Transition to lead free bullets in hunting - Status of Science and Policy proceedings in Germany

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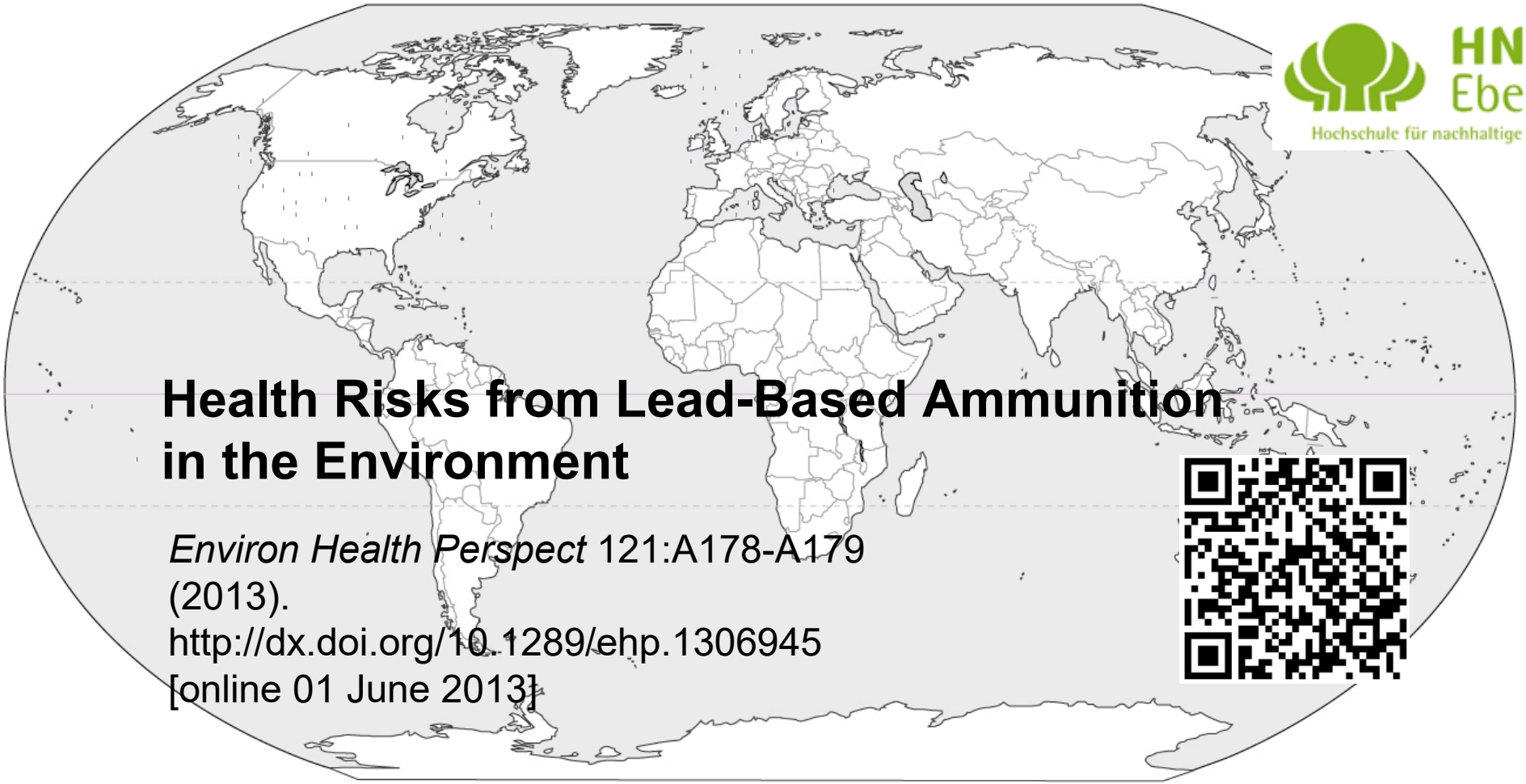


Health Risks from Lead-Based Ammunition in the Environment

Environ Health Perspect 121:A178-A179 (2013).
http://dx.doi.org/10.1289/ehp.1306945
[online 01 June 2013]

Group of Scientists, 2014. Wildlife and Human Health Risks from Lead-Based Ammunition in Europe: A Consensus Statement by Scientists. Available from: **http://www.zoo.cam.ac.uk/leadammunitionstatement/**

Studies done in Germany

RAPTORS

GAME MEAT FOR HUMAN CONSUMTION

SAFETY ASPECTS (RICOCHETS)

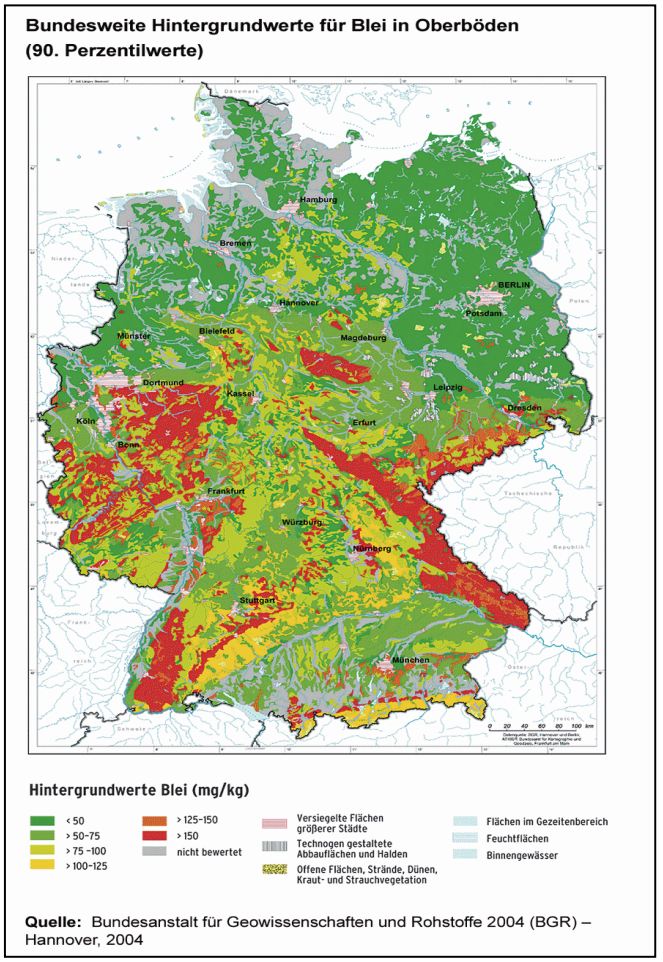
TERMINAL BALLISTICS OF HUNTING BULLETS

Poisoning of raptors – IZW BERLIN

Lead from hunting bullets main source of poisoning in white tailed eagles in Germany – the main anthopogenic factor impeding the population.

Lead in Game Meat

Bundesinstitut für Risikobewertung



Lead from hunting bullets main source lead found in Game Meat.

Introduction can be reduced by using nonlead bullets.

