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GRAZING BEHAVIOR AND ACTIVITY PATTERNS BY FREE-GRAZING CATTLE IN THE PANTANAL REGION

S.A. Santos[1], C. Costa[2], L. V.A.S. Chalita[3], A.Pott[1], J. M. Alvarez[1] and A. G. Ortiz[1]

[1]Embrapa Pantanal, C.P. 109, Corumbá, MS, Brasil, 79320-900, sasantos@cpap.embrapa.br

[2]FMVZ-UNESP, Distrito Rubião Júnior, Botucatu, SP, 18618-000.

[3]IB-UNESP, Distrito Rubião Júnior, Botucatu, SP, 18618-000.

Abstract

A study of habitat selection and habitat use by free-grazing cattle was conducted in the Pantanal, from October 1997 to September 1999. Observation periods lasted 13 hours per day during three days in each month. The location and activity duration of each group of animals was recorded by continuous sampling. Rumination, walking and resting times were affected (P<0,05) by interaction between month and year and grazing time differed (P< 0,05) only between months. On average, cows spent 54.9, 29.6, 10.6 and 4.9% of their diurnal hours grazing, ruminating, walking and resting, respectively. The grazing time spent in each landscape unit was influenced (P<0,05) by interaction between month and year. The cows exploited more intensively the temporary ponds in 97/98 (26 min ha^{-1}) and the edge of ponds in 98/99 (23.2 min ha^{-1}). Therefore, the adequate grazing management practice may not follow fixed rules for the Pantanal.

Keywords: Habitat selection, grazing time, rumination time, intake rate, natural pastures.

Introduction

The Pantanal is a vast plain of 140,000 km^2, located in Central-Western Brazil. In this region, beef cattle rearing is the main economic activitiy. Farming systems are extensive and native forage is the principal feeding resource. In addition to cattle and horses, the area also supports populations of native ungulates. However, the region needs to develop sustainable grazing management practices to increase animal productivity and to maintain the integrity of rangeland ecosystems. According to Roguet *et al.* (1998), a better understanding of the animal vs vegetation interaction is needed to attain these objectives.

The quality and availability of native pasture in Pantanal vary from year to year and from season to season due to flood and dry periods (Adámoli, 1987). Hence, animal foraging strategies should change to cope with changing conditions. Considering that Pantanal has diverse habitats (landscapes units), the understanting of cow behavior patterns to locate and to ingest food is crucial to management practices and to evaluate both the distribution of impact of livestock on vegetation and the use of resources by animals.

The objective of this study is to examine cattle habitat selection and activity patterns in each month in the Nhecolândia sub-region, Pantanal, during two years.

Materials and Methods

The study was conducted at Nhumirim ranch, located in the Nhecolândia sub-region, Pantanal. All observations were made in an area of 143 ha, under continuous grazing (2.7 ha/animal), from October 1997 to September 1999. For the purpuse of this study, the landscape types were defined according to Pott *et al.* (1997): 1- semideciduous forest (SF); 2- forested savanna (FS); 3- arboreal savanna (AS); 4- open grasslands with predominance of *Axonopus*

purpusii and *Andropogon* spp.(OGA); 5 - open grasslands with predominance of *Elyonurus muticus* (OGE); 6- edge of permanent ponds (EP); 7- temporary ponds (TP); 8- temporary canals and lowlands (LW). The relative amount of each physiognomy available was determined by mapping, derived from aerial photographs and topography inventory techniques.

Forty-six cows were observed monthly. Direct observations were made during daylight time (from 05:00 to 18:00 h) for three days using continuous sampling sessions. The activities recorded in the field were combined into the following four general activities: grazing time; rumination time; resting time and walking. The starting and final time of each activity was determined taking into consideration 50% or more of the group in activity. The grazing time per area (GTA) was expressed as the average time spent grazing on a landscape unit per hectare described by El Aich and Rittenhouse (1988). Each group of cows was considered as one observation.

