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Comparison of snaffle bits made either in steel or titanium in show jumping horses

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MAPS



BACKGROUND

- Snaffle bits are the main way of **communication** between riders and horses.
- Nowadays bits are mainly in **stainless steel** and distinguished in **curb bits** (with levers) and **snaffle bits** with rings.



- Innovative materials have been investigated to reduce discomfort in the buccal region -> **Titanium bits** have been proposed as less invasive than traditional steel bits (lightness and highly biocompatible).
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AIM

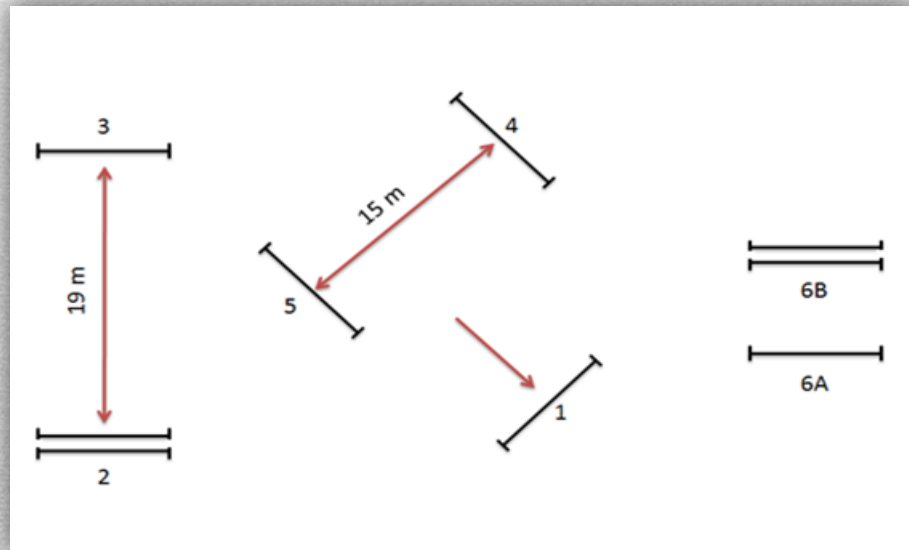
To evaluate the effects of snaffle bits made either in steel or in titanium on some well-being indicators in sport horses during show jumping training.

Direct measurements and individual data obtained by surveying riders were taken into account.



EXPERIMENTAL PLAN

- **18** rider-horse pairs in two equestrian centres of 9 each.
- Subsequent use (in blind) of a traditional steel (**S**) or a titanium (**T**) snaffle bit in two consecutive days (to avoid possible **carry-over effects**).
- **Cross-over design ST | TS** applied: half of the rider-horse pairs randomly assigned to the sequence ST, and the others to TS.
- Standardized exercise of training carried out by 8 skilled riders: **B90**, including **7 obstacles** summarising different difficulty typologies.



CONTROL OF THE EXPERIMENT

- The horses had similar **age** (9.8 ± 3.2 yrs.), **training** level to the show jumping, normal **mouth conditions**, and they had no mouth **defects or alterations**.
- They were already able to perform the **exercises required** (i.e., to avoid training effects).
- Experimental steel and titanium snaffles had **identical aspect**, and only the **groom** knew the sequence of materials assigned to each rider-horse pair.



DATA COLLECTION

- The **duration** of each exercise (i.e., the extent of the flat and jumping works) recorded by video camera.



- **Infrared thermographic images** at muzzle and neck, evaluated as mean cutaneous temperature variation due to the exercise.
- The **temperature of the snaffle bits** (after training).
- The **pH of saliva** samples collected after the training.



- Information on snaffle bits acceptance and quality of exercise by **survey** from riders just after each training.
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SURVEY TO RIDERS

Individual judgement from each rider/horsewoman after the exercise previously. Questions previously validated with other experienced riders.

SURVEY TO BE FILLED INDIVIDUALLY AT THE END OF TRAININGS BY RIDERS/HORSEWOMEN

Rider/Horsewoman _____ Horse Name _____

DATE ___/___/___ HOUR ___:___ Outside Temp. & weather conditions _____

Please give your opinion on the following aspects related to the work just concluded.

a. The snaffle bit acceptance by the horse can be scored:

b. The overall muscle de-contraction in the animal can be evaluated as:

c. Was there a homogeneous saliva production in the whole mouth of the horse?