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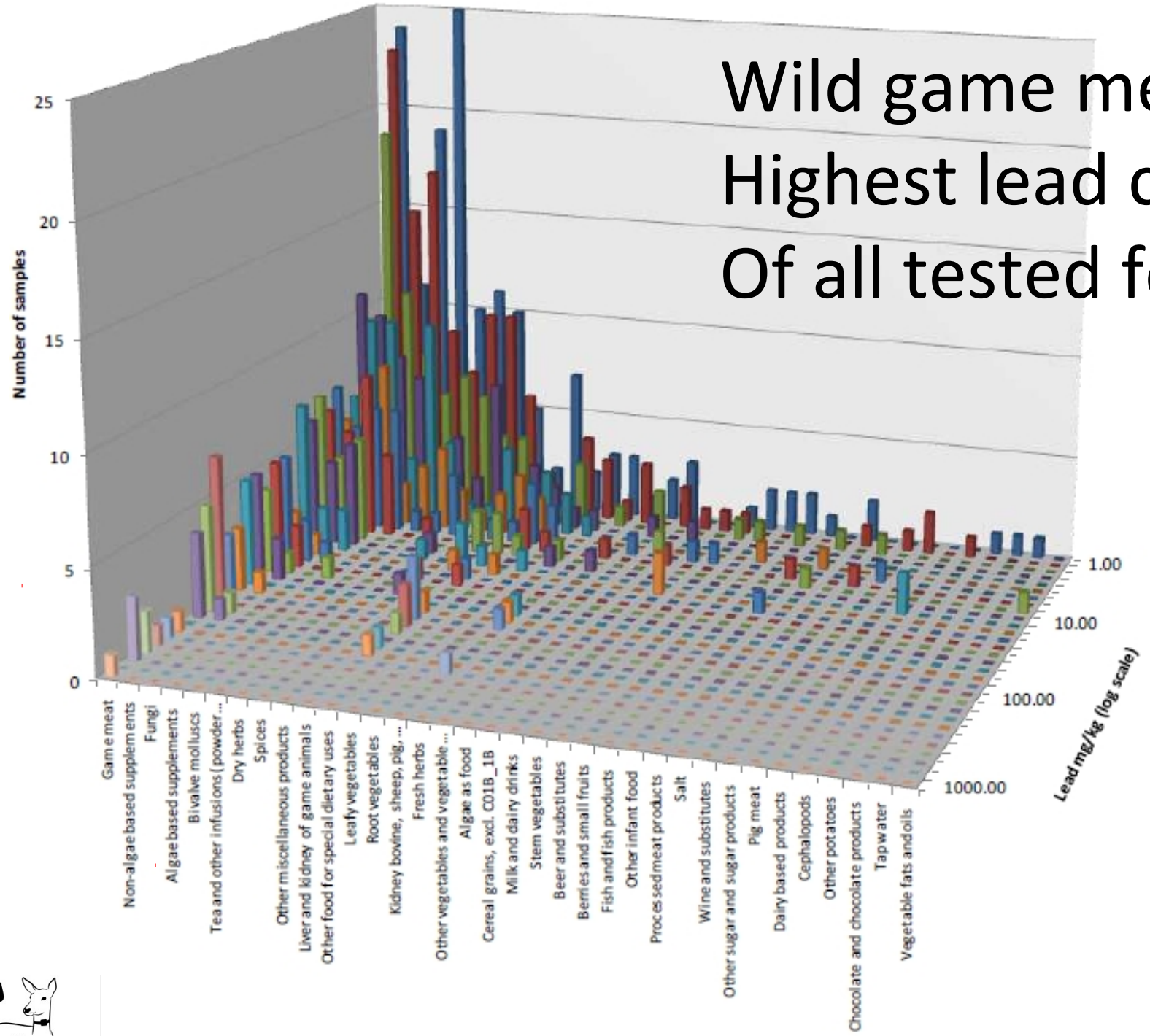
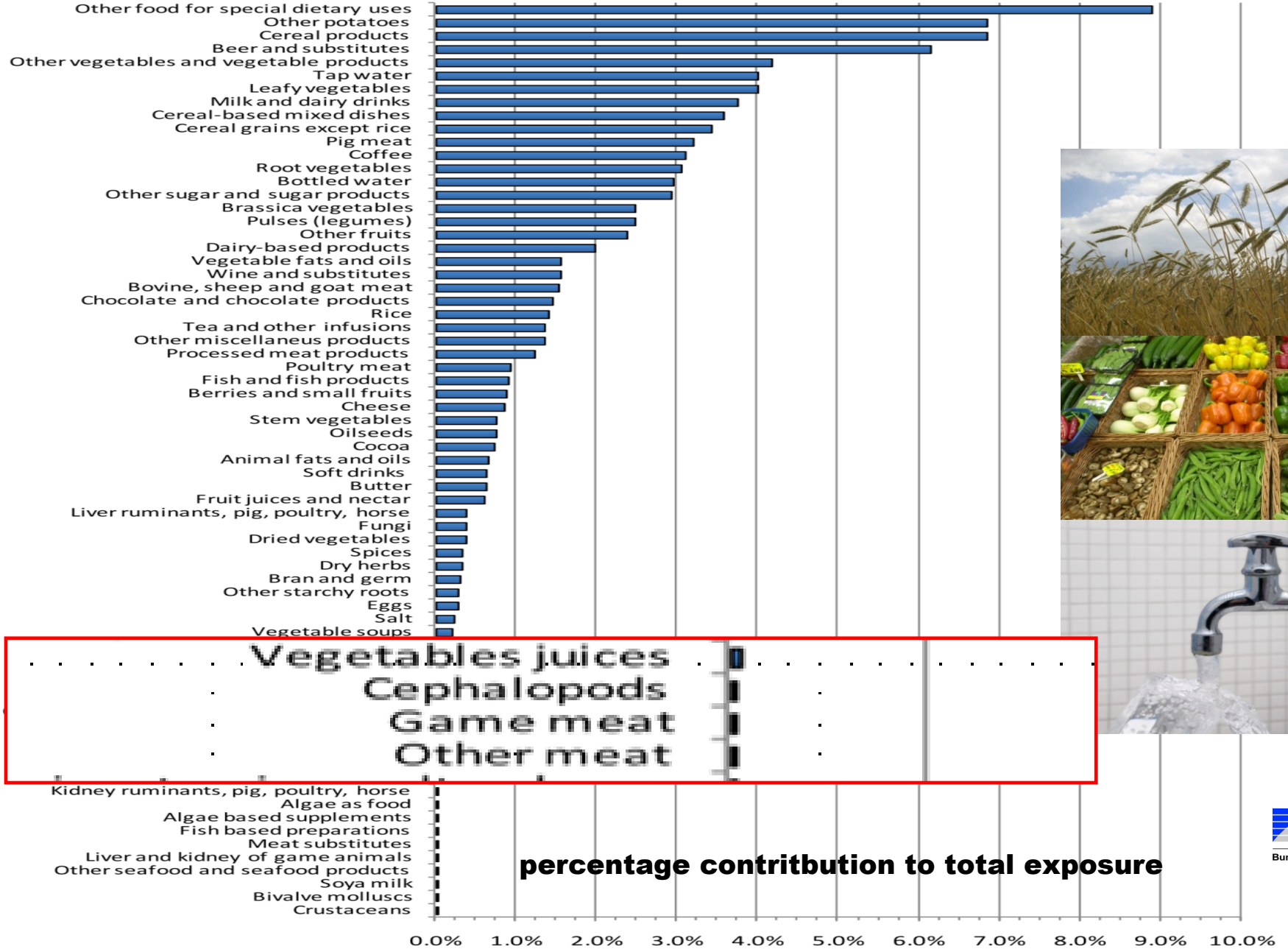


Wild game meat – Highest lead contend Of all tested food

EFSA, 2010 – Lead Content

Dept. of Wildlife Biology, Management & Hunting Practice HNEE

EFSA, 2010 – Exposure to Lead from Food



BfR
Bundesinstitut für Risikobewertung

Richochet DEVA Institute

Bildquelle: Blaser Jagdwaffen / FWWJ

Hunting bullets are dangerous – User Caution advised. Uneffected by Bullet material.

Field Studies

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Field Studies

11.371
Protocols

6 Species

68 Bullet types

...

Ballistische Daten:
Patrone/Kal.: _____
Geschossart: _____
Gewicht (g): _____
Laufl änge (mm): _____
Industriell geladen: ☐
Fert. Zeich.: _____
Gewerbl. wiedergeladen: ☐
Selbst wiedergeladen: ☐
V_0: _____ m/s

FWWJ

Reg. Nr.:

Abschussbericht

Name des Erlegers: _____
Strasse: _____
Wohnort: _____
Telefonnummer: _____

Jagdbezirk/ OBF Nr.: _____

Posteingang (nicht ausfüllen)

Fachgebiet Wildbiologie, Wildtier-management & Jagdbetriebskunde (FWWJ)
Prof. Dr. S. Rieger
Carl Gremse, Dipl. Forstw.
Hochschule für nachhaltige Entwicklung Eberswalde (HNEE)

Datum: ___.___.20___ Uhrzeit: ___:___ Jagdart: Ansitz: ☐ Pirsch: ☐ Bewegungsjagd: ☐ Nachsuche: ☐

beschossenes Wild			Aufbrechgewicht			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		>120kg ____ kg	012		> 250 m ____ m	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	