The daily intake through quantification of the components of ingestive behavior was estimated in August 1999. Bite rate and bite weight were estimated in some landscapes units. Bite rate was recorded by direct observation and bite weight by simulating the bite of the animal. Dry matter intake was determined according to Moore and Sollenberger (1997).

A general Linear Model analysis of variance was used to test differences in activity patterns and physiognomy use between years, months and their interactions. Analyses were performed using the Statistical Analysis System (SAS Institute, 1990).

Results and Discussion

Rumination, walking and resting times were affected ($P<0,05$) by interaction between month and year. Grazing time differed ($P< 0,05$) only between months (Fig.1). However, mean

grazing time spent in each landscape unit (Fig.2) was influenced ($P<0,05$) by interaction between month and year. Cows spent 54.9, 29.6, 10.6 and 4.9% of their diurnal hours (from 05:00 to 18:00) grazing, ruminating, walking, and resting, respectively.

Grazing generally occurred in three bouts (meals) during the day, with the most intensive being prior to dusk. Roguet et al. (1998) stated that the largest evening grazing bout may be considered as a core grazing period and that any required changes in grazing time are made preferentially at other times of the day. The times of starting in the morning and stopping after dark appear to be influenced by sunrise and sunset.

From October 1998 to September 1999 (98/99) there was inundation of some areas (January to June), different from the period from October 1997 to September 1998 (97/98). The cows exploited more intensively the temporary ponds in 97/98 (26 min ha^{-1}) and the edge of ponds in 98/99 (23.2 min ha^{-1}). These landscapes represent 3.1 and 3.3% of the total area and were used especially during the drier months (September, October and November). The OGA areas were grazed year round (mean of 243 min per day and 5.0 min ha^{-1}) and represent 49.6% of the total area. The marginal value theorem predicts that in a heterogeneous environment, animals graze on a rich patch longer than on a poor one (Charnov, 1976). On the temporary ponds and on the edge of ponds, occur cattle preferred species, such as 'capim-de-capivara'(*Hymenachne amplexicaulis*) and some hydrophilous species.

In August 1999, the animals used over 50% of the total time grazing (193 min) on OGA, 20% (77min) grazing on LW, 15% (58min) on the EP, 6.8% (26min) in TP and the rest of the time in AS (33min). The mean bite rate was 63 ± 7.0, 51 ± 10.5, 51 ± 10.5 and 45 ± 3.3 min^{-1} for OGA, LW, TP and EP, respectively. The mean bite weight was 0.40, 0.37 and 0.25 g dry matter (DM) for OGA, LW and EP, respectively. It was observed that bite rate and bite weight was

related to how easy it was to harvest the forage and the preferred species available. The estimation of mean daily forage intake was about 8 kg of DM. In fact, this technique does not provide an accurate estimation of intake because intake is influenced by several other factors.

Rumination generally occurred in two bouts during the day with the most intensive being in the morning, between 08:00 and 11:00 h. Over 32% of total rumination activity was spent in OGE, which constitutes 14% of the pasture area.

Resting time during the day depended generally on the sunrise time and climatic conditions and sometimes it was influenced by salt furnishing, mainly after some days of absence. Cattle usually lay down in specific areas as in the semideciduous forest (46.2%). This preference may represent predator-defense behaviour. Sometimes, cows preferred to lie down in arboreal savanna (23.1%) and in OGE areas (15.4%). This may be due the high abundance of haematophagous insects in the forested areas. Close to the sunset, it was observed that cattle moved to places near resting areas.

In conclusion, there is an interaction of month and year with activity patterns and physiognomy use. The grazing behaviour may differ in relation to the landscape scale, available foraging resources and climatic conditions. Thus, the adequate grazing management practice for the Pantanal may not follow fixed rules.

