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Associations among infrared thermography, sperm motility and viability of collared peccaries (*Pecari tajacu* Linnaeus, 1758)

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1. INTRODUCTION

Climate change has a major impact on ecosystems and the survival of various species. In this scenario, heat stress acts as one of the main factors that cause deleterious effects on male fertility. Understanding how an animal's body temperature affects the sperm parameters can be a key factor in the early diagnosis of low-quality semen. Thus, this study aimed to evaluate the potential associations among temperatures of different body regions and some sperm parameters of collared peccaries (*Pecari tajacu*), based on the hypothesis that high body temperatures, caused by heat stress, are related to low sperm quality.

2. MATERIALS AND METHODS

The experimental design is shown in the Figure 1. To determine the relationship among sperm metrics, environmental data, and body surface temperatures, Spearman's correlation test was applied considering significant when $P < 0.05$.

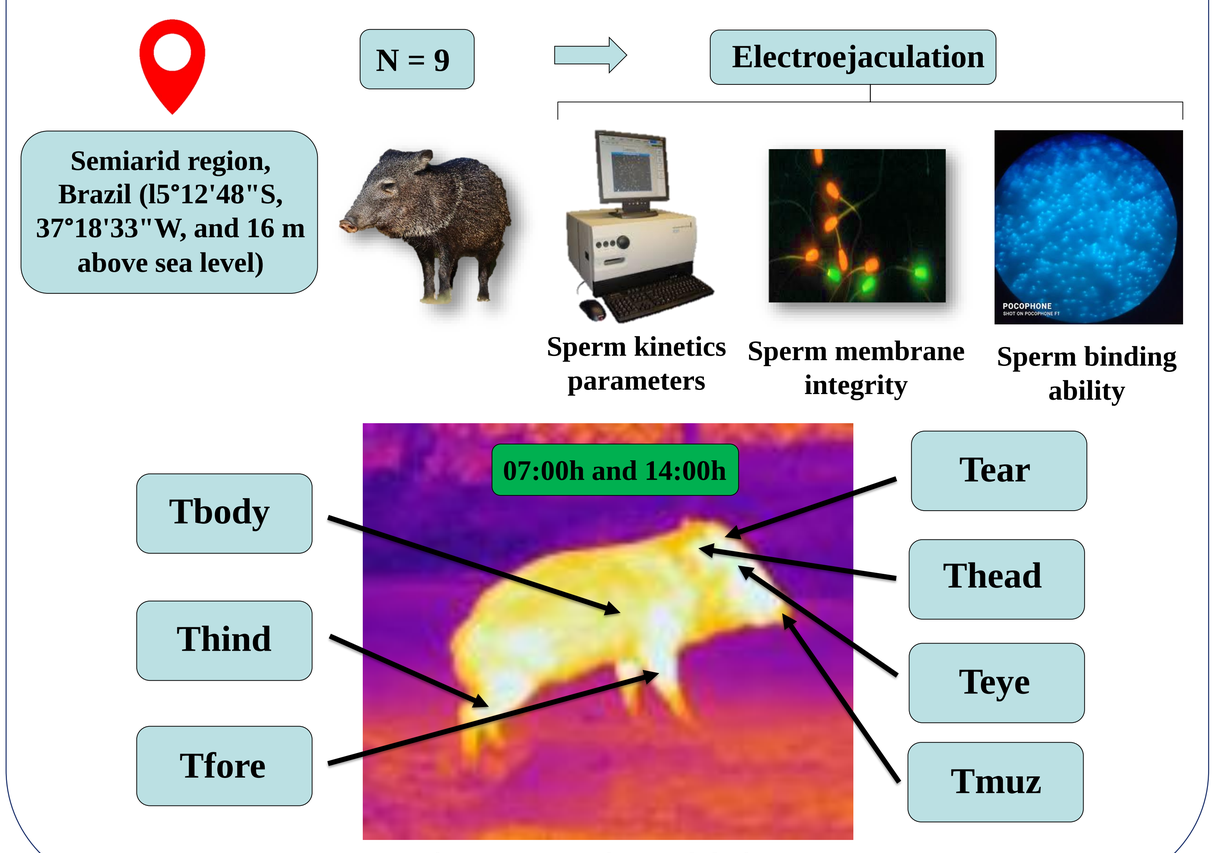

Figure 1. Experimental design.

3. RESULTS

The animals were evaluated for sperm parameters during the study period (Table 1). The environmental conditions presented the following averages, at 07:00 and 14:00, respectively: air temperature (T: 27.27 and 31.03 ºC), humidity (H: 65.11 and 53.89%), wind speed (W: 3.65 and 5.73 m/s), and solar radiation (SR: 223.8 and 832.19 W/m^2), respectively. Table 2 shows the mean surface temperature values of different corporal regions, obtained at 07:00 and 14:00.

Table 1. Mean values (± SEM) of sperm parameters of collared peccaries (*Pecari tajacu*; n = 9).

Sperm parameters	Means
Total motility (%)	92.4 ± 1.3
Progressive motility (%)	64.6 ± 4.0
Velocity average pathway (μm/s)	63.8 ± 3.6
Velocity straight line (μm/s)	50.6 ± 4.1
Velocity curvilinear (μm/s)	113.8 ± 4.5
Amplitude lateral head (μm)	5.4 ± 0.2
Beat cross frequency (Hz)	37.1 ± 0.5
Straightness (%)	74.7 ± 2.3
Linearity (LIN; %)	44.7 ± 3.1
Subpopulations	
% of Rapid sperm	75.8 ± 3.4
% of Medium velocity sperm	16.4 ± 2.8
% of Slow sperm	2.9 ± 0.44
% of Static sperm	4.7 ± 0.9
Sperm binding ability (Nº bound sperm)	224.1 ± 30.7

Table 2. Mean values (± SEM) of body temperatures of collared peccaries (*Pecari tajacu*; n = 9) at different times of day.

Body regions	Body temperatures (°C)	
	07:00	14:00
Muzzle	36.11 ± 0.65	41.29 ± 0.38
Eye	29.68 ± 0.72	36.14 ± 0.70
Body trunk	36.32 ± 0.85	39.55 ± 0.42
Head	36.11 ± 1.00	42.64 ± 1.01
hindlimbs	36.32 ± 1.07	41.94 ± 1.12
forelimbs	36.18 ± 0.79	41.39 ± 0.65
Ear	35.69 ± 0.79	40.05 ± 0.43

At 7:00, Teye was negatively correlated with STR (ρ = -0.70) and LIN (ρ = -0.72); ALH was positively correlated with Teye (ρ = 0.862) and Tbody (ρ = 0.81); solar radiation presented a negative relationship with the VCL (ρ = -0.68). At 14:00, BCF was negatively correlated with Thind (ρ = -0.70). At the same time of day, mean air temperature (ρ = -0.739) and Thead (ρ = -0.65) were correlated with membrane integrity. At 14:00, Tbody was negatively correlated with the number of sperm bound to the perivitelline membrane (ρ = -0.87). Maximum air temperature also correlated negatively with membrane integrity (ρ = -0.69).

4. CONCLUSION

In summary, stressful thermal conditions that could provoke body temperature increase would impair semen quality in collared peccaries. This study demonstrates for the first time that infrared thermography is a useful tool for early detection of a decrease in sperm metrics in this species.

Acknowledgements: