

BEHAVIOUR OF WHITE RHINO IN EX SITU STUDY: ethogram, time budget, and environmental factors



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INTRODUCTION

Understanding the ethology of White Rhino (*Ceratotherium simum*) remains a challenge due to the limited availability of detailed behavioral data of this species. *Ex-situ* and *in-situ* research are two complementary approaches used in biodiversity conservation.



OBJECTIVES

The study aims to fill this gap through a comprehensive analysis of the behavior of a group of white rhinos, the only one potentially reproductive in Italy.

- ❖ Ethogram
- ❖ Individual and group time budget
- ❖ Behavior and temperature relationship



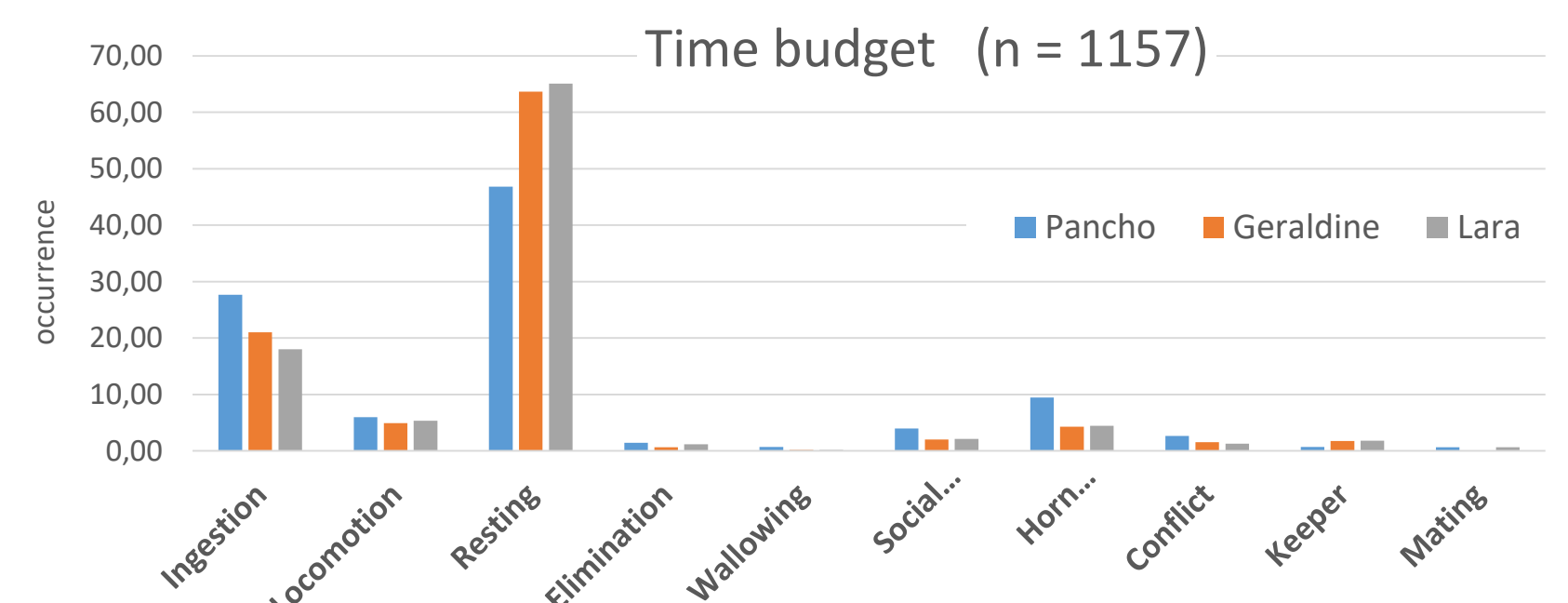
MATERIALS AND METHODS

- 3 rhinos: 1 male, 2 females (Lara ♀ 12 years old; Geraldine ♀ 13; Pancho ♂ 14)
- Le Cornelle Faunistic Park (Bergamo-Italy). Exhibit area: 2000 sqm
- October - December 2022
- 25 observation days
- *Scan sampling*, every 5 minutes, from 9:00 to 16:00
- 1557 scan events
- 37 behavioural modules (micro-categories), grouped into 10 macro-categories