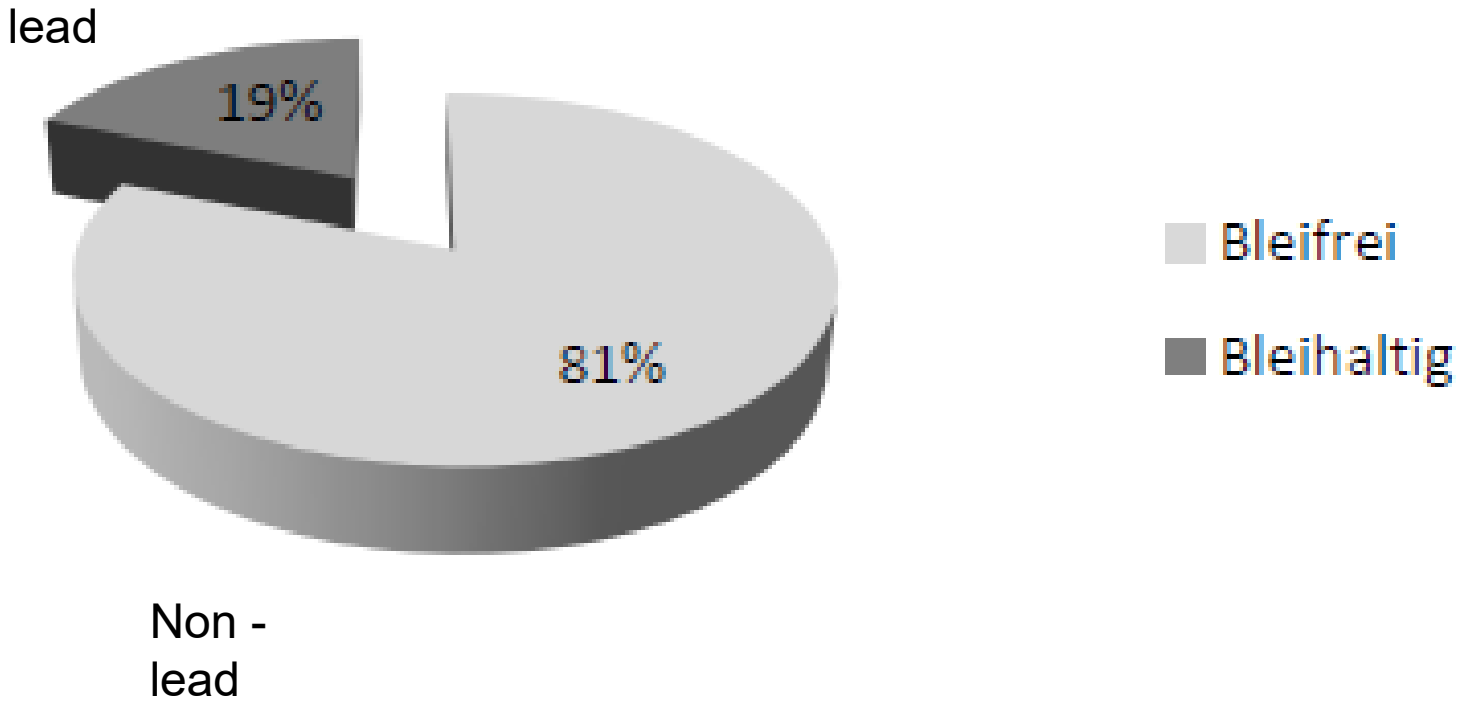
Verhalten des Wildes vor dem Schuss			Verhalten des Wildes nach dem Schuss			Angaben zur Flucht u. Schweißfährte			Sonstige Angaben 1		
ziehend	050		nicht gezeichnet	055		kein Schweiß	061		Hämatome /Blutergüsse	067	
flüchtig	051		gezeichnet	056		wenig Schweiß	062		Rückgrattreffer	068	
äsend / vertraut	052		nicht beobachtet	057		reichlich Schweiß	063		Rippentreffer	069	
alarmiert / gestreßt	053		bleibt stehen	058		regelmäßig Schweiß	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		m

Sonstige Angaben 2:

Gesamtbeurteilung (abschließend bitte unbedingt ausfüllen!)
☐ sehr gut ☐ gut ☐ befriedigend ☐ schlecht ☐ sehr schlecht

Berichterstatter hat das Wild aus der Decke geschlagen beurteilt
Ja ☐ nein ☐

Abschüsse nach Materialgruppe, n= 11278



Laboratory Research

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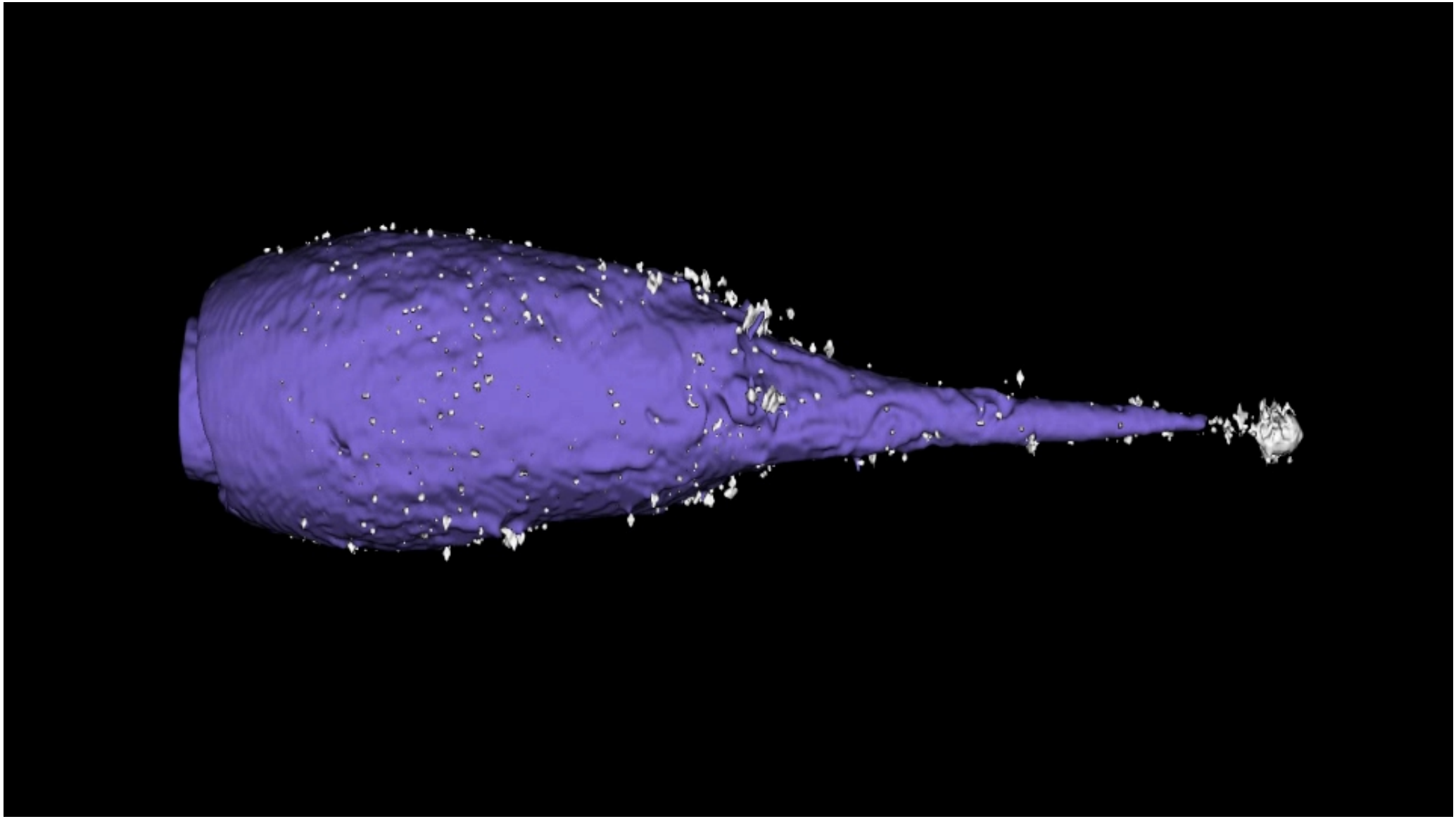
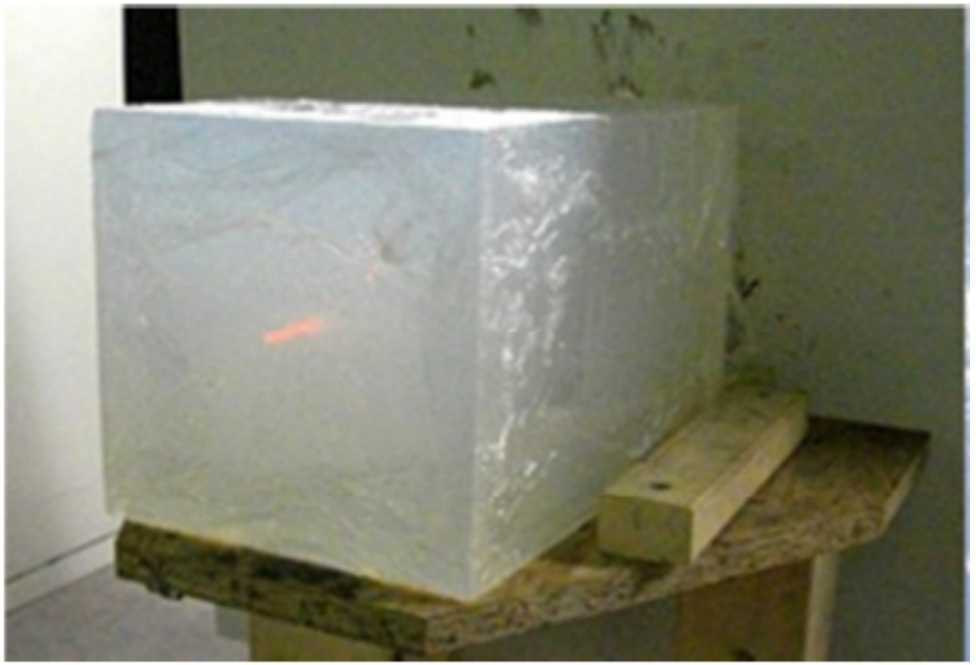