Observations _____

d. The overall saliva production can be scored:

e. Considering the harmonic use of the whole muscular mass, the judgement on the flat work can be scored:

f. Considering the harmonic use of the whole muscular mass, the judgement on the jumping work can be scored:

Personal observations from the rider/horsewoman on the work just ended:

Very Poor = 1
Very High = 5

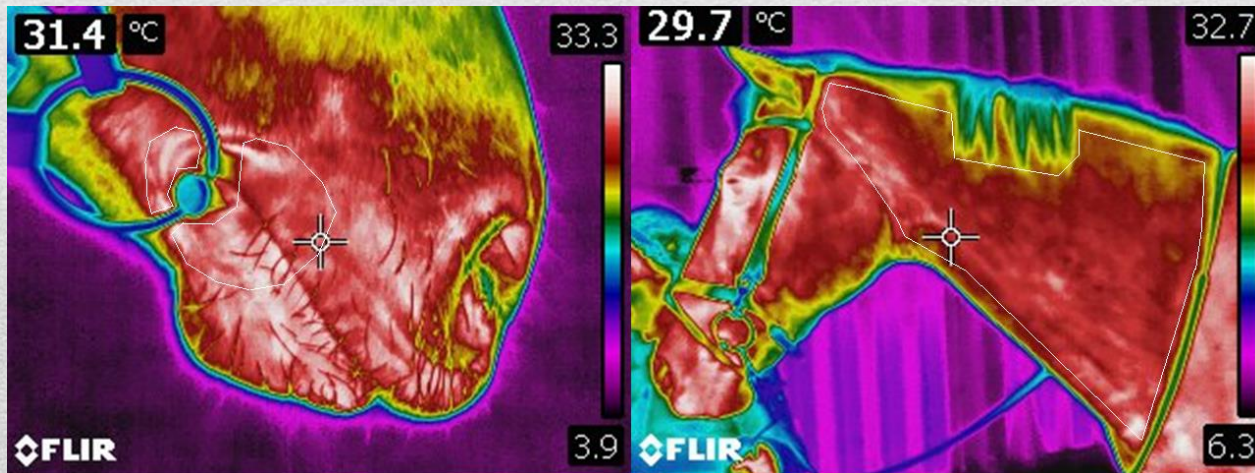
DESCRIPTIVE STATISTICS

Item	Mean	SD	CV	Min.	Max.
Training period (min)	31.66	7.32	0.23	20.25	50.50
- Flat work	23.28	6.07	0.26	13.00	38.33
- Jumping work	8.38	2.39	0.29	4.42	13.67

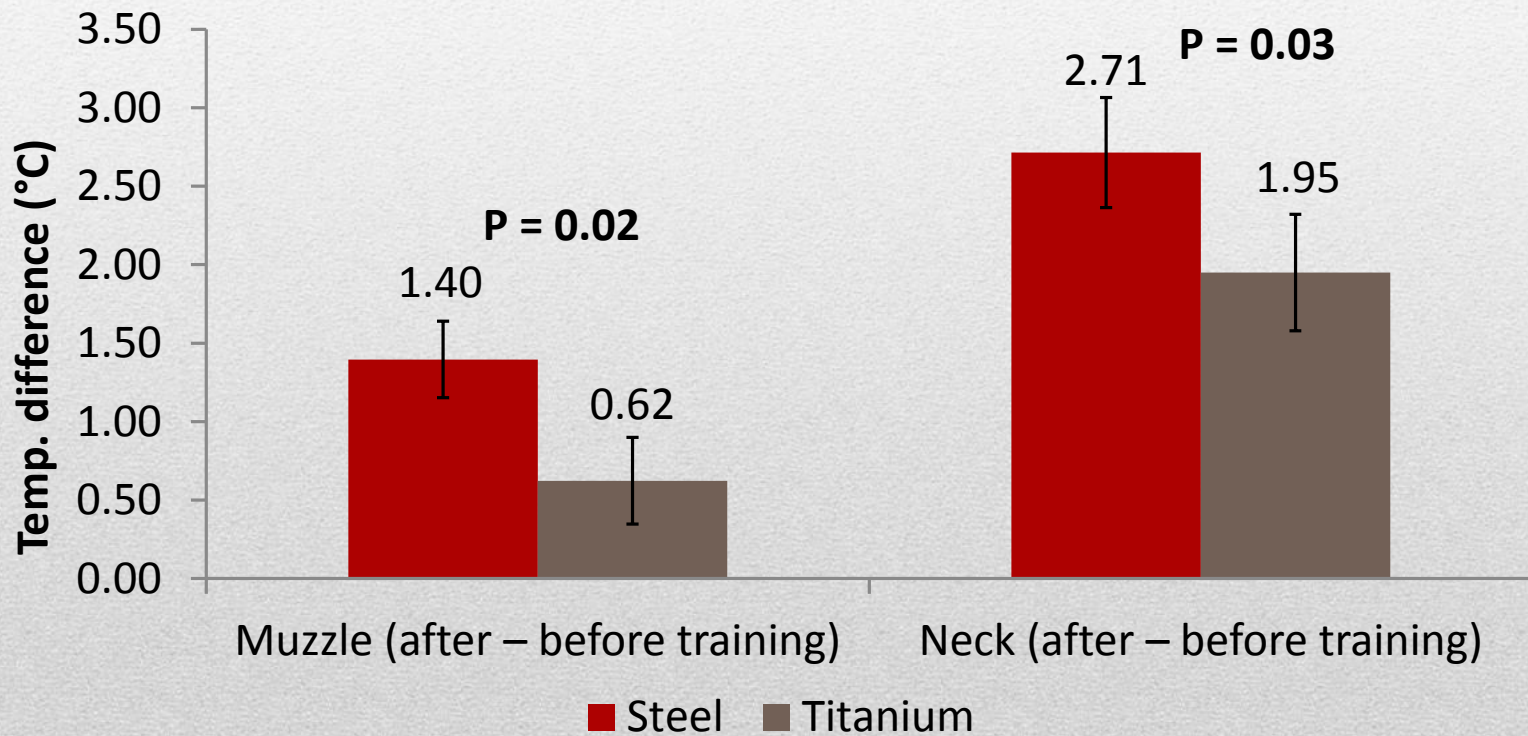


THERMOGRAPHY DATA

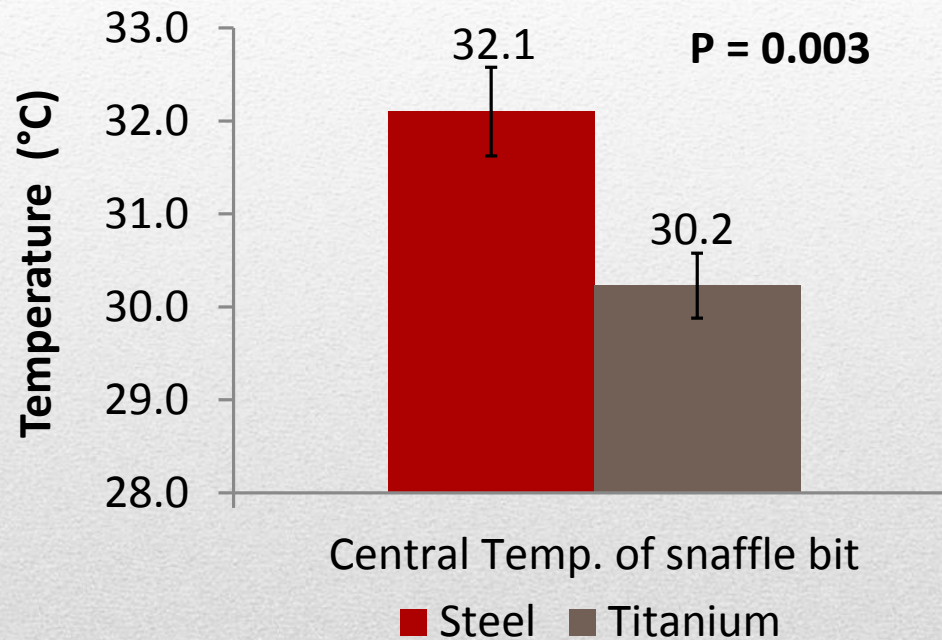
Item	Steel	Titanium	SE	Probability	
				S vs. T	Carry-over
Temp. at muzzle (°C)					
- Before training	30.9	31.4	0.3	0.20	0.84
- After training	32.3	32.1	0.3	0.33	0.41
Temp. at neck (°C)					
- Before training	28.2	28.7	0.4	0.15	0.78
- After training	30.9	30.6	0.6	0.10	0.87



TEMPERATURE CHANGE AT MUZZLE AND NECK



TEMPERATURE OF SNAFFLE BIT AND SALIVARY pH AFTER TRAINING



Item	Steel	Titanium	SE	Probability	
				S vs. T	Carry-over
Salivary pH	8.97	8.93	0.04	0.34	0.72



RESULTS OF THE SURVEY

Survey question (Pts.)	Steel	Titanium	SE	Probability	
				S vs. T	Carry-over
Snaffle bit acceptance	3.50	3.83	0.20	0.09+	0.52
Muscle de-contraction	3.28	3.61	0.18	0.13	0.46
Overall saliva production	2.61	2.89	0.24	0.24	0.90
Quality of flat work	3.33	3.50	0.19	0.51	0.51
Quality of jumping	3.50	3.61	0.17	0.51	0.26

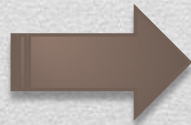


CONCLUSIONS

The titanium snaffle bit, as compared to the steel one, produces:

1. Lower increase in mean skin temperature at muzzle and neck
2. Lower temperature at the central hub of the bit
3. The tendency for a better acceptance of the bit as reported by interviewed riders

Therefore



- **Better muscle relaxation**
 - **Less muscular stress for horses**
 - **Better conditions of work**
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Thank you for your attention



Acknowledgements

