THE SLOVAK STUDY ON BOWHUNTING

Justification and Objective

Mgr. Štefan Jakubík,
president of Slovak Bow Hunters Association - Slovakbowhunting



SLOVAK BOW HUNTING™

SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

PROPOSAL OF THE STUDY ON BOWHUNTING

At the beginning of 2022, the Slovak Bow Hunters Association-Slovakbowhunting proposed a novel study on bowhunting during its annual members' general meeting.

Subsequently, the leadership of Slovakbowhunting officially requested an authorization from the Slovak Hunting Chamber (SPK) to prepare and conduct this study, and finalize it under its auspices.

The approval of the Concept for the Development of Hunting in Slovakia by the Government of the Slovak Republic (Resolution No. 548 of November 29, 2017), which is a national program for the development of hunting and the conservation of the gene pool of wild game, offered justification for requesting the study. Article 2.11.4 of this resolution states:

"1. A comprehensive methodology, curriculum, and education system for bowhunting in Slovakia must be developed.

2. Legislative adjustments should be prepared to create a transparent system for the theoretical and practical training of bowhunting enthusiasts.

3. Hunting legislation should be amended to allow bowhunting in open hunting areas."







JUSTIFICATION FOR THE STUDY

Bowhunting is a legitimate hunting method in many countries worldwide and deserves thorough scientific examination in the Slovak context. The study aims to assess its ***effectiveness, ethics, and impact*** *compared to firearm hunting. Such research is essential not only for an objective assessment of potential bowhunting in open hunting grounds in Slovakia, but also for ensuring responsible and sustainable hunting practices.*



1. HUNTING EFFICIENCY

One of the fundamental objectives is to **compile hunting statistics** for hoofed game based on records of game hunted with a bow compared to a firearm.

2. HUNTING ETHICS AND ANIMAL WELFARE

The study compares the **levels of stress hormones**, specifically cortisol and adrenaline, in the blood and tissue of game hunted with a bow versus a firearm. These biological markers provide an objective measure of how different hunting methods affect the animal's physiological state before death. If it is proven that bowhunting induces lower stress levels and is more humane, it could significantly support the legalization of this method in open hunting areas in Slovakia.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

JUSTIFICATION FOR THE STUDY

3. QUALITATIVE PROPERTIES OF GAME MEAT

In addition to ethical considerations, the study evaluates the quality of game meat, a key factor in meat processing and consumption. It focuses on **laboratory analyses of organic samples** from game harvested by both hunting methods. **Differences in stress hormone levels**, **muscle microdamage**, or other biochemical factors may affect the **taste, texture, and shelf-life of game meat**. If it is demonstrated that meat from bowhunted game has superior biochemical properties, these findings could support broader adoption of this hunting method within sustainable wildlife management for wild boar and hoofed game in open hunting areas.



4. CONCLUSION

Conducting this study represents an **essential step in the professional discussion on the possibilities of legalizing bowhunting in open hunting areas in Slovakia**. Another important aspect is expanding hunting opportunities for bowhunters while ensuring that this method aligns with modern principles of sustainable and ethical hunting. The study results can also serve as a **foundation for legislative amendments** and decision-making processes by nature conservation and hunting organizations, not only in Slovakia but **across EU countries where bowhunting is not yet permitted.**



SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

THE STUDY'S INTERNATIONAL IMPACT

The study can also serve as a statistical and research-based **support for the legalization of bowhunting** in open hunting areas in other European countries where bowhunting is not currently permitted. Hunters from these countries require **strong arguments** proving the **efficiency of bowhunting compared to firearms.**









Unlike other similar European studies (such as one from Denmark, which examined only roe deer hunting, or a study from Finland, which focused solely on white-tailed deer hunting), this study aims to **COVER THE FULL SPECTRUM OF THE MOST WIDESPREAD EUROPEAN HOOFED GAME SPECIES, INCLUDING RED DEER, FALLOW DEER, MOUFLON, WILD BOAR, AND ROE DEER.**

OBJECTIVES OF THE STUDY

Objective A:

TO ESTABLISH STATISTICS ON THE HARVESTING OF HOOFED GAME USING BOWS BASED ON HUNTING RECORDS, AND TO COMPARE THE EFFICIENCY AND ETHICAL ASPECTS OF BOWHUNTING WITH THOSE OF FIREARM HUNTING.



ZÁZNAM O ULOVENÍ ZVERI LUKOM

SLOVAK BOW HUNTING™

MENO POĽOVNÍKA				
DÁTUM ULOVENIA				
ČAS ULOVENIA ZVERI				
DRUH ULOVENEJ ZVERI				
VZDIALENOSŤ ULOVENEJ ZVERI V ČASE VÝSTRELU				
POHYB ZVERI V ČASE VÝSTRELU	v pokoji	prechadzajúci	v kluse	
STUPEŇ PENETRÁCIE ŠÍPU	úplna	úplna, ale šíp zostal v tele	čiastočná	
ZÁSAH NA	komoru	pľúca	na mäkko	iné
POSTAVENIE ZVERI V ČASE VÝSTRELU				
VZDIALENOSŤ OD NÁSTRELU PO DOHĽADANIE ZVERI				
POUŽITÝ LOVECKÝ HROT	pevný	mechanický	špeciálny	iné

Tento záznam slúži výhradne k vypracovaniu štatistických údajov o love lukom na Slovensku. Svojim podpisom potvrdzujem, že všetky údaje uvedené v zázname sú pravdivé.

Záznam je potrebné vyplniť, zoscanovať a poslať na email: s.miko@slovakbowhunting.sk

podpis poľovníka

SLOVAK BOW HUNTING™

SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

OBJECTIVES OF THE STUDY

Objective B:

TO DEVELOP STATISTICAL ANALYSES OF THE QUALITATIVE PROPERTIES OF GAME MEAT, BASED ON TISSUE AND BLOOD SAMPLES FROM BOW-HUNTED AND FIREARM-HUNTED GAME.









SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

BENEFITS OF THE STUDY

THE ANTICIPATED BENEFITS OF THE STUDY INCLUDE:

1. Acquisition of **statistically relevant data** on the **efficiency** of bowhunting, its **humaneness**, and direct impact on game **meat quality** and **consumer health**.
2. Scientific and demonstrable **evidence supporting the legalization of bowhunting in open hunting areas** as an ethical and sustainable hunting method.





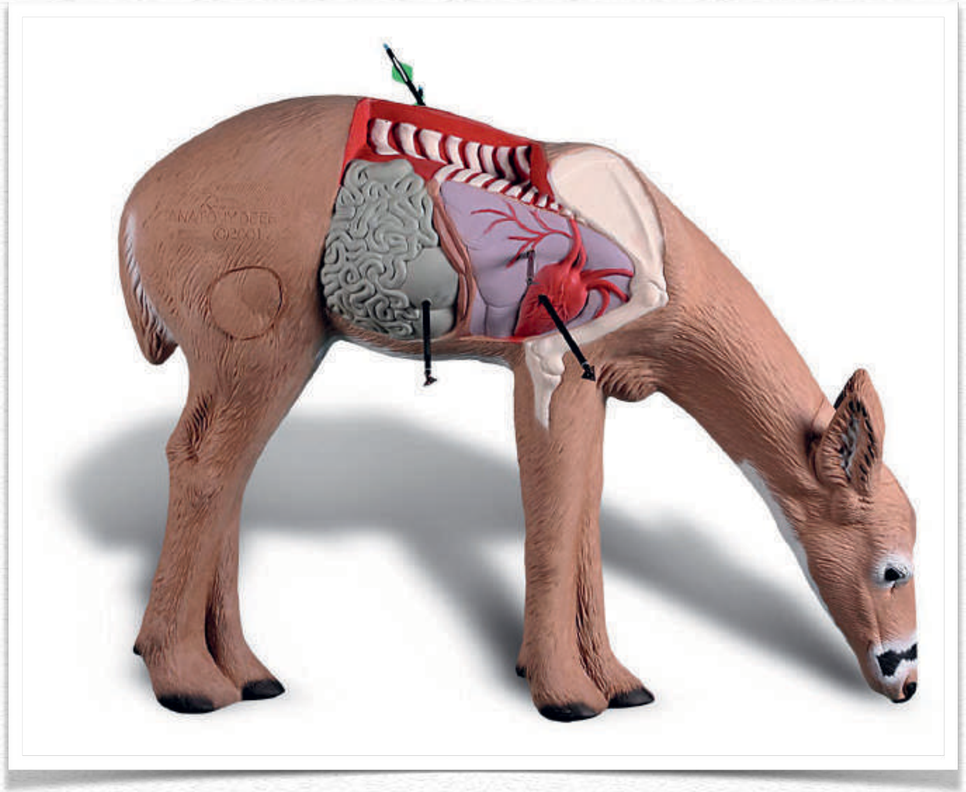
SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

EXPECTED OUTCOMES

OBJECTIVE A – HUNTING EFFICIENCY AND ETHICS

1. **Precise hunting efficiency statistics** on:
   - distance and movement of game at the time of the shot,
   - depth of arrow penetration and shot trajectory,
   - distance from impact site to final resting place.

2. **Assessment of ethical aspects** based on kill time and minimizing animal suffering.



THESE RESULTS SHOULD CONTRIBUTE TO A BETTER UNDERSTANDING OF THE PRACTICAL DIFFERENCES BETWEEN HUNTING METHODS AND DISCUSSIONS ON THEIR SUSTAINABILITY AND HUMANENESS.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

EXPECTED OUTCOMES

OBJECTIVE B – QUALITATIVE PROPERTIES OF GAME MEAT

1. A comparison of stress hormone levels (cortisol and adrenaline) between bow-hunted and firearm-hunted game.

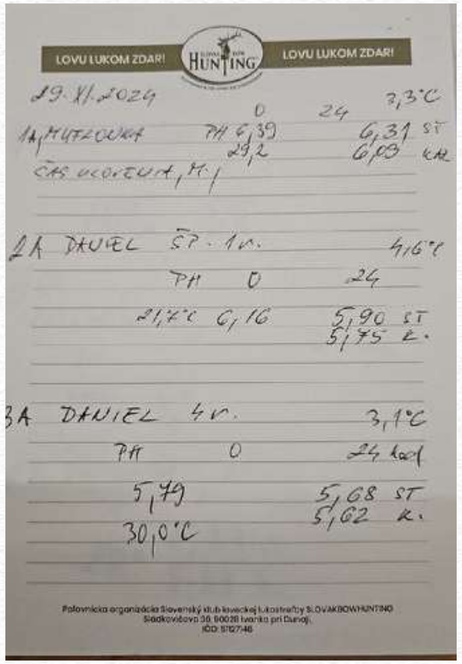
- We hypothesize lower stress hormone levels in bow-hunted game due to reduced noise and less traumatic impact.

2. An analysis of qualitative properties of game meat, specifically:

- pH, color, texture, and sensory attributes of the meat.
- Physical, chemical, and microbiological parameters related to overall meat quality.

3. Impact on consumer health: Results may indicate that bow-hunted game, with reduced stress hormone levels, is of higher quality and safer for consumption.

4. Impact on animal welfare: Identifying factors that can minimize pre- and post-hunt stress contributes to a more ethical hunting approach.







THE FUTURE OF THE STUDY

1. ESTABLISHMENT OF AN INTERNATIONAL SYSTEM

An agreement between Slovakbowhunting, Magyar Vadászíjász Egyesület, and Klub lovecké lukostřelby ČMMJ, with a projected agreement among EBF member organizations, could lead to the development of an international bowhunting record-keeping system. This system, accessible via the internet, could offer key benefits:

- **DATA UNIFICATION AND TRANSPARENCY:**
  Providing uniform and up-to-date hunting efficiency statistics.
- **DIGITIZATION AND ADMINISTRATIVE EFFICIENCY:**
  Streamlining game recording and educational program organization.
- **SUPPORT FOR SAFETY AND SUSTAINABILITY:**
  Ensuring compliance with ethical and sustainable hunting regulations.
- **IMPROVED INTERNATIONAL COOPERATION:**
  Facilitating swift communication and sharing of best practices among member countries.
- **RESEARCH AND INNOVATION SUPPORT:**
  Collecting detailed data on bowhunting as a valuable research resource.