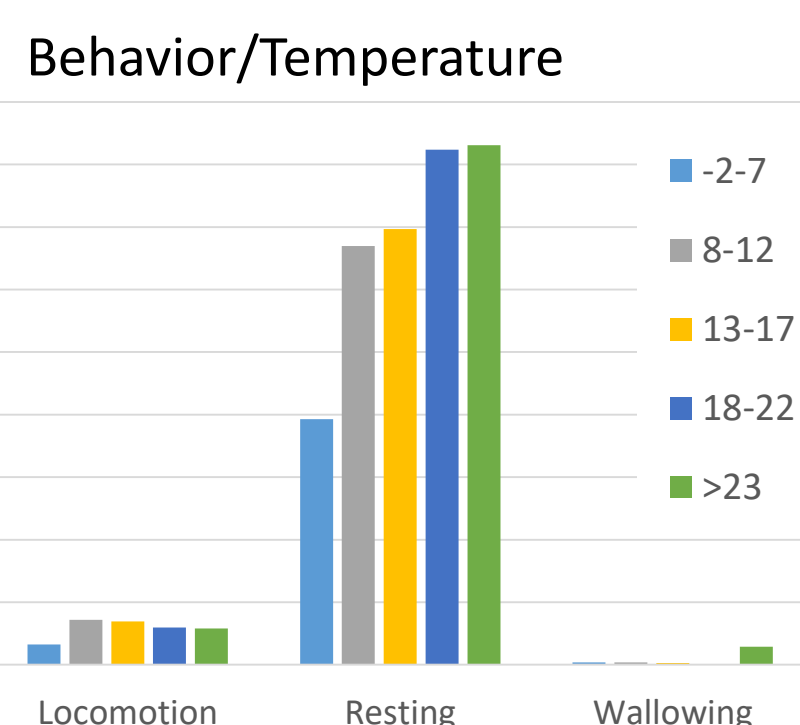
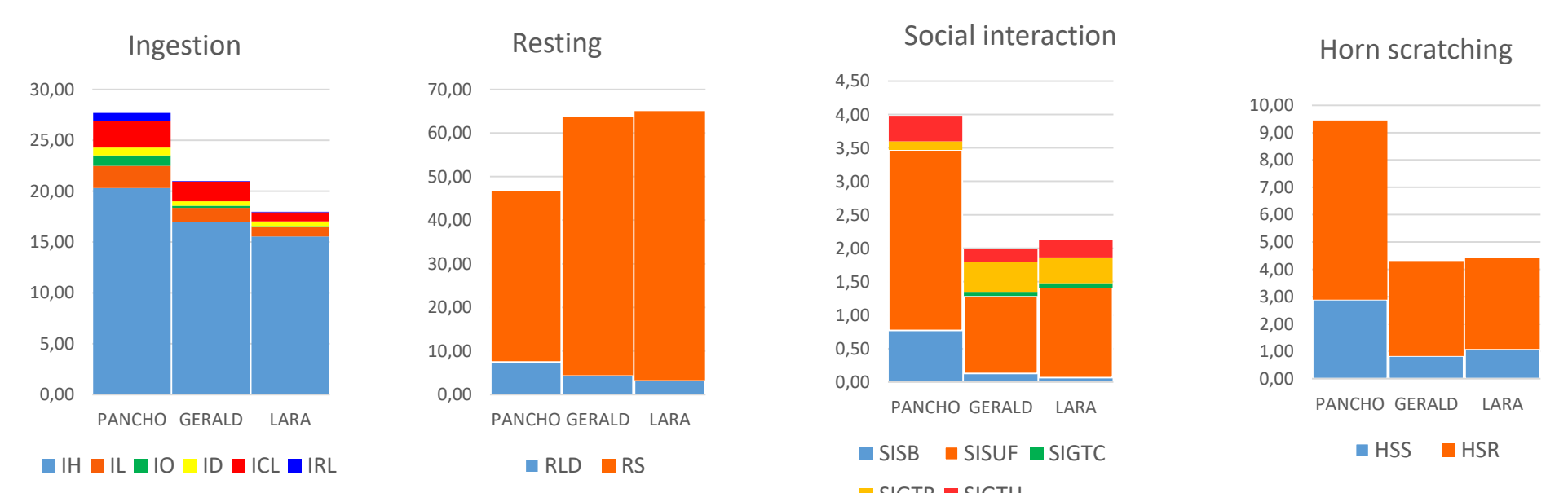
RESULTS AND DISCUSSION

