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# Livestock selective behaviour in natural grasslands challenges the concept of plant preference in the elaboration of a successful diet

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## Key Words

Diet selection, Preference, Grazing herbivores, Foraging behaviour, Grassland biodiversity.

## Introduction

Conciliating livestock production and conservation of grassland biodiversity is now an imperative. We propose that a way to reach that goal is to take advantage of the natural tendency of herbivores to exploit environmental heterogeneity. However, it would go against the well-rooted concept that mammalian herbivores have invariable preference for some plants. Preference was defined as being “what the animal select when given the minimum of physical constraints” (Parsons et al. 1994). But after decades of studies, the concept of preference remains particularly inefficient in predicting observed patterns of selection by herbivores (e.g. Newman et al. 1992; Parsons et al. 1994; Provenza 2006). We performed detailed descriptions of cattle diet composition and foraging strategy in highly diversified natural pasture of South Brazil. We present here preliminary results that seriously question the concept of plant preference.

## Methods

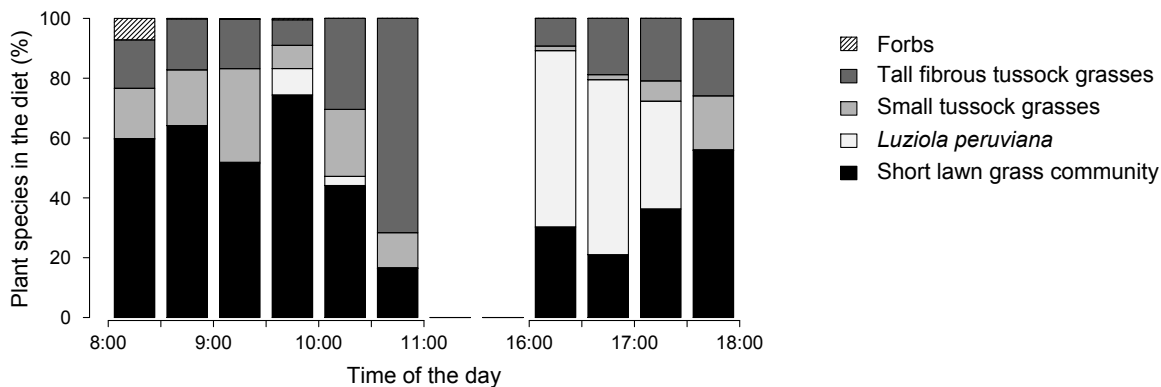
We used a 25 years old experiment conducted on 40 ha of unmodified natural pampa, South Brazil (lat 30°05'S, long 51°40'W), made up of more than 250 plant species. The experiment consists in 5 levels of forage allowance grazed by heifers between 2 and 3 years old. Details on the experiment can be found in Da Trindade et al. (2012). During the 4 seasons of 2012, 4 trained observers repeatedly monitored the foraging behaviour of 30 heifers, totaling 120 animal.days of observation. Monitoring consisted in recording, bite per bite, the plant species and plant parts consumed by the animal during the total duration of the morning and afternoon meals. We present here results for one individual grazing in a treatment with intermediate forage allowance (12 kg DM for 100 kg LW) during fall (April 2012). Observed bites were classified into 5 categories: 1- bites took from the short lawn grass community, 2- bites of *Luziola peruviana*, a highly palatable species encountered in flooded areas, 3- bites took on small (< 25 cm) tussocks, 4- bites more than 20 cm deep took on tall, fibrous tussock grasses and 5- bites of forbs.