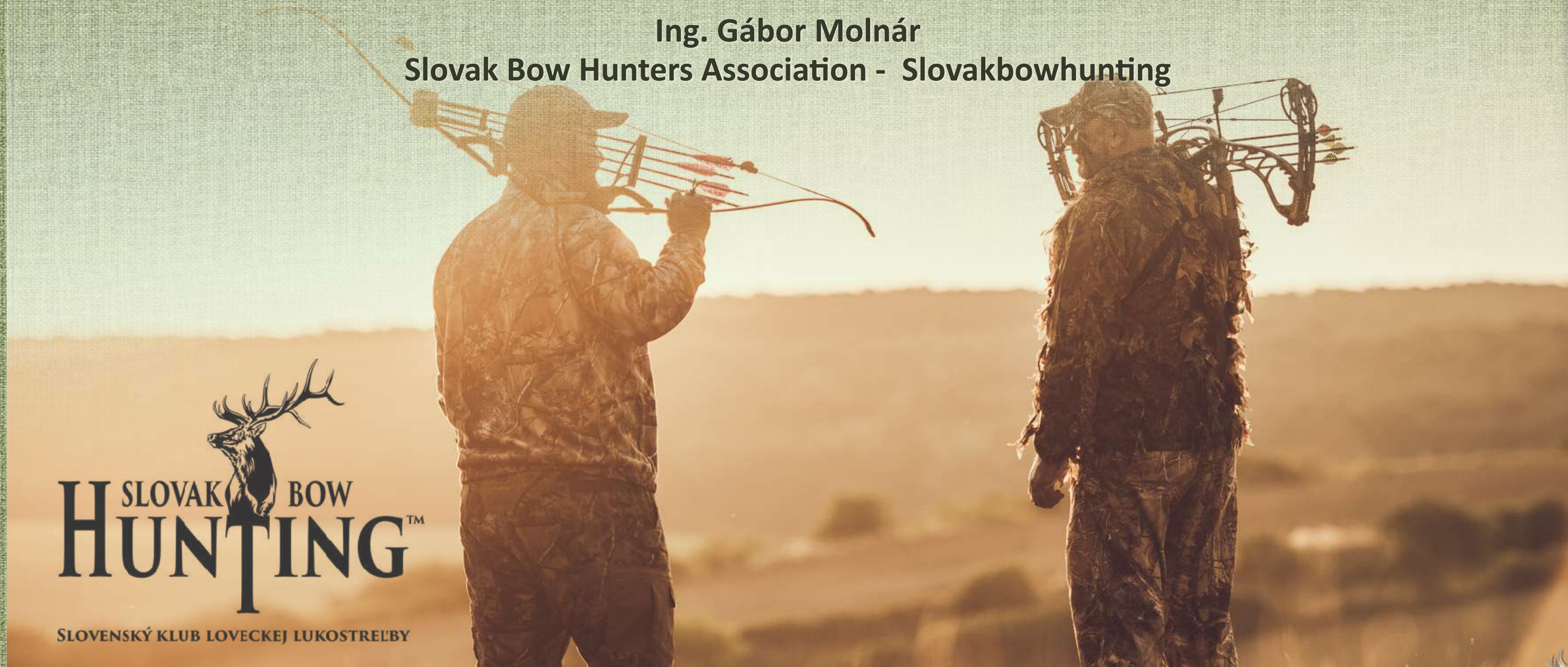
THESE BENEFITS WILL COLLECTIVELY ENHANCE THE EFFICIENCY AND PROFESSIONAL DEVELOPMENT OF BOWHUNTING WITHIN THE EU AND EBF MEMBER COUNTRIES.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

OBJECTIVE A

A statistical comparison of the efficiency and ethics of bowhunting versus firearm hunting based on records of game hunted with a bow.

Ing. Gábor Molnár
Slovak Bow Hunters Association - Slovakbowhunting



STUDY OBJECTIVES

OBJECTIVE A.

CREATION OF STATISTICS BASED ON THE RECORDS OF HUNTED GAME WITH THE AIM TO COMPARE THE EFFECTIVENESS AND ETHICS OF BOWHUNTING IN COMPARISON TO THE EFFECTIVENESS OF HUNTING WITH A FIREARM.

The records were available:

- to members of the Slovak Bowhunting Club Slovakbowhunting,
- to bowhunters in Slovakia who expressed interest in cooperation.

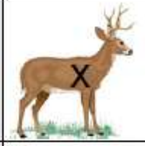
We prepared and evaluated an annual data summary on documented bowhunting harvests of ungulate game from 2019 onwards.

The goal was to have a statistically measurable and demonstrable number of the most common species of European ungulate game (at least 200).

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

AN EXAMPLE OF A HUNT RECORD

ZÁZNAM O ULOVENÍ ZVERI LUKOM

MENO POĽOVNÍKA	Gábor Molnár			
DÁTUM ULOVENIA	11.01.2023			
ČAS ULOVENIA ZVERI	15:43			
DRUH ULOVENEJ ZVERI	Jelen Lesný			
VZDIALENOSŤ ULOVENEJ ZVERI V ČASE VÝSTRELU	22m			
POHYB ZVERI V ČASE VÝSTRELU	v pokoji ✓	prechadzajúci	v kluse	
STUPEŇ PENETRÁCIE ŠÍPU	úplna ✓	úplna, ale šíp zostal v tele	čiastočná	
ZÁSAH NA	komoru ✓	pľúca	na mäkko	iné
POSTAVENIE ZVERI V ČASE VÝSTRELU				
VZDIALENOSŤ OD NÁSTRELU PO DOHĽADANIE ZVERI	50m			
POUŽITÝ LOVECKÝ HROT	pevný	mechanický ✓	špeciálny	iné

Tento záznam slúži výhradne k vypracovaniu štatistických údajov o love lukom na Slovensku. Svojim podpisom potvrdzujem, že všetky údaje uvedené v zázname sú pravdivé.



SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

NUMBER OF HUNTED GAME PER YEAR 2019 - 2024

Year	Number of hunted game (pc)
2019	61
2020	48
2021	54
2022	72
2023	45
2024	47
Total	**327**



SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

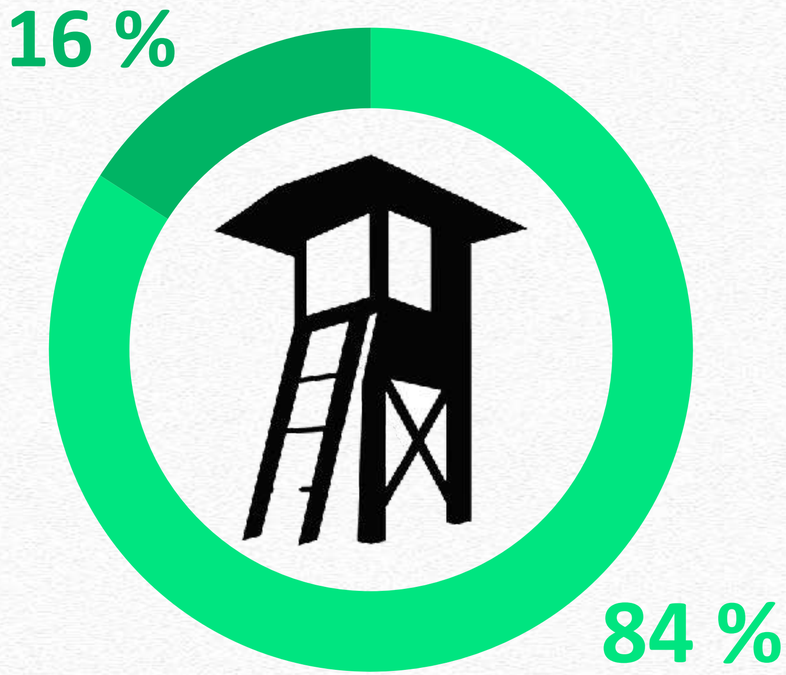
NUMBER OF HUNTED GAME BY PREFERRED HUNTING STYLE

year	Number of harvested game	Treestand	Stalking
2019	61	49	12
2020	48	40	8
2021	54	44	10
2022	72	59	13
2023	45	40	5
2024	47	43	4
Total	**327**	**275**	**52**



NUMBER OF HUNTED GAME BY PREFERRED HUNTING STYLE

Year	Treestand	Stalking
2019	49	12
2020	40	8
2021	44	10
2022	59	13
2023	40	5
2024	43	4
Total	**275**	**52**



BASED ON THE STATISTICAL EVALUATION OF THE COLLECTED DATA, IT IS CLEARLY CONFIRMED THAT IN OUR SAMPLE THE HUNTING METHOD OF AMBUSH FROM TREESTANDS WAS SIGNIFICANTLY MORE EFFECTIVE THAN STALKING.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

SHOOTING DISTANCE IN RELATION TO THE NUMBER OF HUNTED GAME

Distance /m	Number of hunted game (pc)
0-20	239
20-25	59
25-30	21
30-35	8

72%

Up to 20 meters.

BASED ON THE COLLECTED DATA AND THEIR STATISTICAL EVALUATION, IT IS CLEARLY CONFIRMED THAT IN OUR SAMPLE THE MAJORITY OF SHOTS (72%) WERE TAKEN AT A DISTANCE OF 20 METERS OR LESS, WHICH CORRELATES WITH STUDIES CONDUCTED BY BOWHUNTERS IN DENMARK, FINLAND, AND NORTH AMERICA.

SLOVAK BOW HUNTING™

SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

DISTANCE FROM THE SHOT LOCATION TO THE RECOVERED GAME (IN METERS)

Distance / m	Number of hunted game (pc)
0-25	172
25-50	95
50-100	53
100 and more	7

85%

Up to 50 meters.

BASED ON THE COLLECTED DATA AND THEIR STATISTICAL EVALUATION, IT IS CLEARLY PROVEN IN OUR SAMPLE THAT 85% OF THE GAME DIED WITHIN 50 METERS OF THE POINT OF IMPACT, WHICH CORRELATES WITH THE HUNTING USING A FIREARM DATA.