PHILIPS



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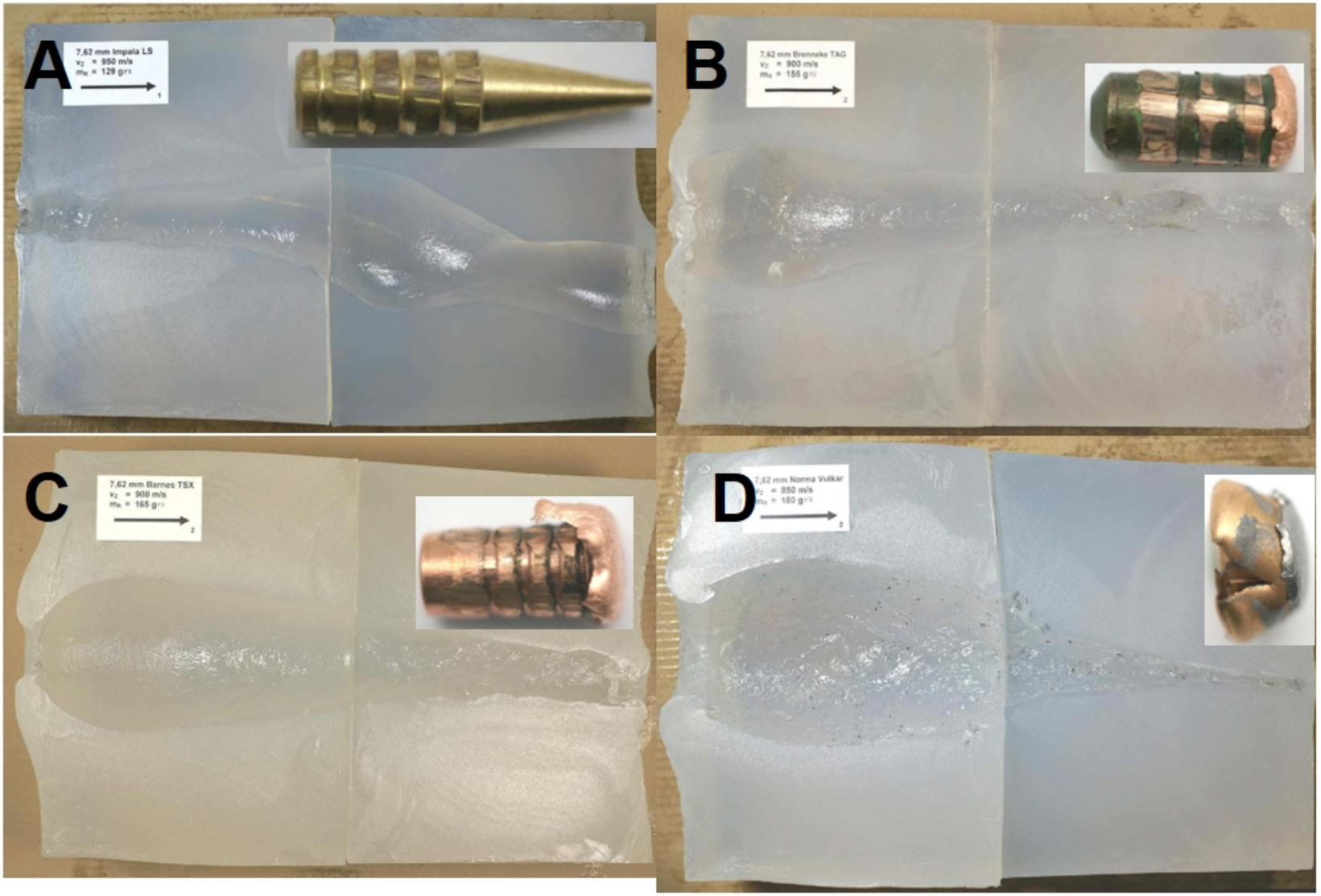
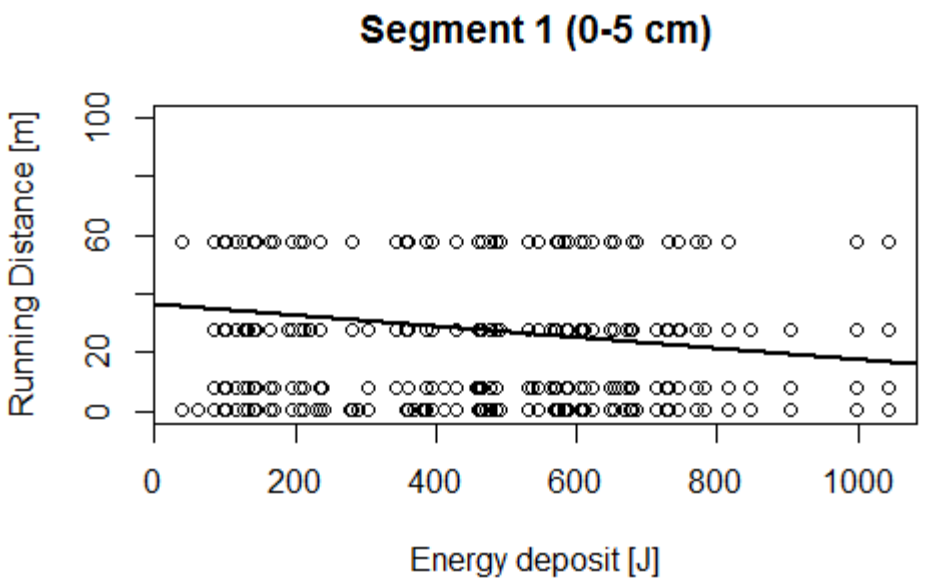
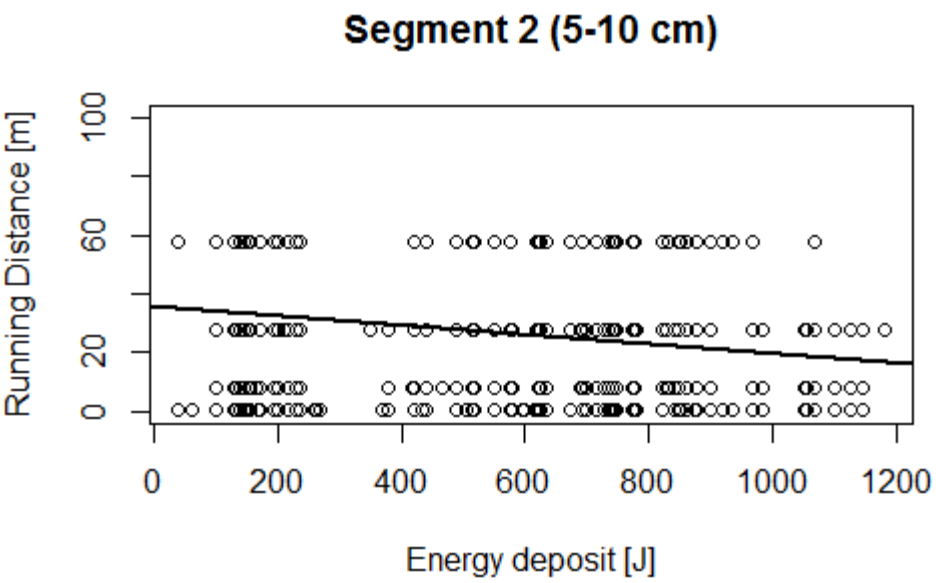
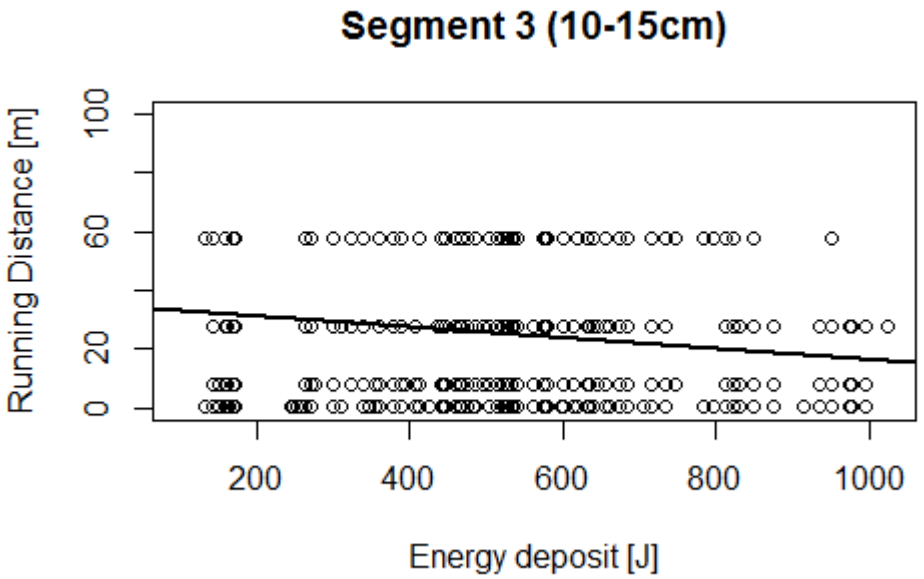
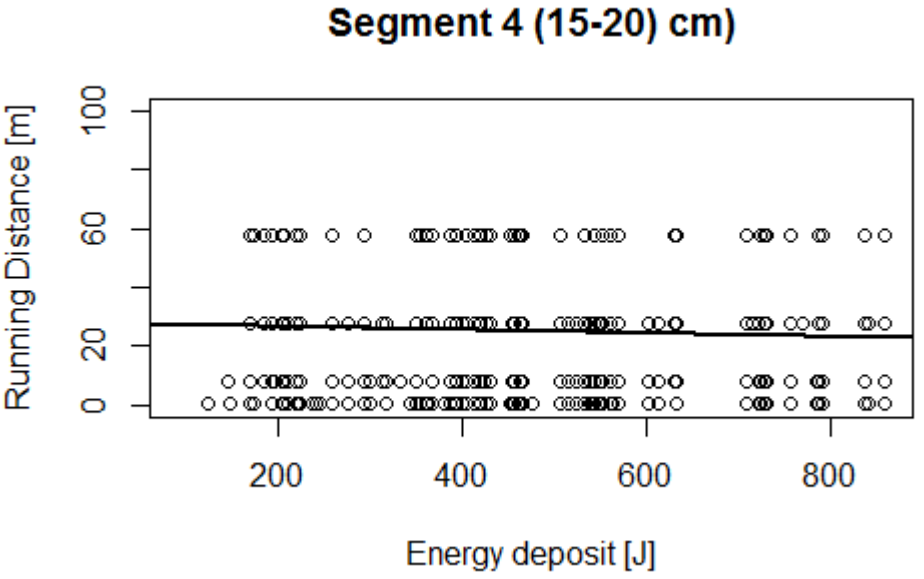



7,62 mm FmJ
v_Z = 600 m/s
2
1
2
3
4
5
6
7
8


Segment 1 (0-5 cm)
Running Distance [m]
0
20
60
100
0
200
400
600
800
1000
Energy deposit [J]


Segment 2 (5-10 cm)
Running Distance [m]
0
20
60
100
0
200
400
600
800
1000
1200
Energy deposit [J]


Segment 3 (10-15cm)
Running Distance [m]
0
20
60
100
200
400
600
800
1000
Energy deposit [J]


Segment 4 (15-20) cm
Running Distance [m]
0
20
60
100
200
400
600
800
Energy deposit [J]

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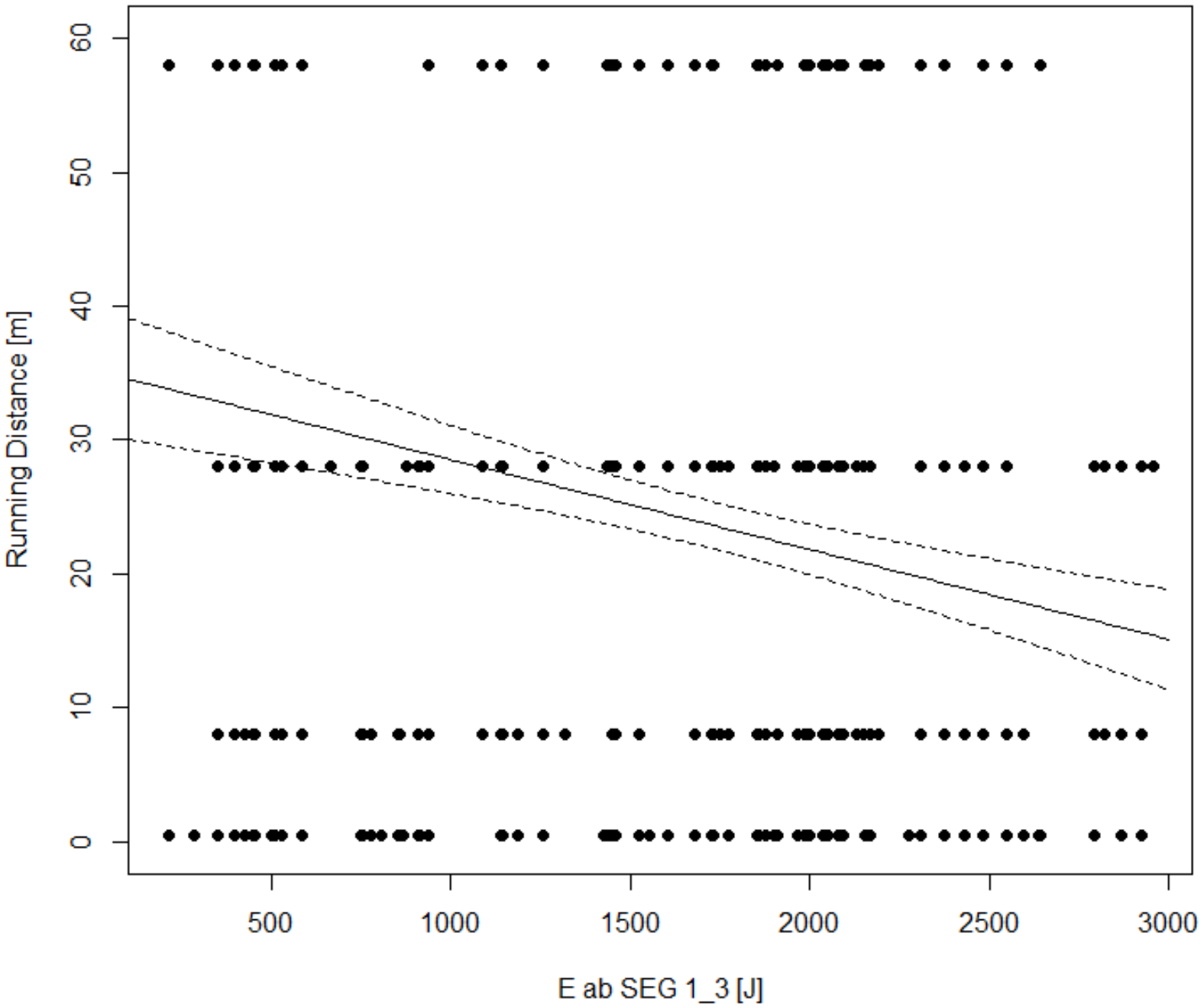
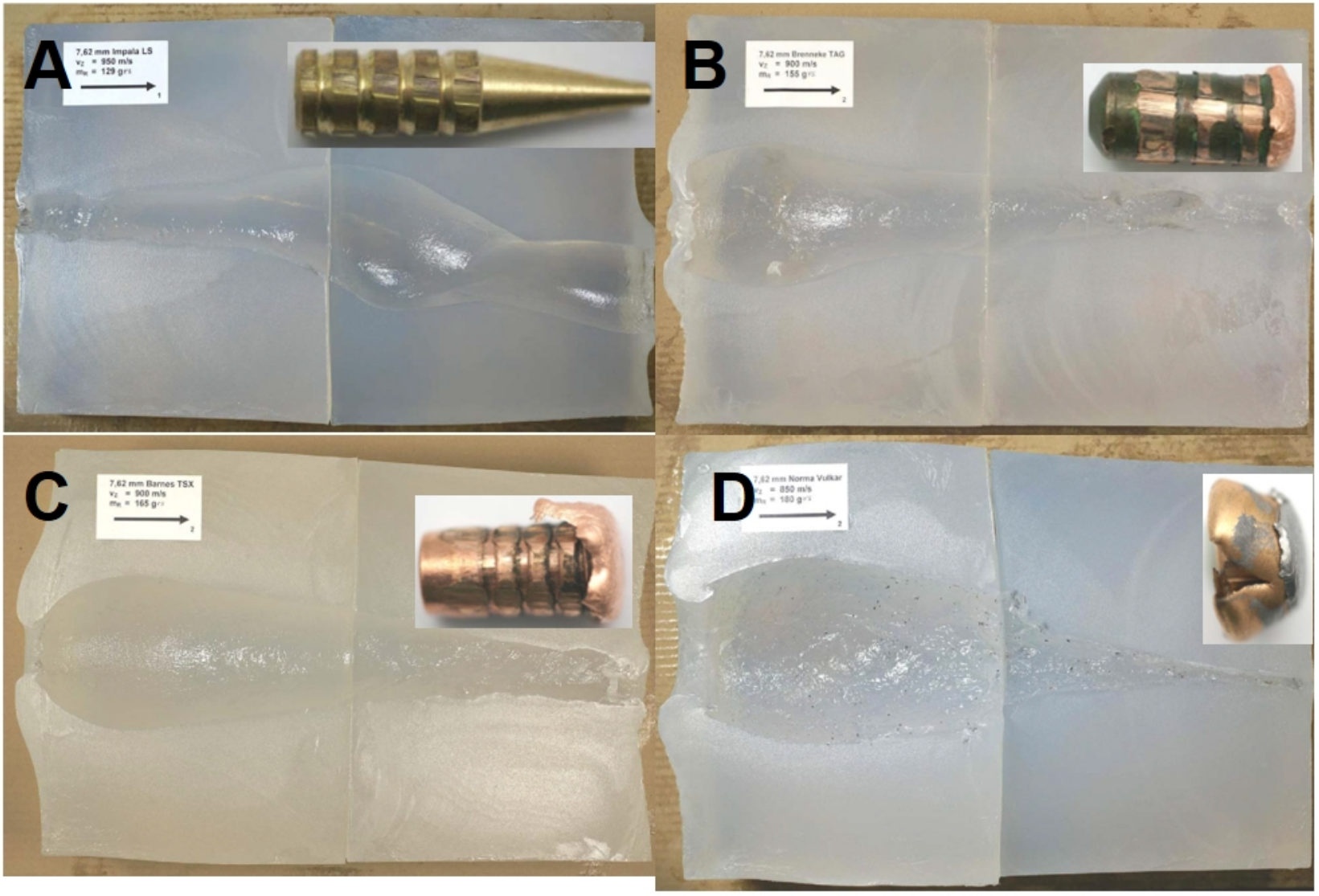