## Results

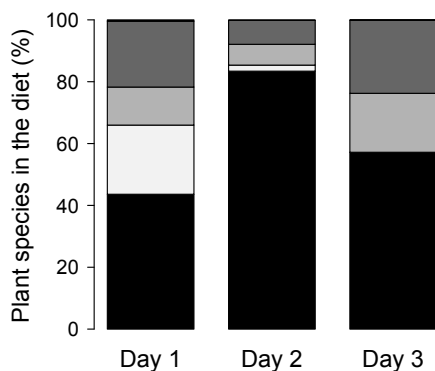
Figure 1 presents evolution of the plant species composition of the diet of the heifer over the morning and the afternoon meal. We can see clear modification in the pattern of short-term selection. The short lawn grass community dominated first part of the morning diet but strongly decreased by the end of the meal when large bites from tall fibrous tussock grasses became dominant. Forbs were only consumed during the first 30 min of the meal. *Luziola peruviana*, virtually absent from the morning diet, dominated first part of the afternoon diet but disappeared in late afternoon. The proportion of both lawn grasses and tussocks regularly increased along the afternoon meal. The pattern of diet selection by the heifer did not only change with time along the day, but also between days, as illustrated by the evolution of the daily plant species composition of the diet of the animal over 3 consecutive days (Fig. 2).

## Discussion

It is classical argument that the difference between observed plant species selection and supposed plant preference is due to the presence of physical constraints (e.g. Penning et al. 1997; Rutter 2006). A classically mentioned constraint is offer (composition of the plant species community), which would not allow the animal to meet its daily needs with a pattern of selection reflecting its preference. But this argument is not valid in the detailed case we present here. Indeed, offer in a 4 ha paddock with a stocking density of 1 animal per ha did not change in the time laps of one morning, or even of 3 days. Considering that offer, or other external physical constraints did not change over a single meal, evolution in the plant selection pattern reflected modification in the short-term preference. Physiological feedbacks, the need for balancing intake or



**Figure 1.** Evolution of plant species composition of the diet of a 2 years old heifer grazing unmodified natural pampa, south Brazil, on the 12/04/2012. Diet composition, presented for the morning and afternoon meals, was grouped by periods of 30 min. Forage allowance was 12 kg DM for 100 kg LW.



**Figure 2.** Evolution of the daily plant species composition of the diet of a 2 years old heifer grazing unmodified natural pampa, south Brazil, over 3 consecutive days (12-14 of March 2012). Forage allowance was 12 kg DM for 100 kg LW. See legend in Fig. 1.

synergetic interaction between the food items can explain these modifications of short-term preference. One can argue that preference is only relevant at the scale of the day. But we showed that the pattern of selection equally evolved from one day to the other, without significant modification of the offer.

## Conclusion

In complex grassland, trying to explain herbivores foraging behaviour based a concept (preference) only relevant in the theoretical case of the absence of constraints to access food looks particularly useless. Consenting that preference is not fixed but more likely dependents of the particular context the animal is facing will be of great help to understand mammalian herbivores foraging strategies.

## Acknowledgments

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## References

- Newman JA, Parsons AJ and Harvey A (1992) Not all sheep prefer clover: diet selection revisited. *The Journal of Agricultural Science* **119**, 275–283.
- Parsons AJ, Newman JA, Penning PD, Harvey A and Orr RJ (1994) Diet preference of sheep : effects of recent diet, physiological state and species abundance. *The Journal of Animal Ecology* **63**, 465–478.
- Penning PD, Newman JA, Parsons AJ, Harvey A and Orr RJ (1997) Diet preferences of adult sheep and goats grazing ryegrass and white clover. *Small Ruminant Research* **24**, 175–184.
- Provenza FD (2006) Postingestive feedback as an elementary determinant of food preference and intake in ruminants. *Journal of Range Management* **48**, 2–17.
- Rutter SM (2006) Diet preference for grass and legumes in free-ranging domestic sheep and cattle: Current theory and future application. *Applied Animal Behaviour Science* **97**, 17–35.
- Da Trindade JK, Pinto CE, Neves FP, Mezzalira JC, Bremm C, Genro TCM, Tischler MR, Nabinger C, Gonda HL and Carvalho PCF (2012) Forage allowance as a target of grazing management: implications on grazing time and forage searching. *Rangeland Ecology & Management* **65**, 382–393.