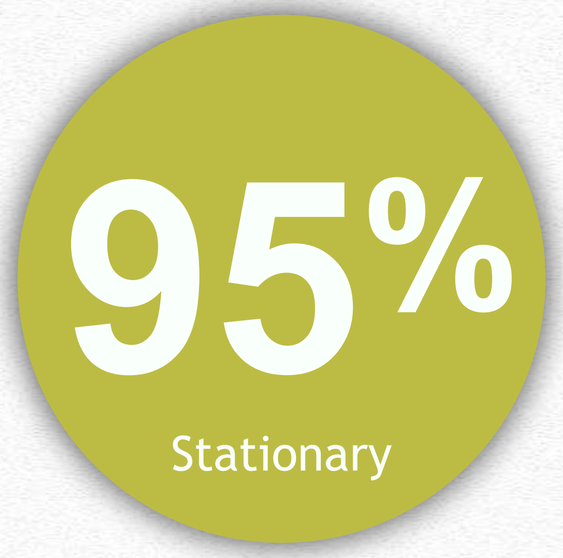
SLOVAK BOW HUNTING™

SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

ANIMAL MOVEMENT AT THE TIME OF THE SHOT

Animal movement	Number of hunted game (pc)
Stationary	313
Moving	14
Running	0





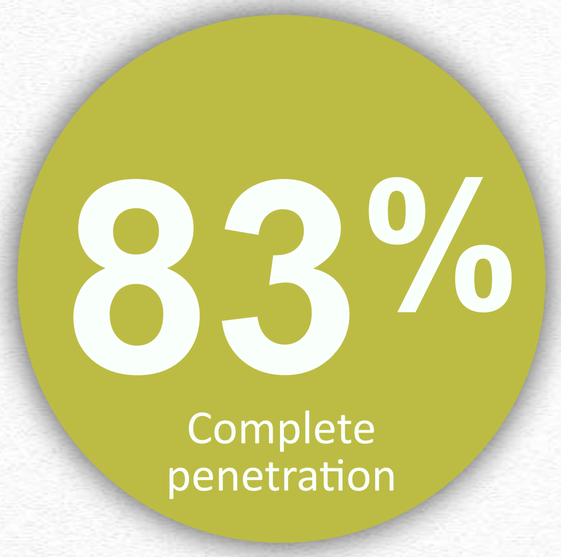
BASED ON THE COLLECTED DATA AND THEIR STATISTICAL EVALUATION, IT IS CLEARLY PROVEN THAT IN OUR SAMPLE 95% OF THE GAME WAS STATIONARY AT THE MOMENT OF THE SHOT. THIS DIRECTLY IMPACTS THE REDUCED LEVELS OF STRESS HORMONES IN BOW-HUNTED GAME, INCREASING THE MEAT QUALITY AND MAKING IT SAFER FOR CONSUMPTION.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

DEGREE OF ARROW PENETRATION

Degree of penetration	Shots
Pass-through – complete penetration, the arrow passed through the body	272
Pass-through – penetration, but the arrow remained in the body	41
Partial penetration	14



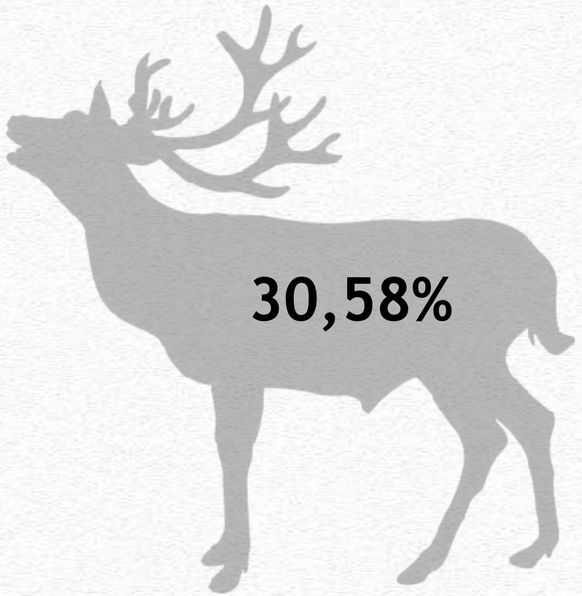


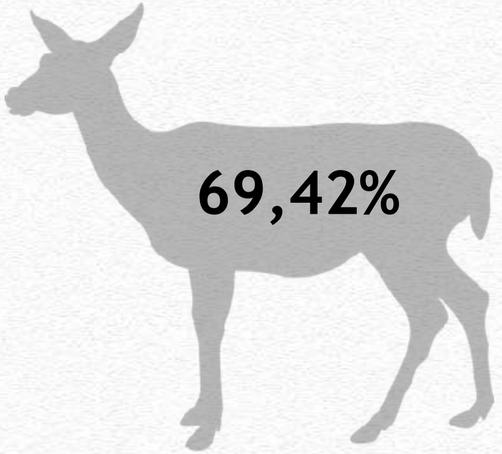
IN 83% OF CASES, THE ARROW COMPLETELY PASSED THROUGH THE VITAL ZONES OF THE ANIMAL.
IN 13% OF CASES, THE ARROW PASSED THROUGH THE ANIMAL'S BODY, BUT A PART OF IT REMAINED INSIDE.
IN 4% OF CASES, THE ARROW DID NOT PENETRATE DEEPLY ENOUGH AND DID NOT PASS THROUGH THE ANIMAL'S BODY.

THESE NUMBERS CLEARLY SHOW THAT THE LEGALLY SPECIFIED DRAW WEIGHT OF A BOW AND AN APPROPRIATELY CHOSEN HUNTING ARROWHEAD ARE SUFFICIENT FOR HUNTING ANY EUROPEAN GAME.

OVERVIEW OF SPECIES COMPOSITION

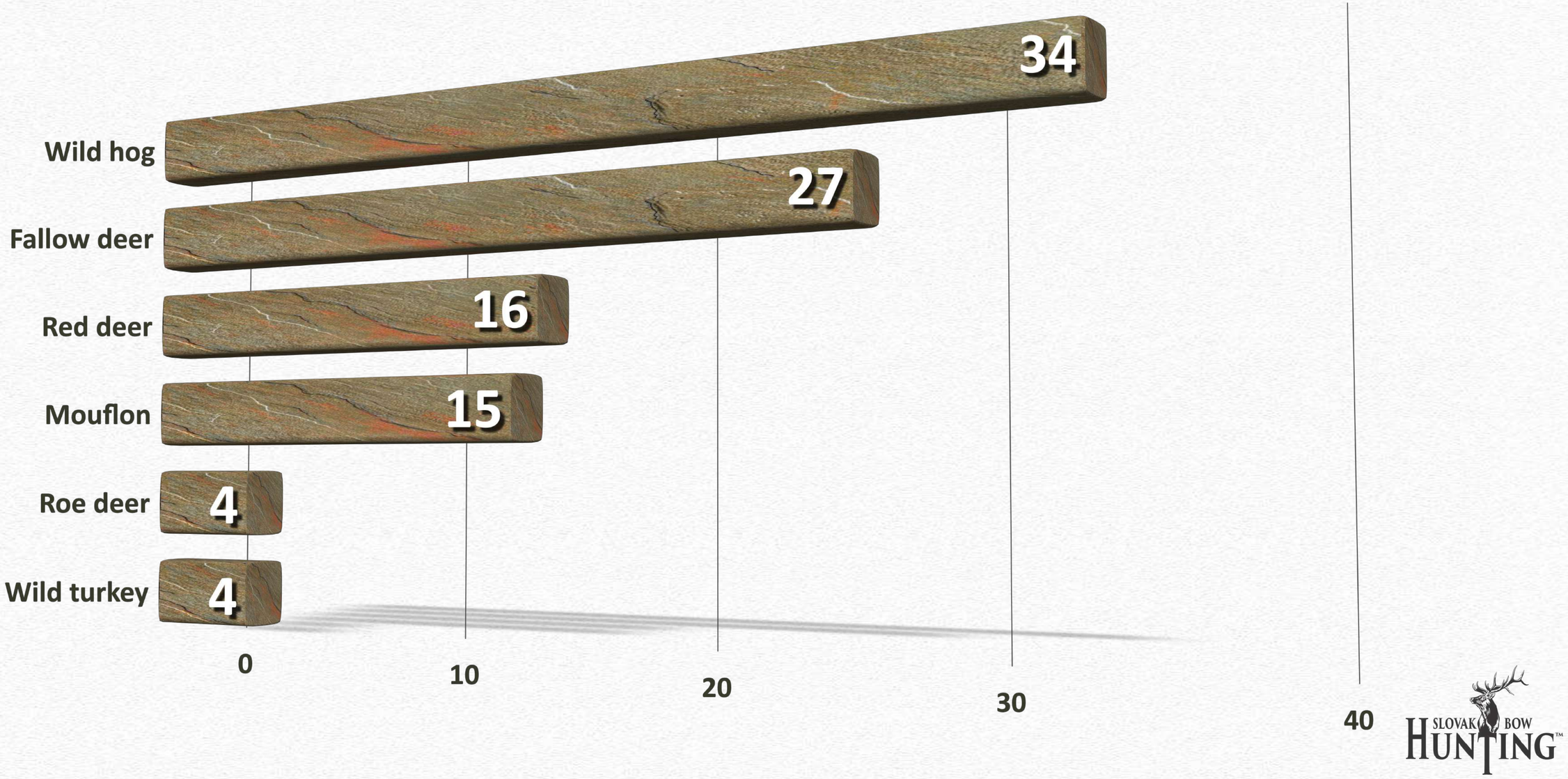
2019 - 2024	Total number of hunted game	Male	Female
Wild hog	102	39	63
Fallow deer	88	17	71
Red deer	51	9	42
Mouflon	58	25	33
Roe deer	15	3	12
Wild turkey	13	13	0
Total	327	100	227





BASED ON THE COLLECTED DATA AND THEIR STATISTICAL EVALUATION, IT IS CLEARLY PROVEN THAT IN OUR SAMPLE BOWHUNTERS PREFER HUNTING FEMALE GAME.

OVERVIEW OF SPECIES COMPOSITION 2019-2024 (%)



SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

OBJECTIVE B

Bows vs. Firearms and Their Impact on Stress Parameters and Meat Aging

Doc. MVDr. Ladislav Molnár, PhD. a MVDr. Jaroslav Soroka
University of Veterinary Medicine, Clinic of Birds, Exotics and wildlife
Košice, Slovak Republic



SLOVAK BOW HUNTING™

SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

THE UNIVERSITY OF VETERINARY MEDICINE AND PHARMACY IN KOŠICE

STUDY OBJECTIVES

OBJECTIVE B.

CREATION OF A STATISTICAL DATASET BASED ON THE ANALYSIS OF THE QUALITATIVE PROPERTIES OF GAME MEAT OBTAINED FROM THE EXAMINATION OF ORGANIC TISSUE AND BLOOD SAMPLES OF GAME HUNTED WITH A BOW, IN COMPARISON WITH GAME HUNTED USING A FIREARM.

MONITORED CRITERIA:

1. Analysis of tissues: Analysis of muscle tissue, soft tissues, blood, and blood clots from game hunted for the purpose of conducting a series of tests (physical, chemical, microbiological, and sensory).

2. Determination of stress hormones: Assessment of the levels of stress hormones in the meat depending on the method of hunting – bow vs. firearm.

3. Focus on key hormones: Emphasis on cortisol and adrenaline (epinephrine), which are released prior to or during killing. Their presence can significantly affect meat quality, for example, its pH, color, or texture.

4. Importance of researching stress hormones in hunted game:

4.1 Meat quality: Increased levels of stress hormones reduce meat quality.
4.2 Consumer health: Elevated cortisol can impact human health if ingested in large quantities.
4.3 Animal welfare: The research helps to identify issues in the living conditions of free-ranging game and in ethical hunting practices.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

METHODOLOGY

Dates: 28 November - 1 December 2024
Location: Zvernica Kováčová
Number of hunters: 9
Number of logistical support personnel: 2

28 November, 2024 (bow)
1 x Mouflon
1 x Mouflon ewe
2 x Fallow deer
1 x Fallow doe

29 November, 2024 (firearm)
1 x Mouflon

2 x Mouflon ewes

2 x Fallow deer

1 x Wild boar











SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

METHODOLOGY FOR SAMPLE COMPARISON

For a direct comparison of organic samples, 3 specimens of hunted game of the same species, age, sex, and approximate size were selected.

3 specimens hunted with a BOW, comprising:
2 x Fallow deer, 1 x Mouflon

3 specimens hunted with a FIREARM, comprising:
2 x Fallow deer, 1 x Mouflon

For the purpose of comparing cortisol and adrenaline levels, organic samples from highly stressed game were also incorporated into the study at the initiative of UVLAF:

2 specimens of STRESSED GAME:
1 x Red Deer (wounded / shot)
1 x Roe Deer (traffic accident)

Name of the Hunter	Date of Kill	Species of Game	Sex	Distance at Time of Shot (m)	Movement of the Game at Time of Shot	Degree of Penetration	Point of Impact	Position of the Animal	Distance from Firing (m)	Type of Hunting Broadhead	Location
Stefan Jakubik	29/11/2024	Mouflon	Male	18	Stationary	Complete	Ventricular wound	Crosswise	30	Mechanical	Zvernica Kovacova
Vladimir Buran	29/11/2024	Fallow deer	Male	18	Stationary	Complete	Ventricular wound	From the side	30	Mechanical	Zvernica Kovacova
Stefan Miko	29/11/2024	Fallow deer	Male	20	Stationary	Complete	Ventricular wound	From the side	20	Mechanical	Zvernica Kovacova
Vladimir Buran	29/11/2024	Mouflon ewe	Female	20	Stationary	Complete	Ventricular wound	From the side	15	Mechanical	Zvernica Kovacova

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

FIELD SAMPLING

BLOOD FOR BIOCHEMICAL EXAMINATIONS

Sampled amount: 5–10 ml

Area: Heart and major vessels

1.Cortisol, adrenaline, noradrenaline

2.Glucose, enzymes, and electrolytes

MEAT FOR AGING PROCESSES

Sampled amount: 3 × 300 g

Area: Thigh, back

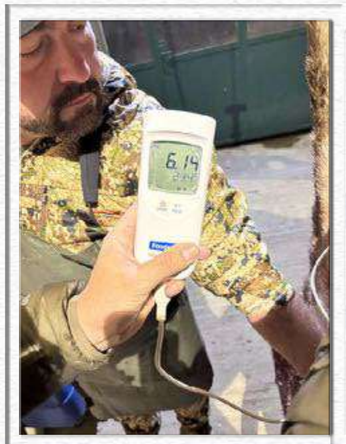
3.pH, ammonia

4.Oxidation

5.Microbiology









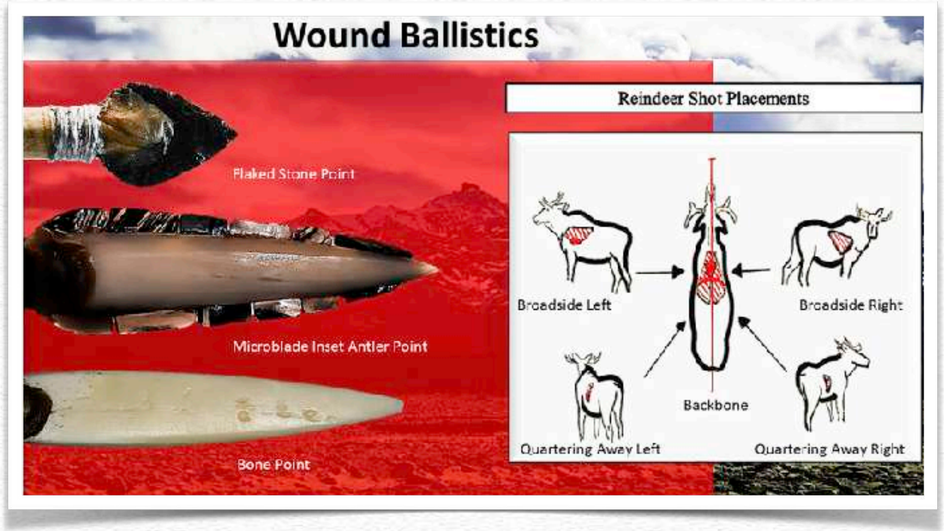
SLOVAK BOW HUNTING™

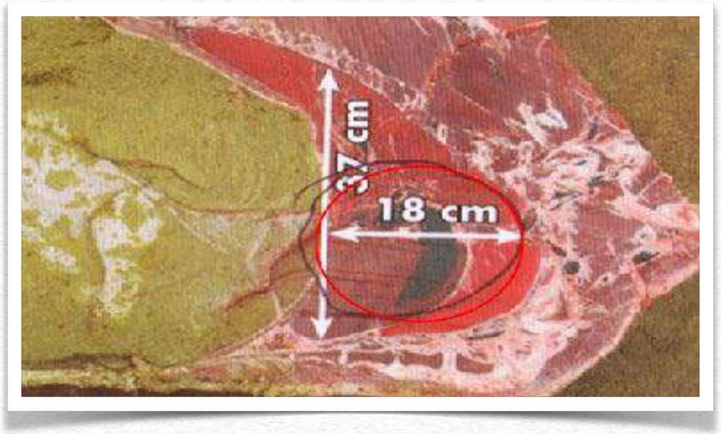
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

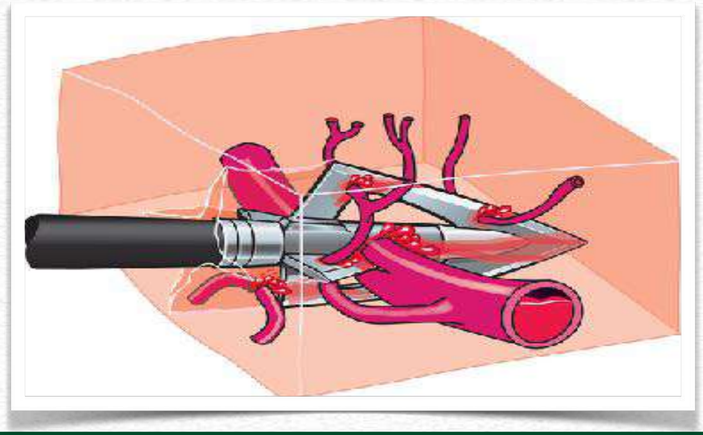
BIOLOGICAL ASPECTS OF BOWHUNTING

1. Mechanism of killing with an arrow:

Arrow passage: Hunting broadheads have sharp blades that, upon penetrating the body, cut through blood vessels, organs, and muscles.
Hemorrhagic shock – massive blood loss: With a proper hit to a vital area (lungs, heart), rapid internal or external bleeding occurs, leading to a drop in blood pressure and loss of consciousness within seconds to minutes.
Minimal Tissue Damage: Unlike a bullet, which causes extensive destruction and hydrostatic shock, an arrow leaves a clean, precise cut, thereby increasing the usability of the meat.







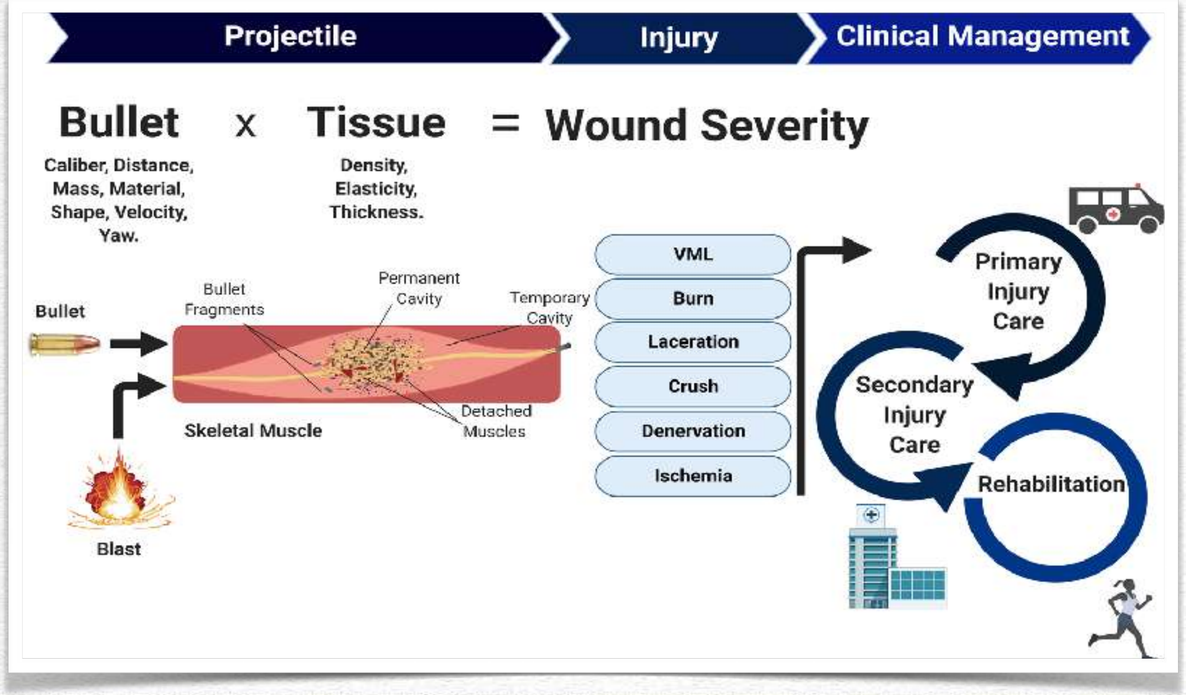
Ethical and ecological consideration: Killing game with an arrow is biologically different from using a firearm—it does not rely on kinetic shock but on massive bleeding via precise cuts. With a proper hit, it is an ethical, quiet, and ecological method that simultaneously ensures high-quality game meat.

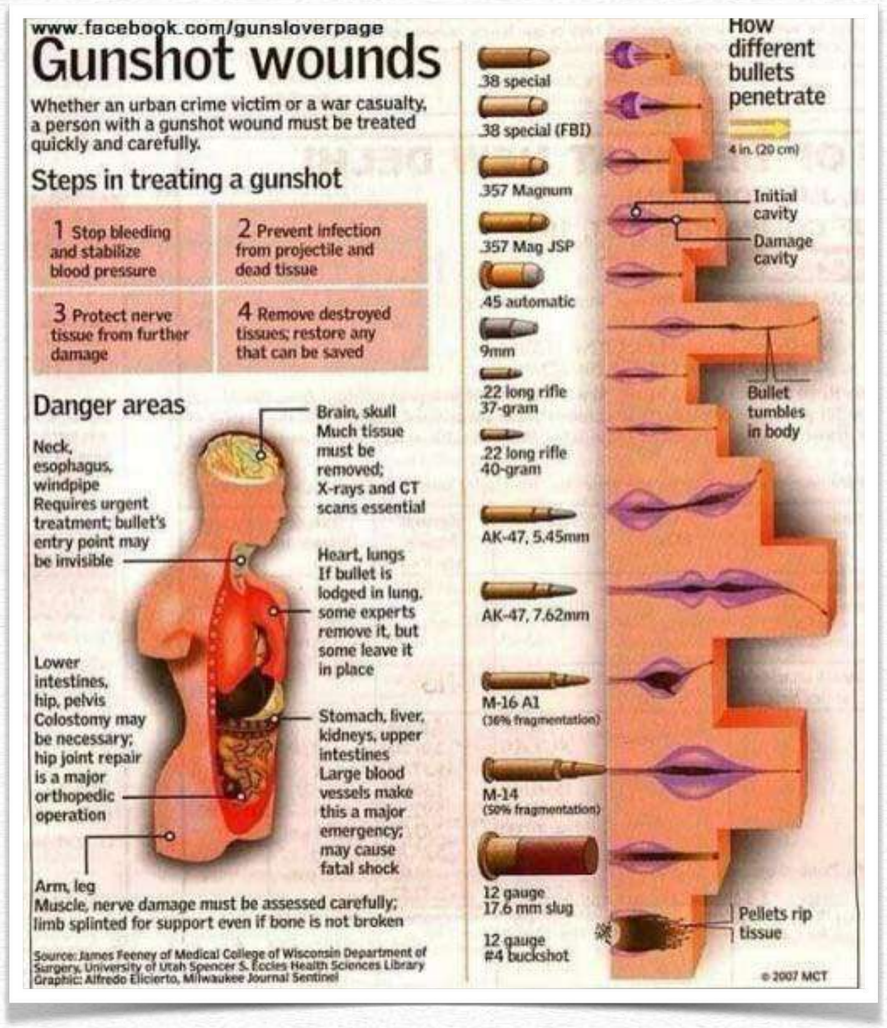
SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

BIOLOGICAL ASPECTS OF HUNTING WITH A FIREARM

1. Mechanism of killing with a firearm:

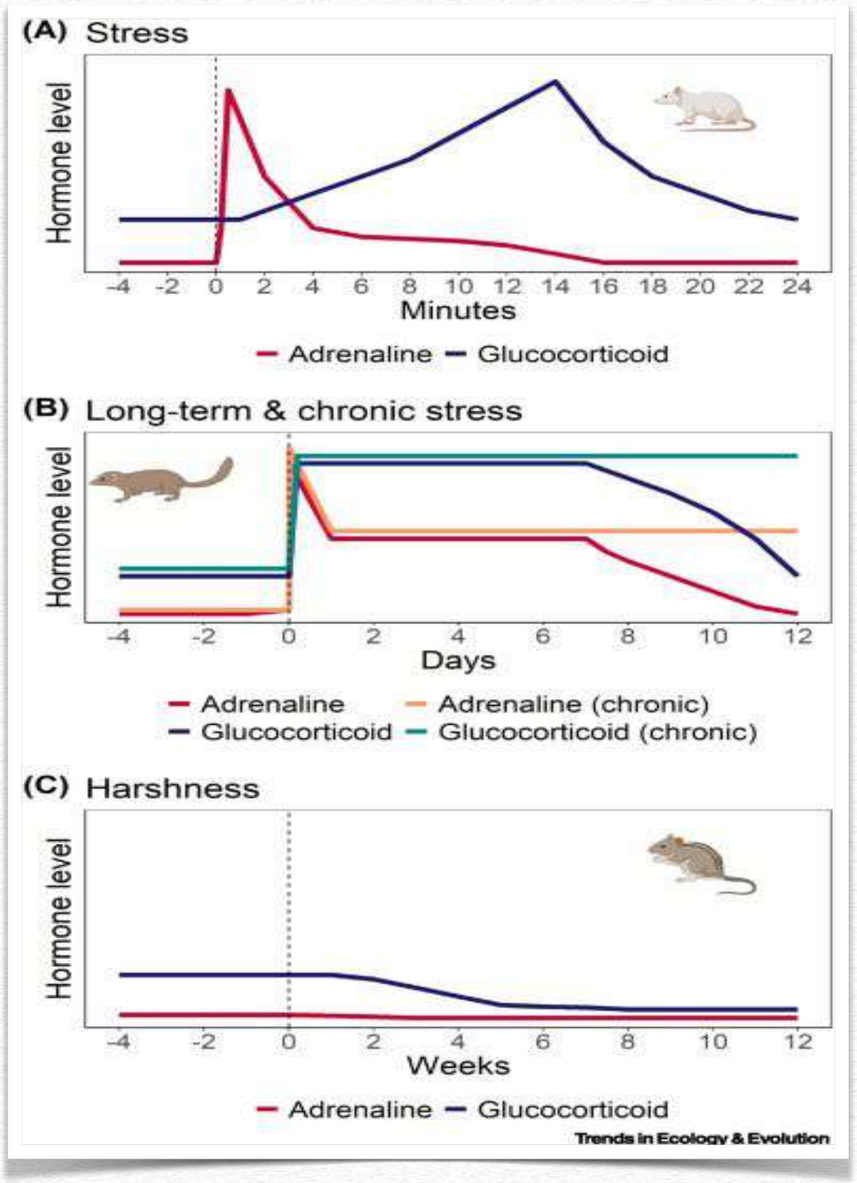
Cavitation effect: The bullet causes tissue destruction, forming primary and secondary wound cavities.
Hydrostatic shock: A rapidly spreading pressure wave can damage distant tissues and organs, leading to the incapacitation of the game.
Exsanguination: If the bullet hits major vessels or the heart, there is a rapid drop in blood pressure resulting in death.
Central nervous system damage: If the brain or spinal cord is hit, immediate death occurs.

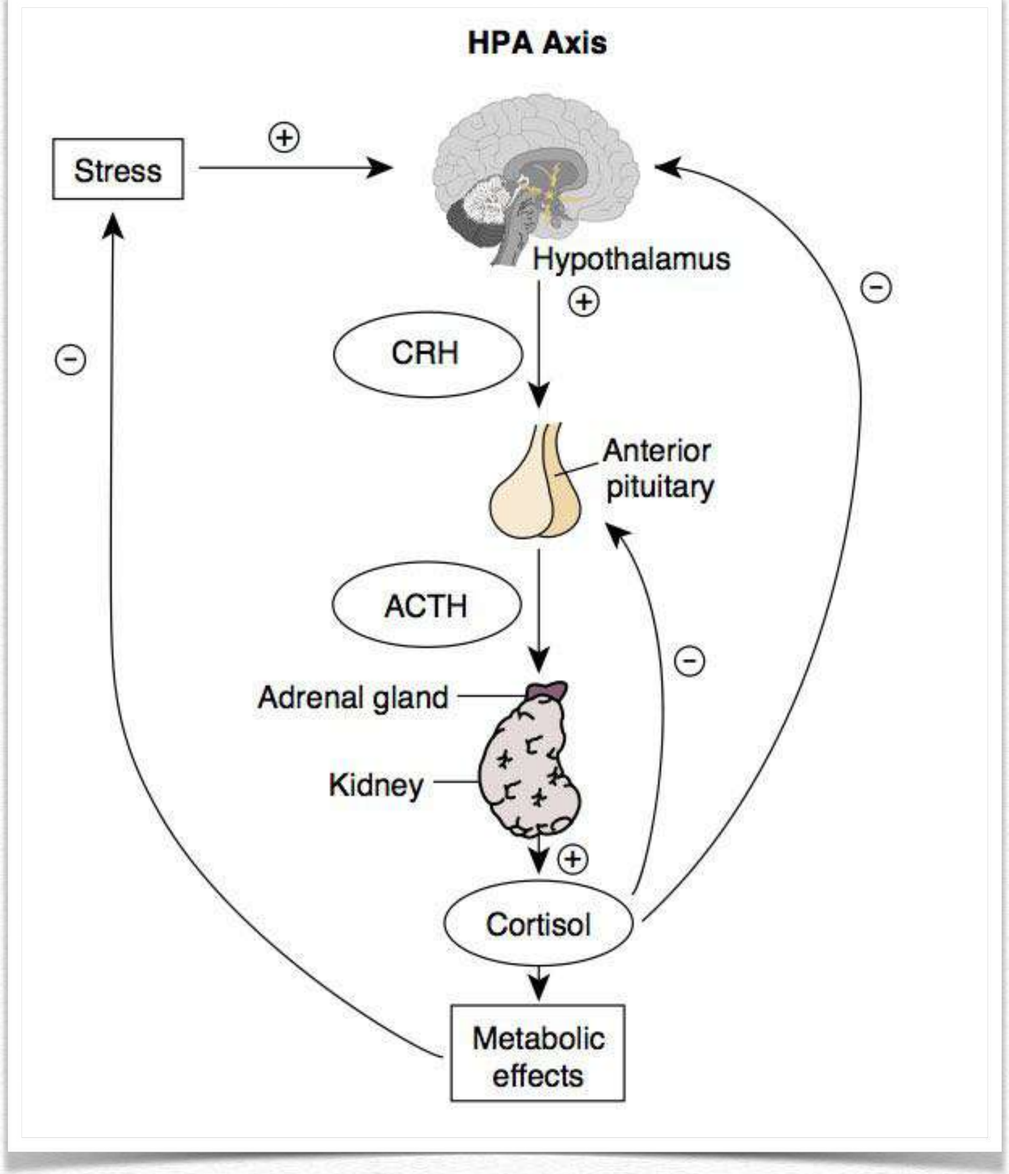




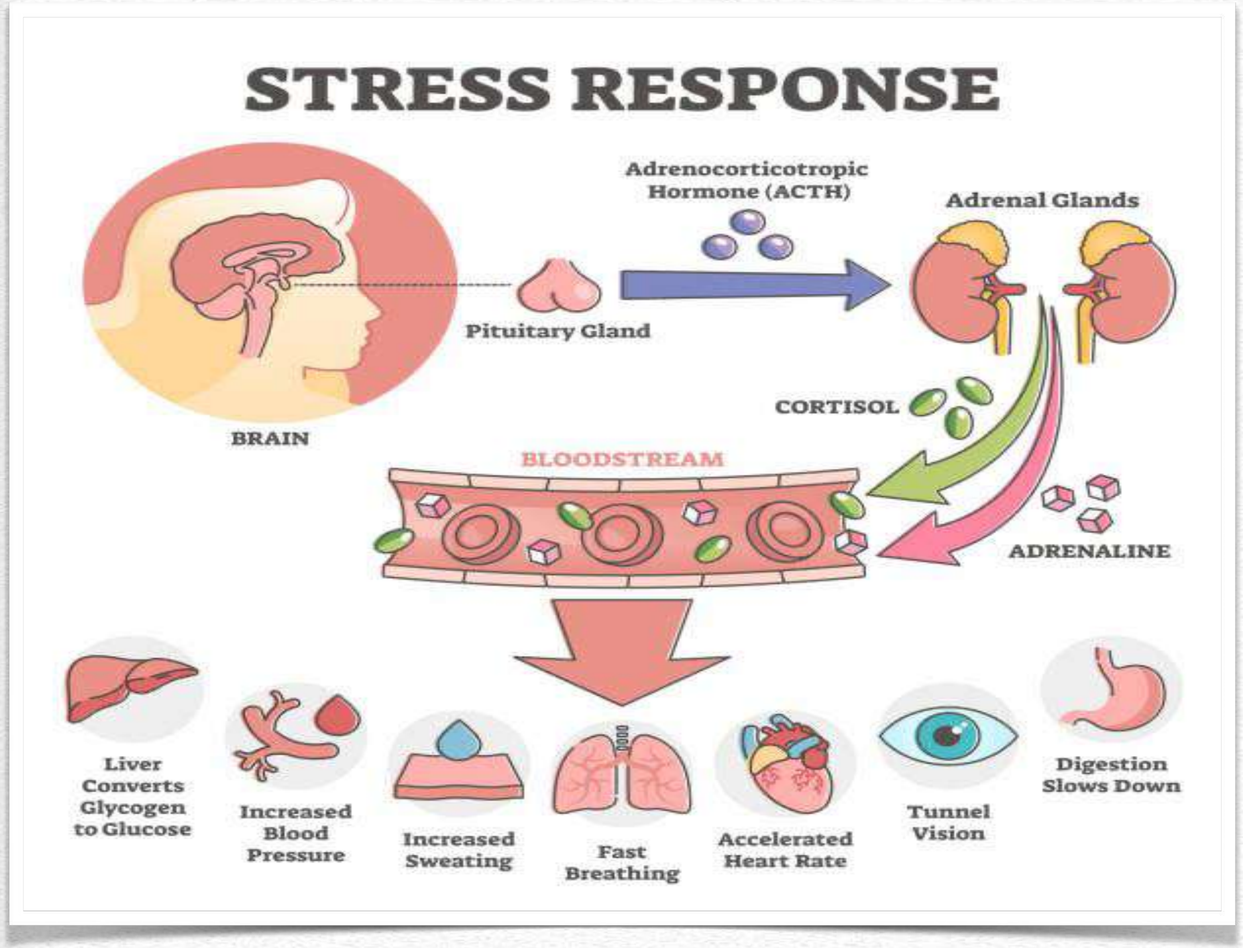
SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