A
7,62 mm Impala LS
B
7,62 mm Brenneke TAG
C
7,62 mm Barnes TSX
D
7,62 mm Norma Vulkar

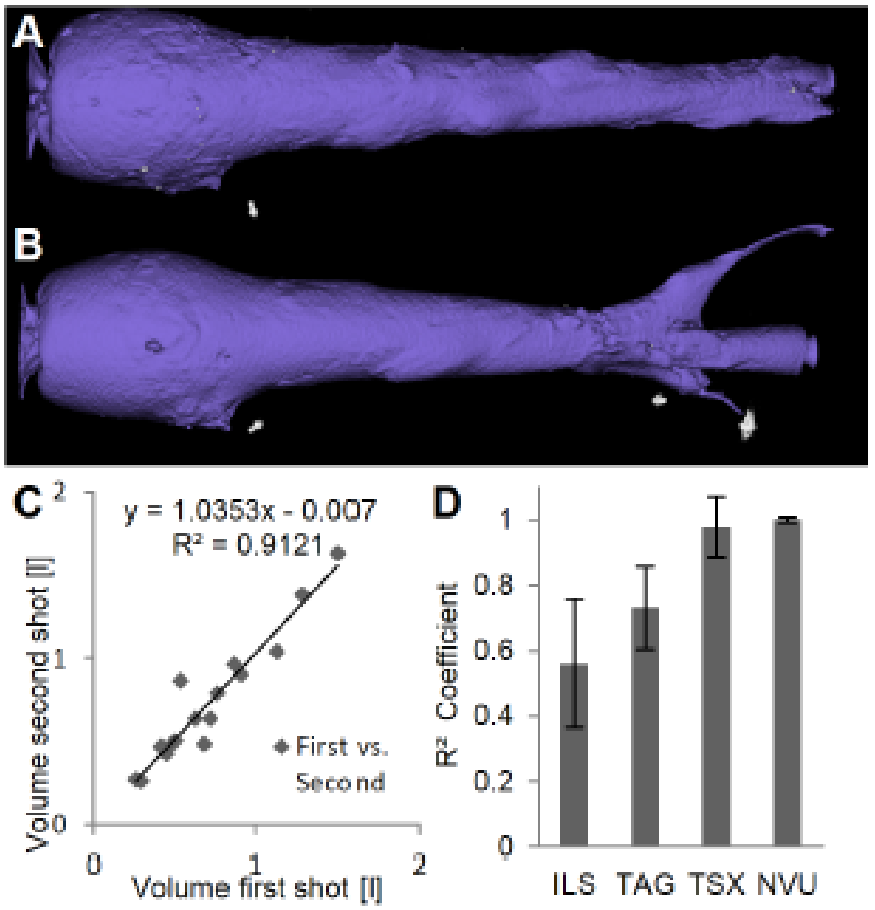
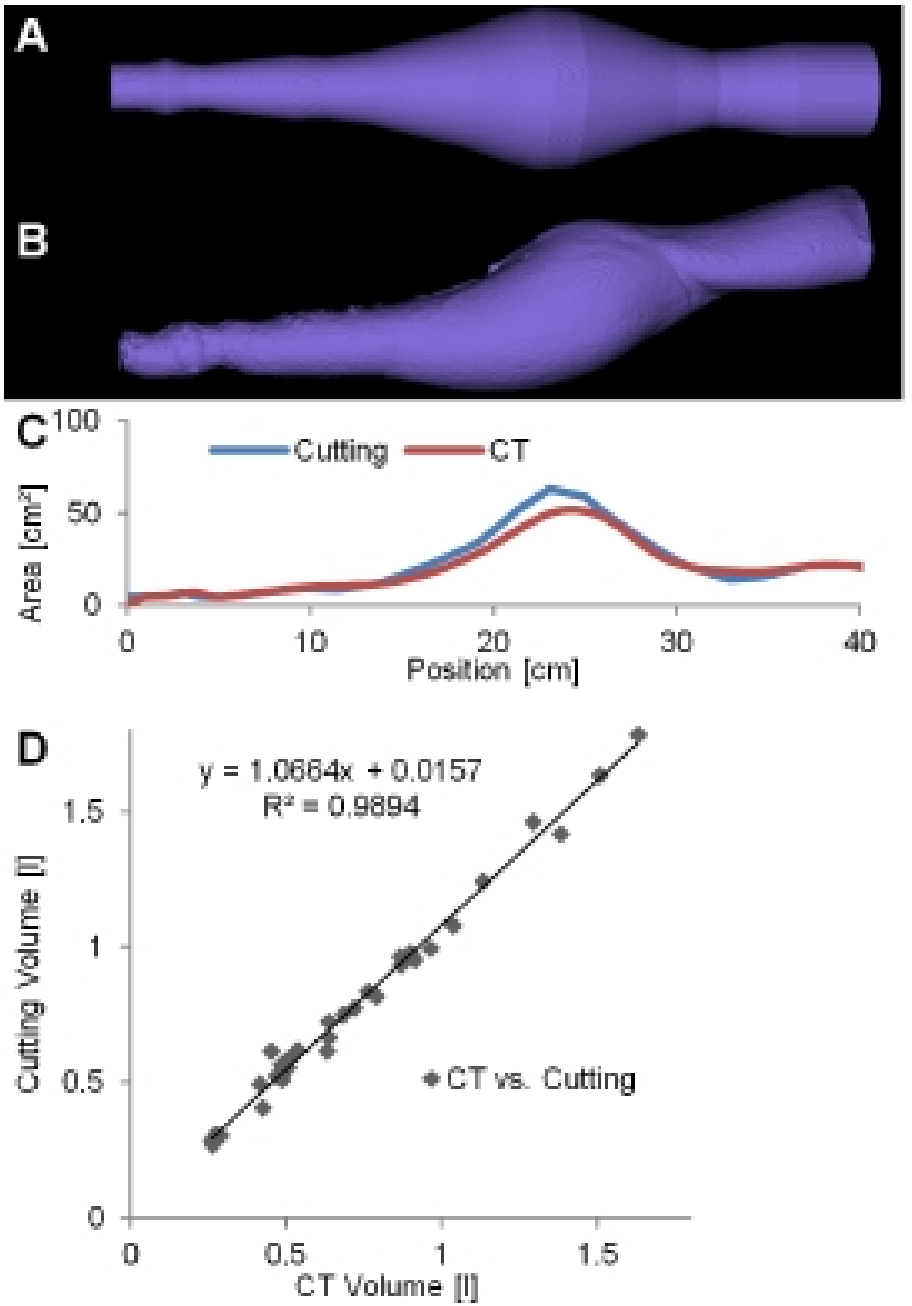


Figure 12. Reproducibility. Reproducibility was assessed by repeating shots. (A, B) Two cavities for the TAG bullet at 900 m/s appear similar except for small parts created by unpredictable fragments. (C) A strong correlation of the volumes between all first and second shots is found (n = 16), showing high reproducibility. (D) The correlation, i.e. reproducibility is highest for NVU and TSX.
doi:10.1371/journal.pone.0102015.g012