| Macrocategory | Microcategory | Behavior | Code |
|-------------------------|---------------------------|---|-------|
| Locomotion (L) | walk | Moves slowly/walks | LW |
| | gallop | Moves quickly/runs | LG |
| | follow slow | Follows another one slowly | LFS |
| | follow fast | Follows another one quickly | LFF |
| | followed slow | Is followed slowly | LFWS |
| | followed fast | Is followed quickly | LFWF |
| Resting (R) | lying down | Is/rests lying down | RLD |
| | standing | Is/rests standing up | RS |
| Ingestion (I) | hay | Eats hay | IH |
| | leaves | Eats leaves | IL |
| | other | Eats other: fruit/vegetables/grass | IO |
| | drinking | Drinks | ID |
| | clay licking | Eats/licks dirt | ICL |
| | root licking | Eats/licks roots | IRL |
| | | Eats/licks roots | IRL |
| Elimination (E) | urinating | Urinate | EU |
| | defecation | defecates | EDF |
| Wallowing (W) | wallowing body | Rolls/takes a mud bath | WB |
| | wallowing horn | Wets its horn in the mud | WH |
| Social interaction (SI) | sniff body | Smells another's rino body | SISB |
| | sniff urine/faeces | Smells another's urine or feces | SISUF |
| | gentle touch coaching | Stands beside another rhino | SIGTC |
| | gentle touch face on body | Rests its head on another rhino | SIGTB |
| | gentle touch horn to horn | Touches another's horn | SIGTH |
| Horn scratching (HS) | stone/rock | Scratches its horn against a rock | HSS |
| | root | Scratches its horn against a root | HSR |
| Conflict (C) | threat | Threatens another with body movements and/or vocalization | CT |
| | threatened | Is threatened by another rhino | CTD |
| | chase | Chases/drives away another | CC |
| | chased | Is chased/driven away | CCD |
| | horn to horn | Clashes its horn against another rhino horn | CH |
| | fighting | Hits another with its horn and body | CF |
| Keeper (K) | interaction | Engages in activities/interacts with the keepers | KI |
| | distraction | Is attracted by the presence/movement of the keepers | KD |
| Mating (M) | mount | Mounts another rhino | MM |
| | mounted | Is mounted by another rhino | MMD |
| | copulation | Mates/copulates with another | MC |

ETHOGRAM
37 behavioural modules



Data indicates that the predominant macro-categories are: **Resting (58,8%), Ingestion (22,2%), Horn Scratching (6%), and Locomotion (5,4%)**. The results agree with those of a recent study conducted at North Carolina Zoo (Williams *et al.* 2023). Ingestion holds great significance for large herbivores like white rhinos, just as the act of resting in the shade during the hottest hours of the day. Regarding *locomotion* is well-documented that rhinos cover considerable distances each day. The frequent act of horn scratching is comprehensible due to the vital role played by the horn in rhinos' lives. Within these categories, χ^2 test revealed **significant differences between males and females**. Specifically, males exhibited greater *ingestion*, *social interaction*, and *horn scratching*, whereas females showed higher levels of *resting*. Male displayed more *social interaction* by approaching both females. These findings suggest distinct behavioral patterns between genders.



Statistical analysis was conducted to assess the significance of some macro-categories in relation to temperature variations. **Ingestion, Resting and Wallowing were statistically significant.** None of the macrocategories showed statistical significance concerning visitor density, suggesting that **the presence of visitors does not appear to disturb the rhinos.**

To construct the ethogram, the literature was integrated with personal observations (Sheil & Kirkby, 2018; Williams *et al.*, 2023; Beccalli M. 2023). These observations led to the identification of **37 behavioral modules** grouped in **10 macrocategories**. The resulting ethogram is a fundamental tool to investigate the ethological behavior of the group.

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