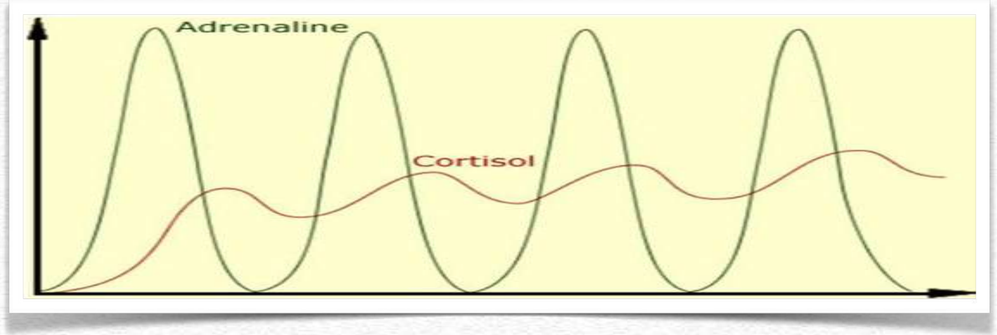
HPA AXIS OF STRESS - (HYPOTHALAMUS – PITUITARY – ADRENAL GLANDS)





THE EFFECT OF STRESS IN THE ORGANISM AND ITS HORMONAL MEDIATORS





SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

RESULTS OF THE BIOCHEMICAL EXAMINATION

	Glu	AST	ALT	CK	Na	K	Kortizol	Adrenalin	Nor Adren
1A	6,38	14,92	1,77	176,37	139,5	10	34,38	47,66	28,39
2A	3,45	7,52	1,92	324.45	135,2	10	13,8	16,63	
3A	2,87	3,92	1,56	153,05	127,3	10	13,8		
	4,233333	8,786667	1,75	153,05	134		20,66	20,66	

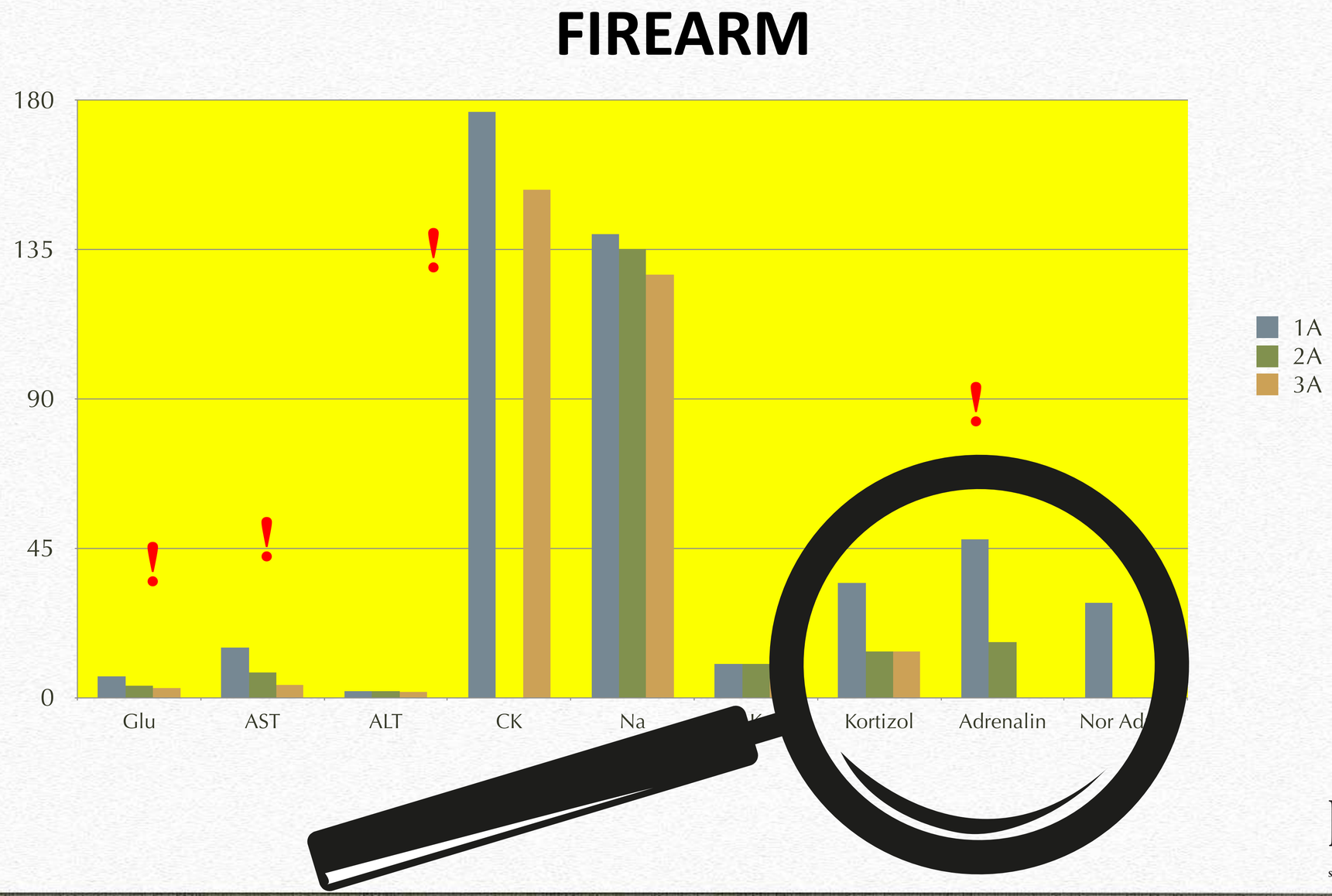
	Glu	AST	ALT	CK	Na	K	Kortizol	Adrenalin	Nor Adren
4B	3,5	7,4	1,9	320,67	135,3	10	13	14,42	
5B	1,88	10,24	1,26	141,6	140	10	28,22	14,42	5,51
6B	5,13	44,84	7,22	610,89	103,5		13		
	3,920476	13,94667	2,482857	275,852	130,6857		19,55143	16,5	

	Glu	AST	ALT	CK	Na	K	Kortizol	Adrenalin	Nor Adren
J	8,7	44,92	2,28	218,4	135,1	10	121,05	37,59	488,48
S	19,34	10,84	2,09	153,41	142,4	10	118,77	657,82	399,28
Priemer	5,940381	16,73333	2,423286	253,3653	132,2986	10	39,62314	237,30333	443,88
	mmol/l	ukat/l	ukat/l	ukat/l	mmol/l	mmol/l	mmol/l	mmol/l	mmol/l
						7-9H	145-619	0-0.46	0-2.48
						16-18H	95-462		

	Glu	AST	ALT	CK	Na	K	Kortizol	Adrenalin	Nor Adren
A	4,2	8,7	1,75	153	134	10	20	20	
B	3,9	13,9	2,48	275	132	10	19	20	5,51
J S	5,94	16,7	2,42	253	132	10	39	237	443

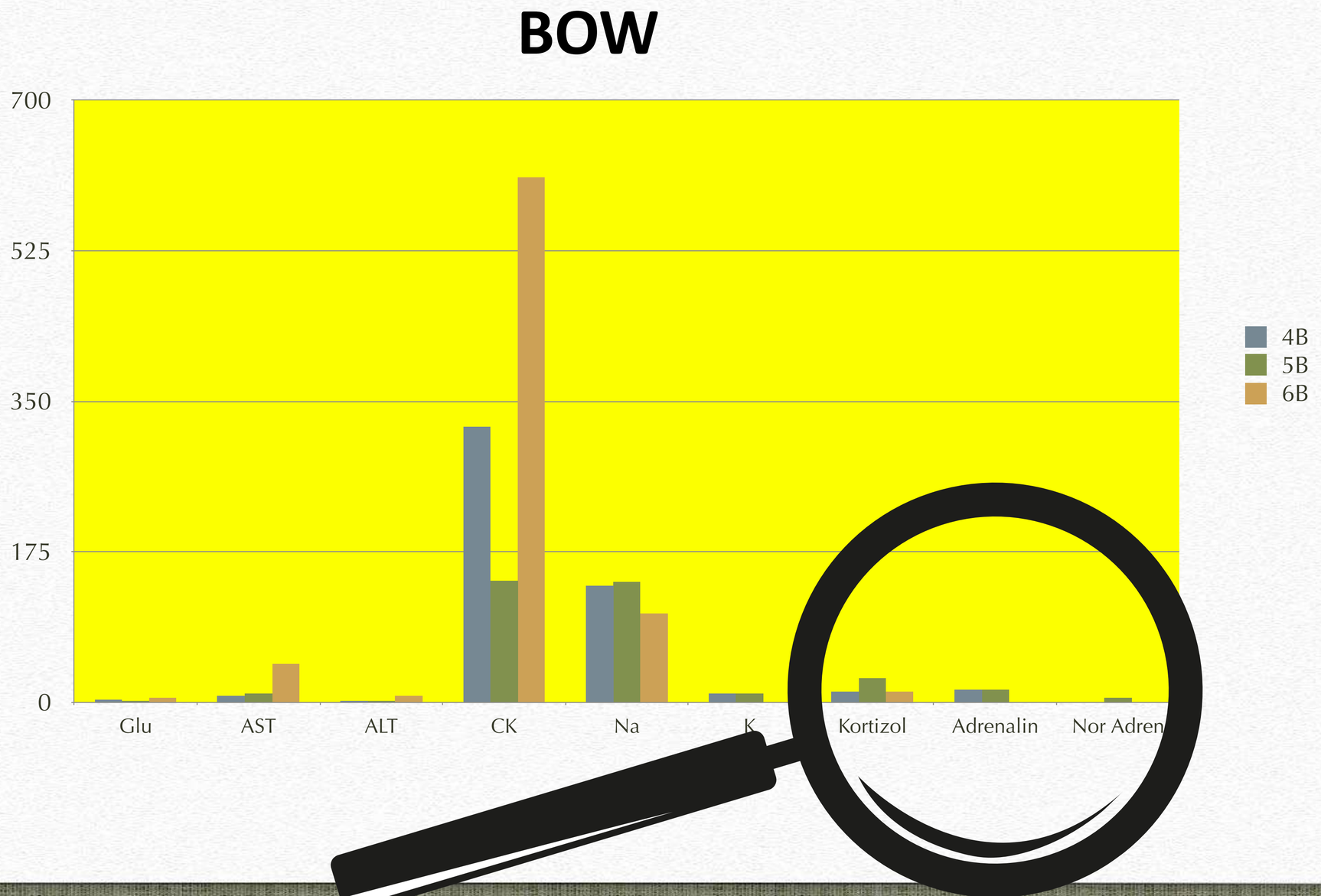
SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

