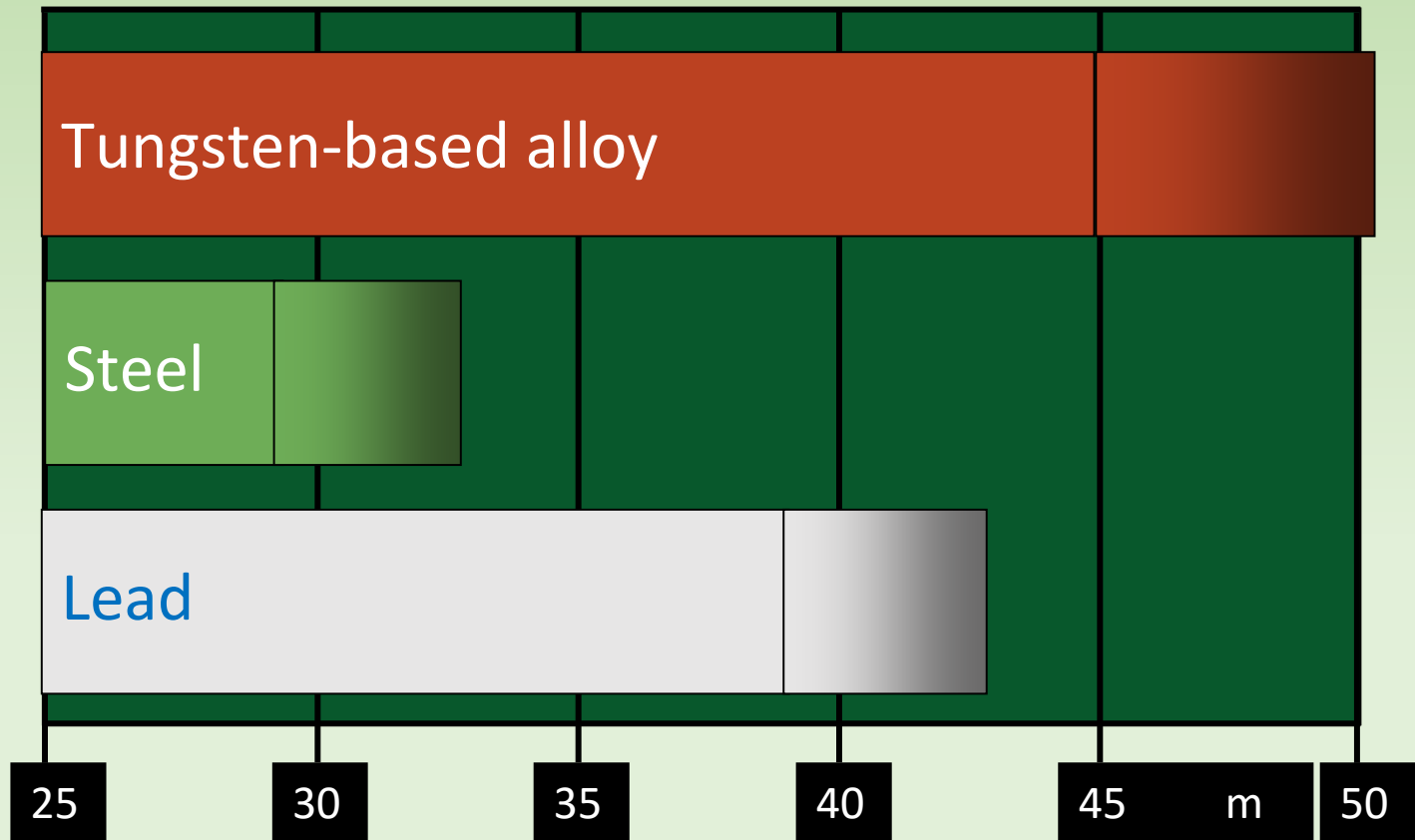
Hunting Bags Germany, Season 2013/14



Source: DJV Handbuch Jagd

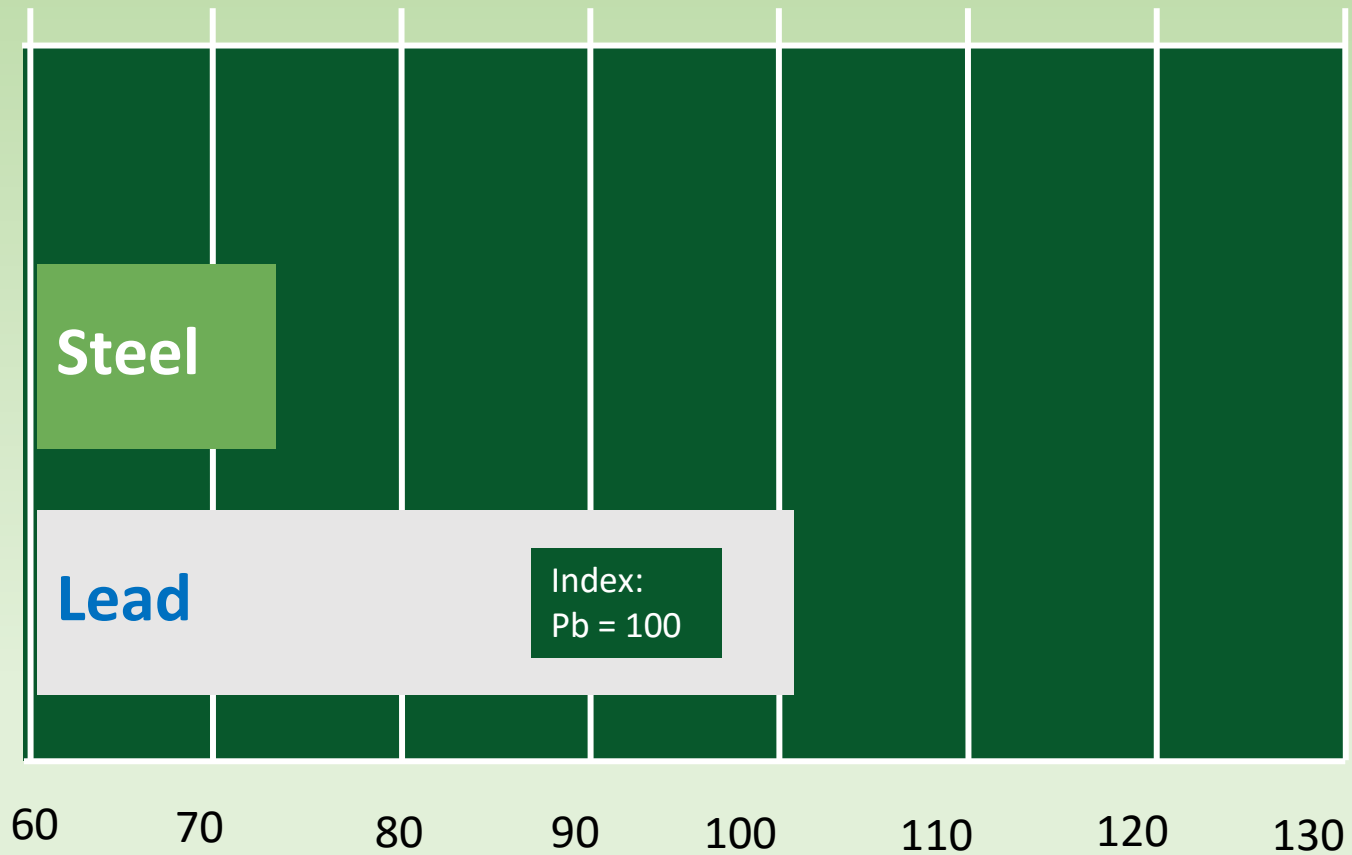
Ballistics

Range of different shot material



Source: RUAG

Energy at 40 m



Source: RUAG

COVERING THE SHOOTING BUSINESS GLOBALLY



Leupold welcomes European partners to Ireland for sales meeting. **p22**



Inside the Turkish gun trade - at the Istanbul ProHunt exhibition. **p34**

f JULY 2015

www.guntradeworld.com

'Bring back lead to save ducks'

As the duck shooting season begins in New Zealand, politicians are calling for lead shot use to be restored in a bid to save a species from extinction.

It's a bizarre situation when calls for the return of an ammunition type - in this case lead shot - will, it is claimed, actually improve duck numbers but this situation is playing out in New Zealand right now.

On the eve of the duck-shooting season political party New Zealand First has repeated its call for lead shot to be allowed once more for this quarry.

There has been concern for the last few years that using steel shot as an alternative - after lead was banned in 12-gauge shotguns over waterfowl fears about ingestion on wetlands - had been drastically reducing mallard numbers, with every bodies fearing it would all but wipe them out.

MP Richard Prendergast, spokesperson on outdoor recreation for New Zealand First, explained: "Many shooters say the steel shot does not always kill and birds may die over hours or days."

"Some shooters are using smaller gauge shotguns so they



can use the lead shot to kill instantly. Others are having to cope with steel shot and taking care to aim appropriately to try for a 'clean kill' but want a return to lead shot.

"It's high time the government listened to shooters, took all aspects of animal welfare seriously and ensured lead shot was made available for the commonly used 12-gauge shotgun."

Nail Hayes, who runs licensed arms dealer Hayes & Associates in New Zealand and has been an avid waterfowl hunter for almost 50 years, added: "The use of steel shot in 12-gauge semi-

automatic comparison with lead; hence the colossal rise in the number of wounded ducks that do not recover - and are wasted!"

"[This] in association with high-capacity shotguns has resulted in a massive increase in the crippling factor (birds not recovered) from five to seven per cent with lead shot to close to 30 to 70 per cent with steel shot. On opening day 2014 a good friend reported that two experienced hunters on his property fired 52 rounds of steel ammo for just three ducks and that all he could see were numerous wounded ducks gliding into the next property and none were retrieved!"

"The existing lead ban - brought in during 2006 - only applies to 12-gauge shotguns used within 200 metres of a body of water and a call for it to be extended to other smaller gauges was vetoed just last year by the NZ Fish & Game Council."

Many hunters have simply bought 16, 20 and 28-gauge shotguns to allow them to continue using lead, but there are still not enough of them to impact on the mallard ducks' demise.

• Continued on Page 6

Lead was banned in 12-gauge shotguns in New Zealand a few years ago.

Now duck hunters frequently complain about the killing effect of steel shot which does not always kill immediately and birds may die over hours or days.

This is not at all in accordance with animal welfare and hunting ethics!

10,641 COPIES EVERY MONTH TO 125 COUNTRIES

Steel Shot (Fe) ↔ Lead Shot (Pb)

- Fe – lower Specific Weight (Pb 11,3; Fe 7,8)
- Fe – much harder

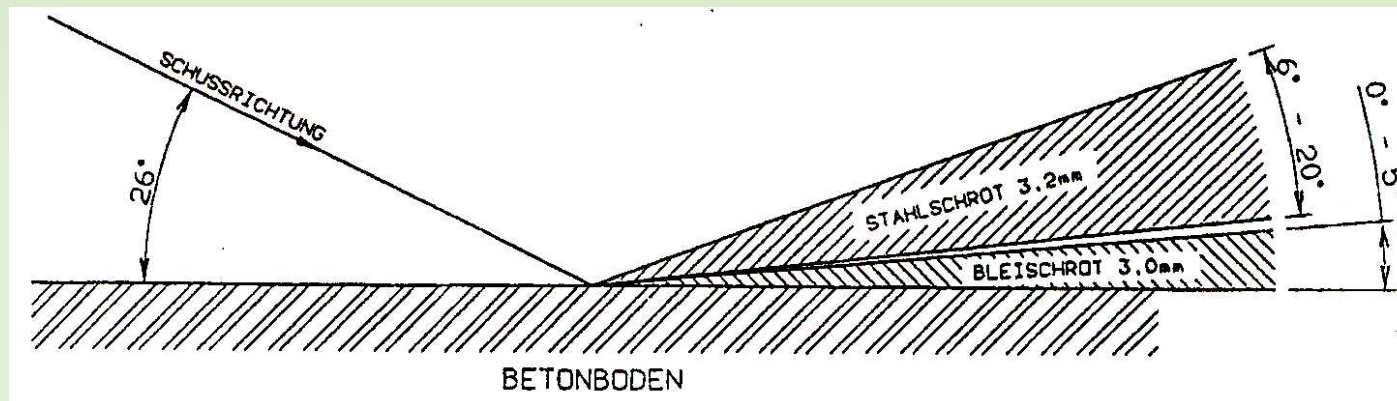
Significance for Fe:

- More pellets, when charge and pellet diameter are identical;
- Deeper penetration;
- Higher loss of speed!
- **Danger of rebounds higher!**
- **Loss of killing ability!** Penetration of the hard steel pellets is better, but energy loss in the body is reduced because pellets do not deform readily.
- Coverage narrows;
- **Range much shorter!**

Danger of rebounding steel pellets much higher!

Steel pellets do not deform easily when touching a hard surface (even water) and consequently loss of speed in such cases is much smaller than in lead pellets.

Rebound angles of steel pellets are larger than those of lead pellets.



This may be the result if steel shot is used in shotguns which were constructed for lead shot



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**Decisions should be based on
knowledge and not on feelings!**

**A general ban on lead ammunition could be
a dangerous cul de sac!**