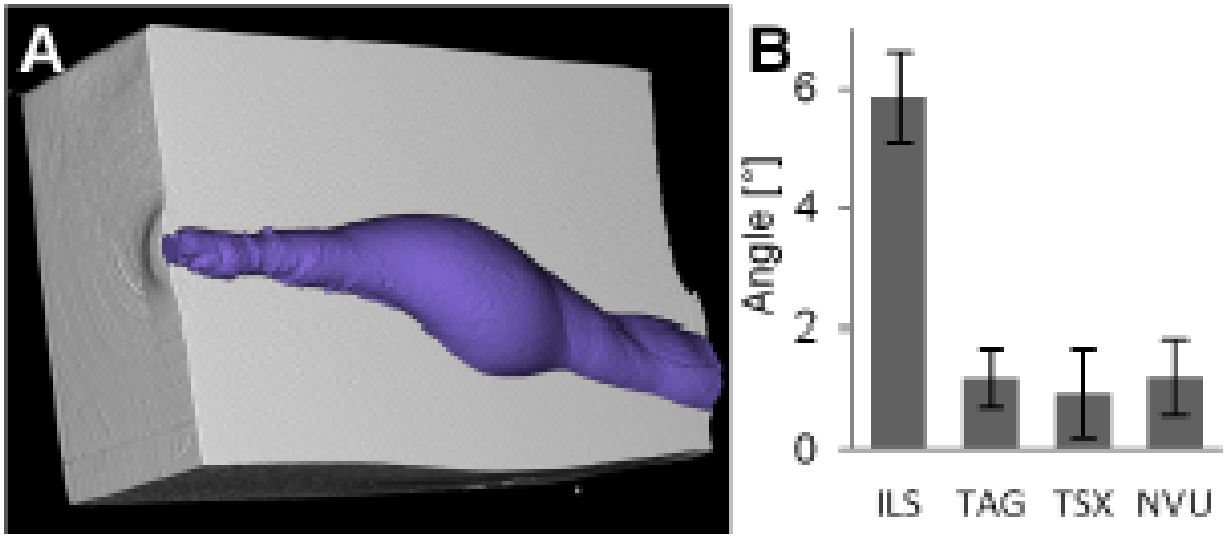


Figure 10. Deviation angle. (A) Virtually cut soap block and cavity show the deviation of the ILS bullet after the tumbling phase. (B) The deviation angle is significantly higher ($P < 0.001$) for ILS compared to all other bullet types.

doi:10.1371/journal.pone.0102015.g010

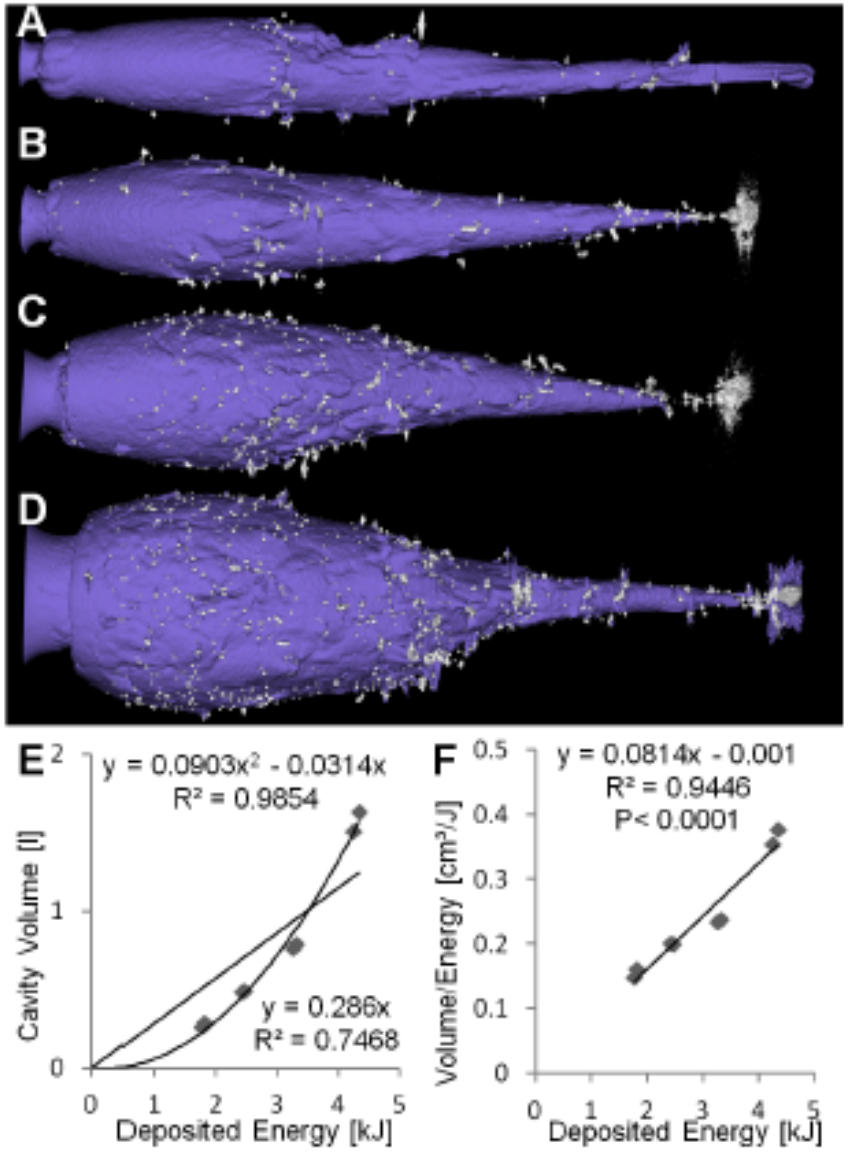


Figure 6. Deforming lead-containing bullet (NVU). (A–D) Cavities at increasing energies. Many metal fragments are visible. (E) Cavity volume plotted over deposited energy with higher R^2 for the quadratic regression than for linear regression. (F) Ratio of volume and deposited energy increases with deposited energy ($P < 0.001$).
doi:10.1371/journal.pone.0102015.g006

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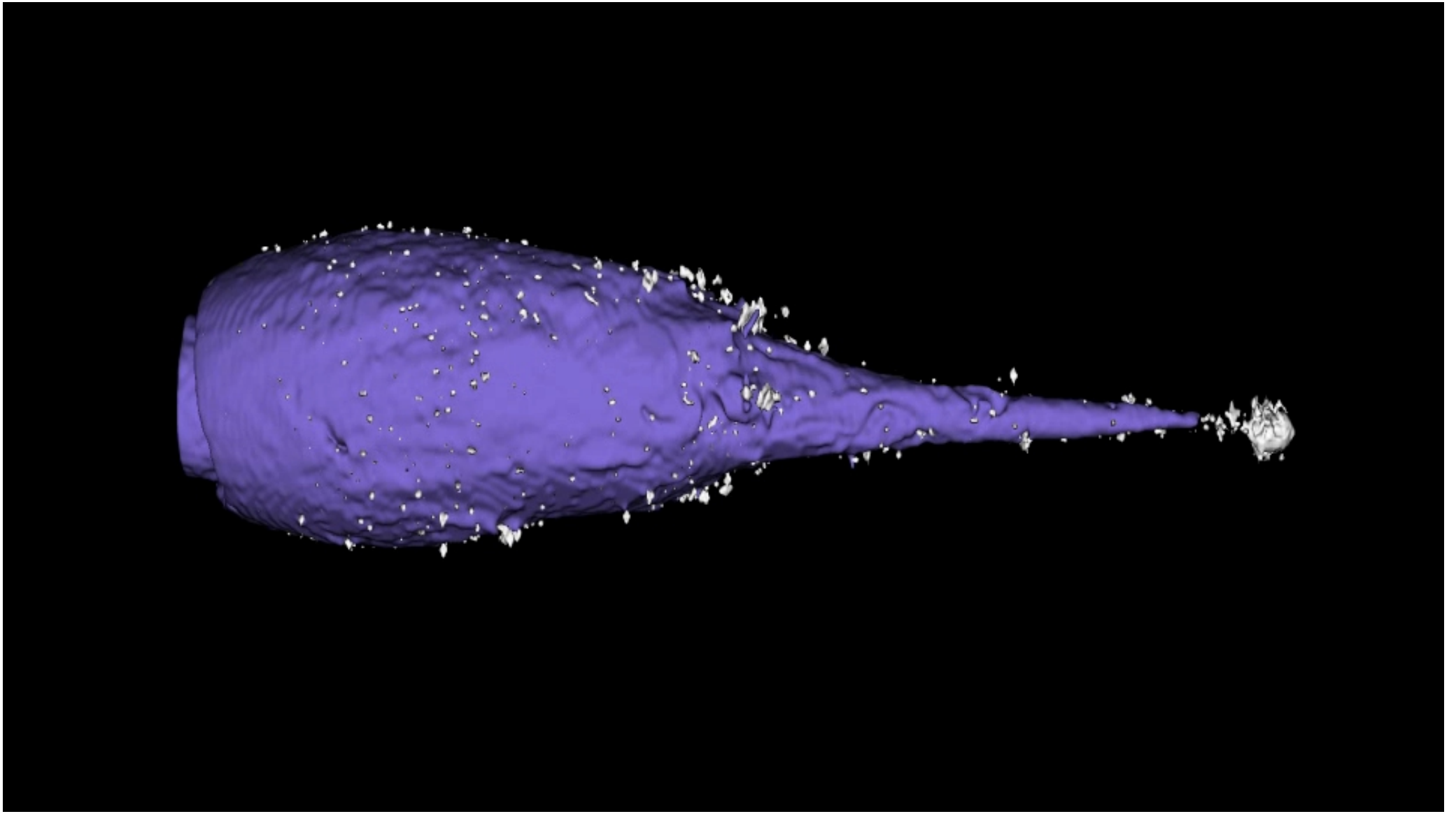