RESULTS OF THE BIOCHEMICAL EXAMINATION



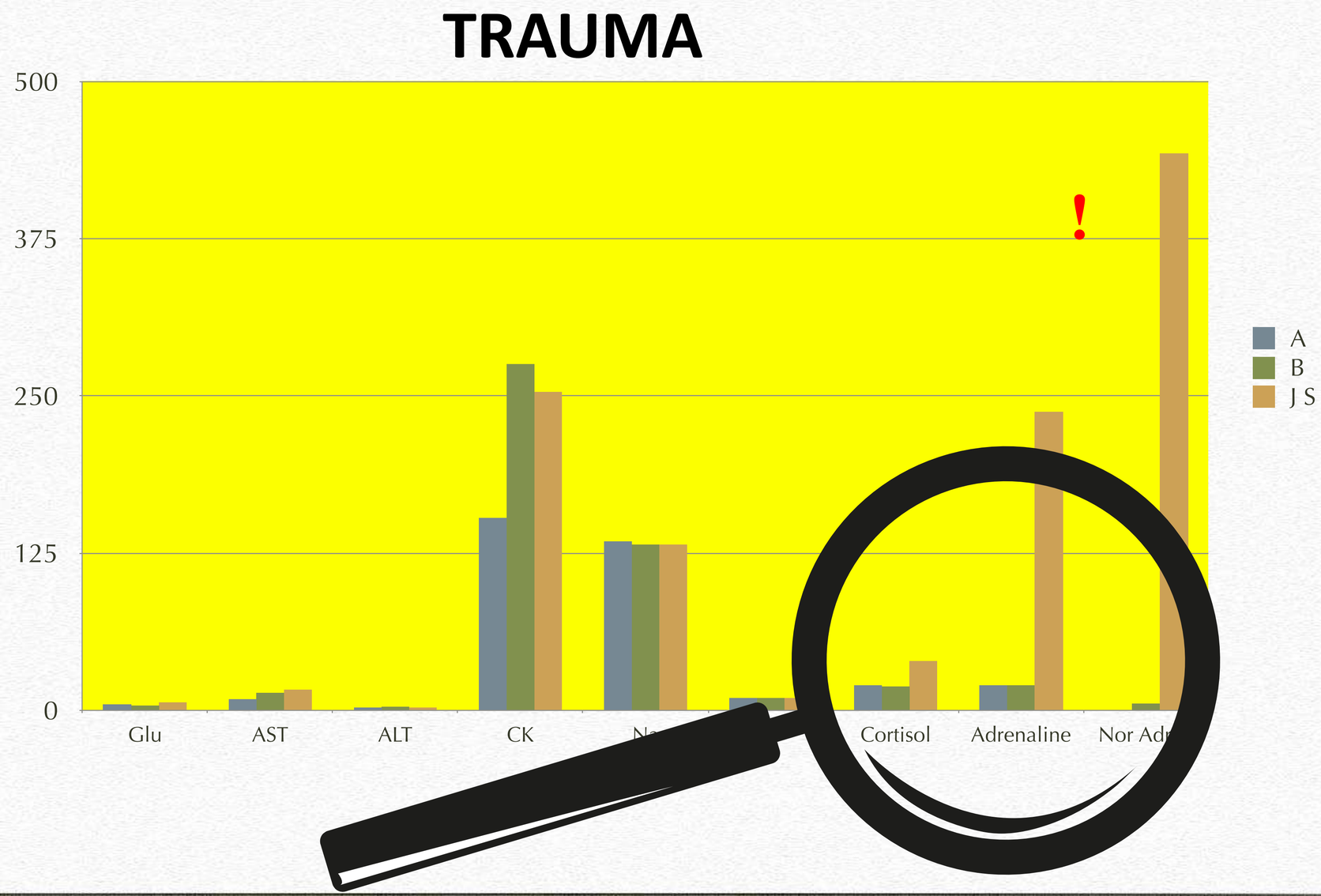
SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

RESULTS OF THE BIOCHEMICAL EXAMINATION



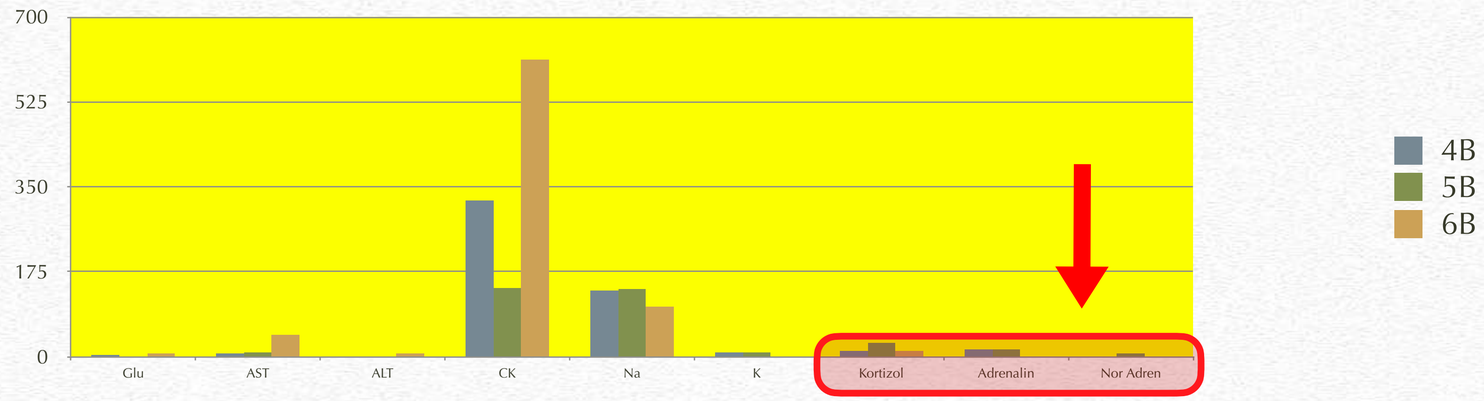
SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

RESULTS OF THE BIOCHEMICAL EXAMINATION



RESULTS OF THE BIOCHEMICAL EXAMINATION

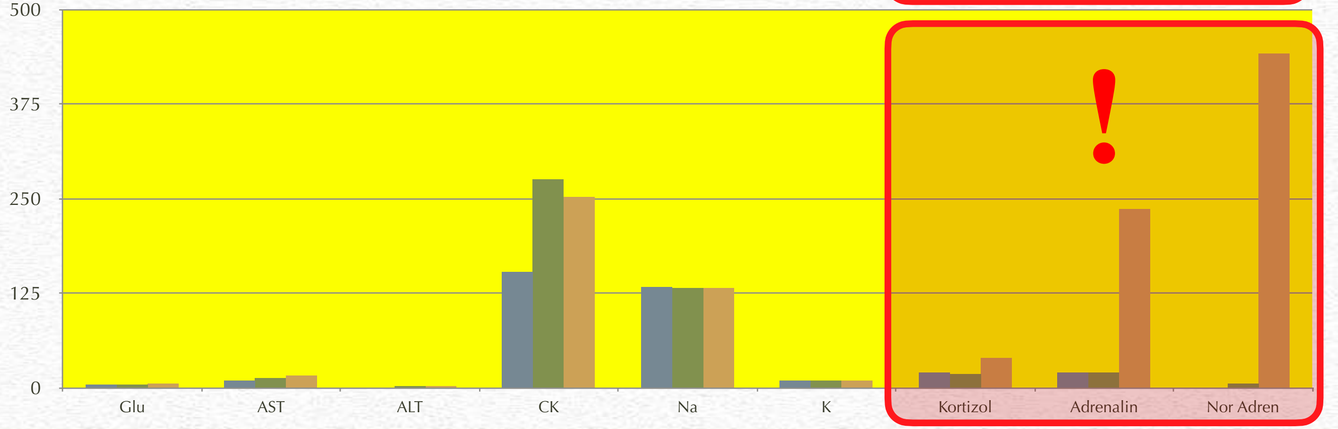
BOW



FIREARM



TRAUMA



SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

LABORATORY PROCESSING OF MEAT

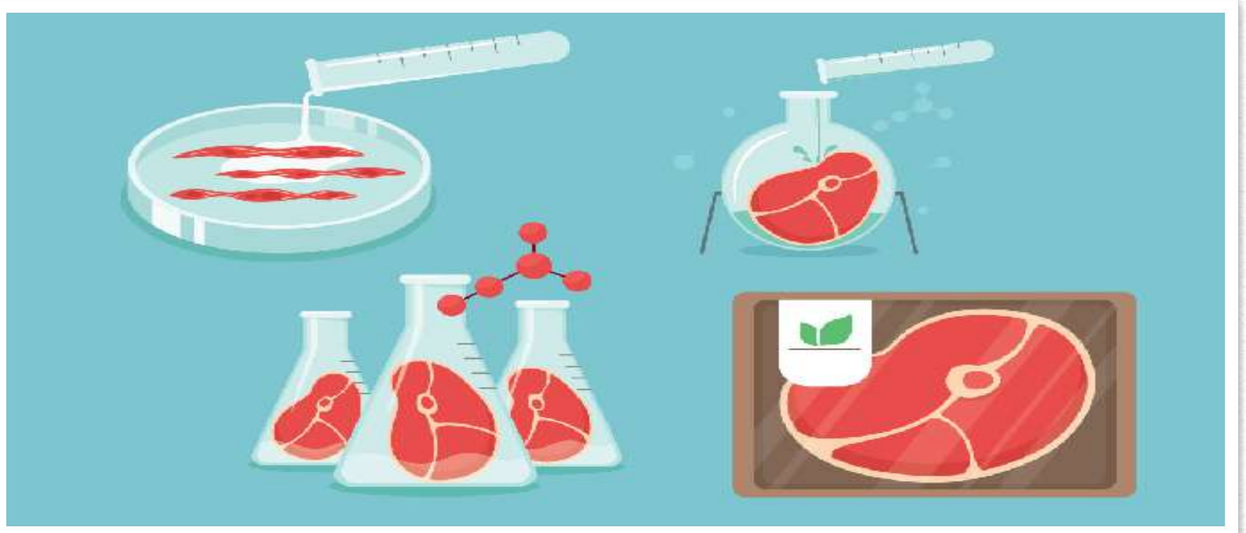
Dates of analyses:

02 December 2024

06 December 2024

16 December 2024

08 January 2025



Parameters analyzed:

1.pH

2.Microbiology

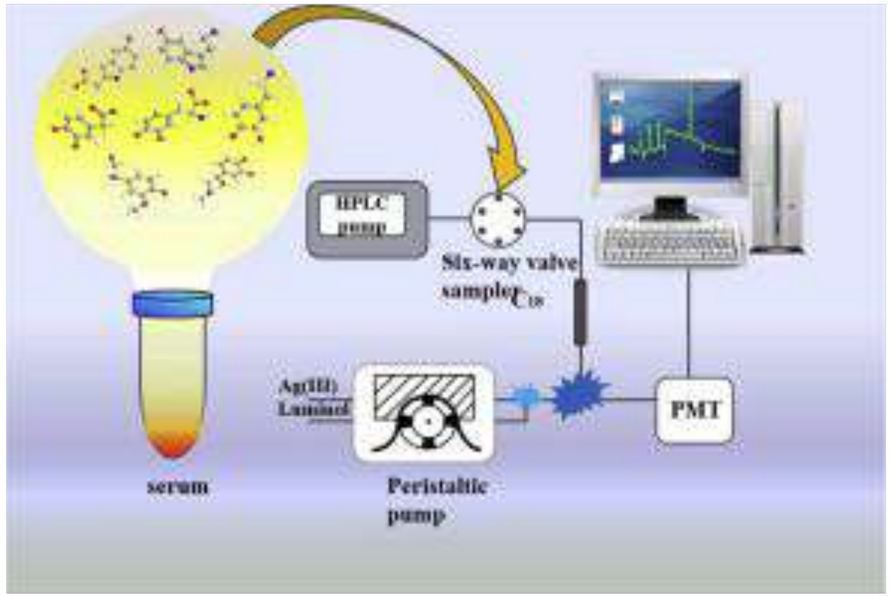
3.Composition

4.Oxidation

5.Aging Processes



LABORATORY ANALYSES









COMPARISONS

Comparison of group 1: Bow						Comparison of group 2: Firearm				
	Data Name	L*(D65)	a*(D65)	b*(D65)			Data Name	L*(D65)	a*(D65)	b*(D65)
1st Analysis	1-3 K	38,763	15,149	1,675		1st Analysis	4-6 K	38,544	14,996	1,616
2.12.2024		0,033	0,057	0,019		2.12.2024		0,061	0,035	0,016
2nd Analysis	1-3 K	37,726	14,463	1,393		2nd Analysis	4-6 K	38,497	14,888	1,390
6.12.2024		0,174	0,069	0,079		6.12.2024		0,027	0,022	0,013
3rd Analysis	1-3 K	41,158	13,616	3,433		3rd Analysis	4-6 K	40,908	12,486	4,090
16.12.2024		0,100	0,016	0,026		16.12.2024		0,040	0,119	0,089
4th Analysis	1-3 K	42,359	12,518	5,967		4th Analysis	4-6 K	45,041	10,610	6,610
8.1.2025		0,045	0,106	0,016		8.1.2025		0,097	0,041	0,042
1st Analysis	1-3 S	38,197	15,099	1,060		1st Analysis	4-6 S	39,558	15,340	1,545
2.12.2024		0,032	0,121	0,011		2.12.2024		0,023	0,054	0,020
2nd Analysis	1-3 S	38,699	15,416	1,151		2nd Analysis	4-6 S	39,425	15,298	1,505
6.12.2024		0,037	0,082	0,040		6.12.2024		0,071	0,082	0,028
3rd Analysis	1-3 S	39,470	14,777	2,024		3rd Analysis	4-6 S	42,239	13,155	4,118
16.12.2024		0,028	0,014	0,012		16.12.2024		0,286	0,083	0,140
4th Analysis	1-3 S	41,923	13,235	5,653		4th Analysis	4-6 S	47,809	14,554	7,322
8.1.2025		0,036	0,056	0,055		8.1.2025		0,039	0,214	0,174

CHEMICAL ANALYSIS OF MEAT COMPOSITION

	Water [%]	Fat [%]	Ash [%]	Protein [%]	Collagen [%]	BEFFE [%]	NaCl [%]	pH
Fallow deer_1AK_1	68,891	8,109	0,734	24,111	1,951	17,747	0	6,35
Fallow deer_1AK_2	68,885	7,981	0,463	24,587	2,028	17,604	0	6,356
Fallow deer_1AK_3	68,996	7,596	0,461	24,599	2,038	17,426	0	6,332
Fallow deer_1AK_4	68,782	7,917	0,618	24,479	1,896	17,511	0	6,349
Fallow deer_1AK_5	68,877	7,915	0,624	24,235	1,993	17,73	0	6,325
Fallow deer_1AK_6	68,584	8,291	0,568	24,685	2,025	17,622	0	6,278
average	68,84	7,97	0,58	24,45	1,99	17,61	0,00	6,33
sd	0,14	0,23	0,10	0,23	0,06	0,12	0,00	0,03

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

DETERMINATION OF AGING PROCESSES FROM HUNTED GAME

	Title	Water [%]	Fat [%]	Ash [%]	Protein [%]	Collagen [%]	BEFFE [%]	NaCl [%]	pH
1AK	Average	68,77	9,22	0,82	22,91	1,77	18,11	0,00	6,46
	sd	0,26	0,09	0,09	0,15	0,10	0,06	0,00	0,06
1AS	Average	72,42	5,24	0,77	23,92	1,81	18,02	0,00	6,30
	sd	0,36	0,20	0,10	0,25	0,08	0,12	0,00	0,04
2AK	Average	71,44	1,41	1,70	25,96	2,29	19,62	0,00	6,71
	sd	0,38	0,41	0,15	0,34	0,29	0,18	0,00	0,02
2AS	Average	73,91	1,74	0,94	24,42	2,12	18,49	0,00	6,52
	sd	0,34	0,39	0,12	0,47	0,21	0,08	0,00	0,03
3AK	prieAveragemer	71,44	2,18	1,31	25,57	2,18	19,74	0,00	6,56
	sd	0,35	0,33	0,21	0,45	0,19	0,07	0,00	0,02
3AS	Average	74,47	0,81	1,54	24,40	2,08	19,22	0,04	6,17
	sd	0,37	0,25	0,22	0,39	0,16	0,12	0,08	0,04
4BK	Average	72,12	2,85	1,00	25,30	2,18	19,58	0,02	6,31
	sd	0,26	0,33	0,18	0,49	0,20	0,09	0,04	0,04
4BS	Average	72,71	2,39	1,13	25,35	2,06	19,07	0,00	6,04
	sd	0,16	0,30	0,10	0,26	0,16	0,15	0,00	0,02
5BK	Average	69,66	7,43	0,69	23,76	1,84	18,10	0,00	6,72
	sd	0,11	0,15	0,09	0,18	0,09	0,02	0,00	0,02
5BS	Average	70,35	5,24	0,99	23,31	1,83	17,44	0,00	6,17
	sd	0,25	0,15	0,15	0,23	0,05	0,15	0,00	0,02
6BK	Average	68,43	7,51	0,44	23,61	2,03	18,47	0,00	6,20
	sd	0,29	0,27	0,20	0,39	0,08	0,10	0,00	0,02
6BS	Average	69,63	6,20	0,53	24,71	1,96	18,52	0,00	6,21
	sd	0,21	0,32	0,07	0,38	0,08	0,09	0,00	0,02

		Water [%]	Fat [%]	Ash [%]	Protein [%]	Collagen [%]	BEFFE [%]	NaCl [%]	pH
1AK	Average	68,84	7,97	0,58	24,45	1,99	17,61	0,00	6,33
	sd	0,14	0,23	0,10	0,23	0,06	0,12	0,00	0,03
1AS	Average	67,40	6,95	0,54	22,21	1,68	16,59	0,00	5,90
	sd	0,10	0,26	0,09	0,27	0,04	0,12	0,00	0,03
2AK	Average	72,43	0,19	1,67	26,69	2,25	20,65	0,00	6,66
	sd	0,28	0,21	0,17	0,32	0,24	0,08	0,00	0,03
2AS	Average	72,47	2,87	1,30	25,10	2,03	18,93	0,00	6,27
	sd	0,28	0,16	0,24	0,35	0,16	0,11	0,00	0,03
3AK	Average	72,42	0,00	1,52	27,28	2,34	20,83	0,00	6,60
	sd	0,36	0,00	0,18	0,35	0,21	0,16	0,00	0,03
3AS	Average	73,86	0,94	1,18	25,18	1,98	19,31	0,07	6,21
	sd	0,19	0,46	0,12	0,81	0,17	0,21	0,11	0,02
4BK	Average	73,12	0,76	1,44	26,34	2,15	20,13	0,00	6,16
	sd	0,30	0,30	0,26	0,51	0,25	0,13	0,00	0,03
4BS	Average	72,01	2,91	0,89	25,20	2,15	19,50	0,00	6,12
	sd	0,13	0,25	0,20	0,37	0,16	0,08	0,01	0,02
5BK	Average	71,43	2,88	0,94	25,31	2,08	19,29	0,00	6,72
	sd	0,16	0,44	0,13	0,40	0,11	0,09	0,00	0,03
5BS	Average	70,58	5,47	0,46	24,31	2,05	18,64	0,00	6,62
	sd	0,12	0,18	0,12	0,26	0,21	0,08	0,00	0,03
6BK	Average	72,68	1,24	1,43	26,25	2,06	20,09	0,02	6,17
	sd	0,27	0,22	0,08	0,19	0,18	0,10	0,05	0,02
6BS	Average	73,32	1,84	1,48	25,57	1,96	19,50	0,04	6,05
	sd	0,24	0,29	0,06	0,25	0,11	0,07	0,07	0,03

INDICATORS OF AGING PROCESSES FROM HUNTED GAME

Comparison of group 1: Bow

	1st Analysis	2nd Analysis	3rd Analysis	4th Analysis
1 AK	1,905	0,252	0,344	1,551
	0,17	0,01	0,03	1,97
2 AK	3,322	0,240	0,337	0,198
	0,69	0,02	0,01	0,02
3 AK	1,935	0,325	0,321	0,585
	0,16	0,03	0,05	0,08
average	2,387	0,272	0,334	0,778
sd	0,34	0,02	0,03	0,69

1 As	1,443	0,210	0,568	0,443
	0,22	0,03	0,30	0,06
2 AS	1,856	0,248	0,330	0,416
	0,44	0,06	0,03	0,07
3 AS	1,423	0,403	0,230	0,656
	0,38	0,02	0,06	0,08
average	1,574	0,287	0,376	0,505
sd	0,35	0,04	0,13	0,07

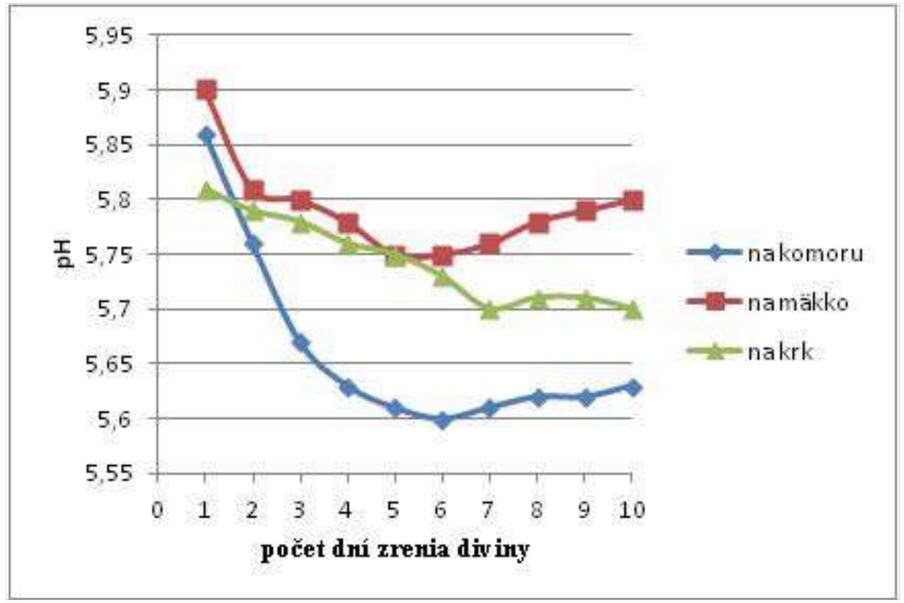
Comparison of group 2: Firearm

	1st Analysis	2nd Analysis	3rd Analysis	4th Analysis
4 BK	1,127	0,822	0,285	1,062
	0,41	0,05	0,09	0,03
5 BK	0,849	1,154	0,318	1,151
	0,15	0,09	0,03	0,10
6 BK	1,397	0,932	0,481	1,372
	0,13	0,16	0,07	0,05
average	1,124	0,969	0,361	1,195
sd	0,23	0,10	0,06	0,06

4 BS	0,555	0,339	0,242	0,900
	0,26	0,03	0,03	0,05
5 BS	1,242	1,045	0,372	1,116
	0,39	0,21	0,06	0,15
6 BS	2,565	1,096	0,370	1,269
	0,17	0,18	0,03	0,11
average	1,454	0,826	0,328	1,095
sd	0,27	0,14	0,04	0,10







SUMMARY OF THE ANALYSIS BASED ON LABORATORY FINDINGS FROM COLLECTED ORGANIC SAMPLES OF THE HUNTED GAME



SUMMARY.....

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

THE GAME MEAT FROM ANIMALS HUNTED WITH A BOW CLEARLY DEMONSTRATES:

- **LOWER** levels **of glucose and stress hormones.**
- **LOWER** levels of the CPK enzyme-**indicating less tissue damage.**
- **A FASTER** onset of aging processes (pH and acidity changes) as a consequence of aging processes.
- **LOWER** microbiological **contamination and lower levels of ammonia.**

*Recommendations

The necessity to determine residual blood in the meat as an indicator of exsanguination.

Balanced species and age groups of animals (mouflon–fallow deer). Standardise hygienic sampling procedures – change gloves.

SLOVAK BOW HUNTING™
SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

THANK YOU FOR YOUR ATTENTION

SLOVAK BOW HUNTING™

SLOVENSKÝ KLUB LOVECKEJ LUKOSTRELBY

No part of this publication / Study may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the authors.