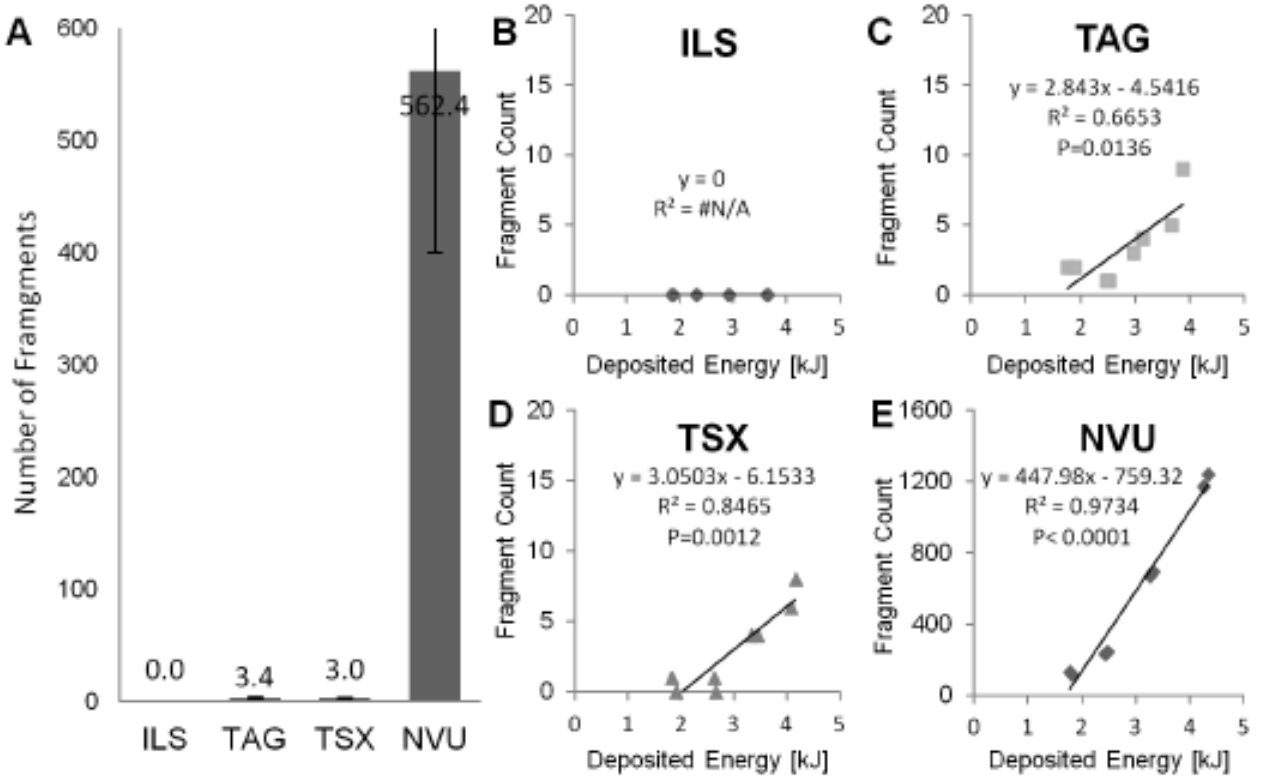

Figure 7. Number of fragments. (A) Significantly more fragments occur for the lead-based bullet compared to all lead-free bullets ($P < 0.001$). No fragments occur for the brass bullet. (A–E) The number of metal fragments over the deposited energy.
doi:10.1371/journal.pone.0102015.g007

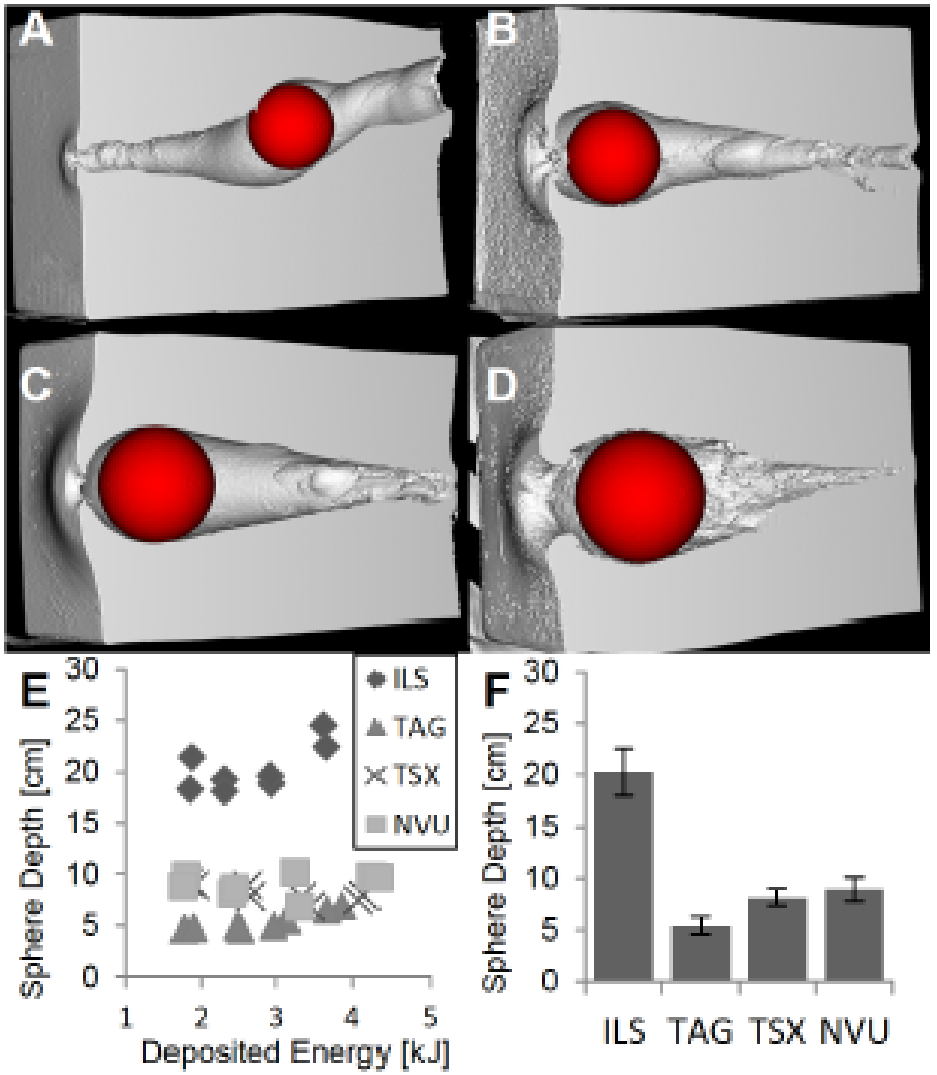

Figure 9. Depth of maximal damage. Position of a maximal fitting sphere was determined for each cavity. (A–D) Examples are shown for ILS, TAG, TSX, and NVU at highest speeds. (E) The depth (along the longest block axis) over deposited energy. (F) Depths differ significantly ($P < 0.001$) between all bullet types except between TSX and NVU.
doi:10.1371/journal.pone.0102015.g009

Figure 8. Exiting fragments. The exiting fragments where collected and weighed to calculate the deposited energy. Fragments are shown for increasing speeds from top to bottom. Pictures were only taken when fragments exited the soap block.
doi:10.1371/journal.pone.0102015.g008

Summary

Lead is toxic.

Lead Hunting bullets taint game meat.

Lead from Hunting bullets poisons raptors.

THE USE OF LEAD IN HUNTING BULLETS IS AVOIDABLE BY UNDERSTANDING TERMINAL BALLISTICS.