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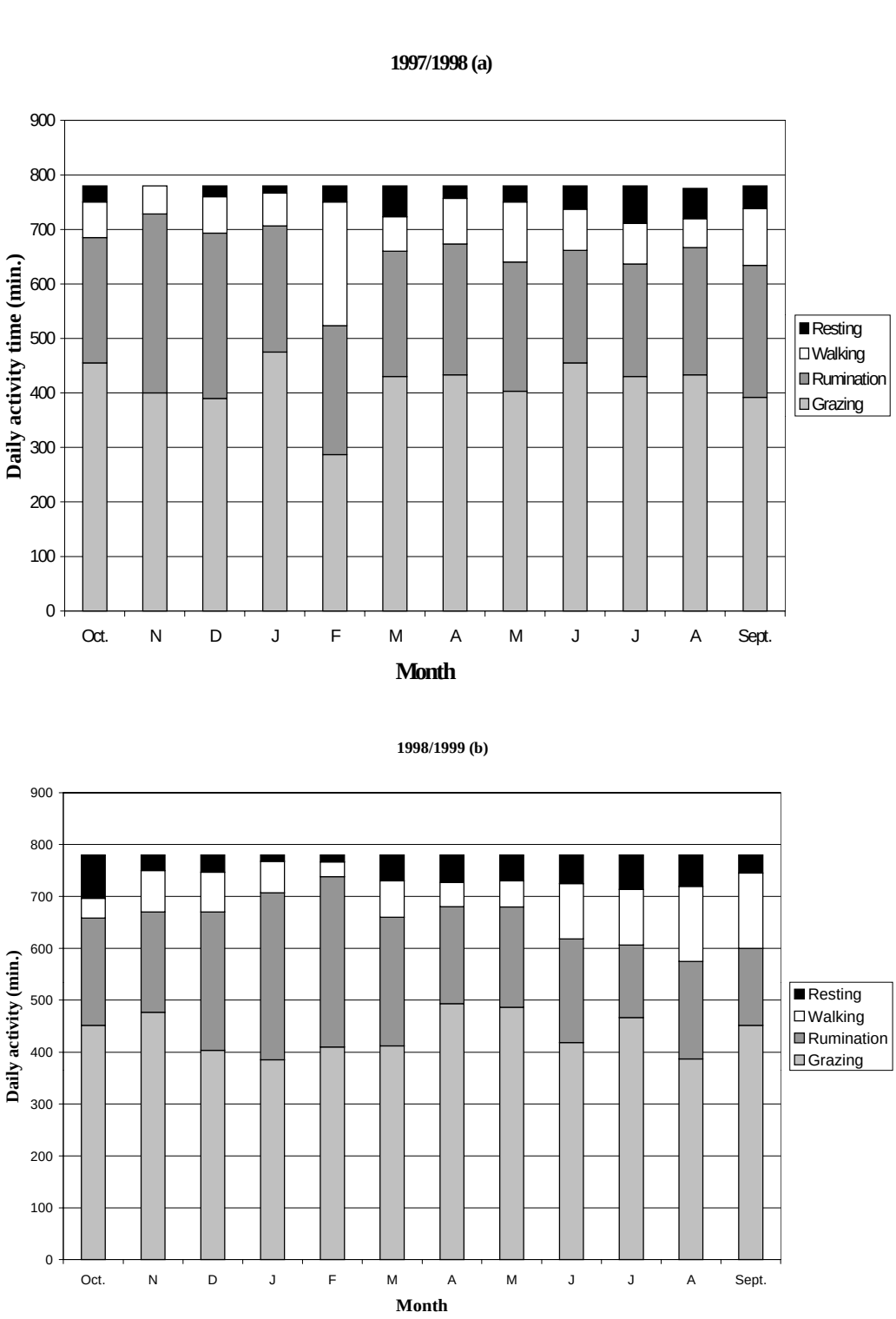

Figure 1 - Average daily activity time from 0500 to 1800 hours, from October 1997 to September 1998 (a) and October 1998 to September 1999 (b).

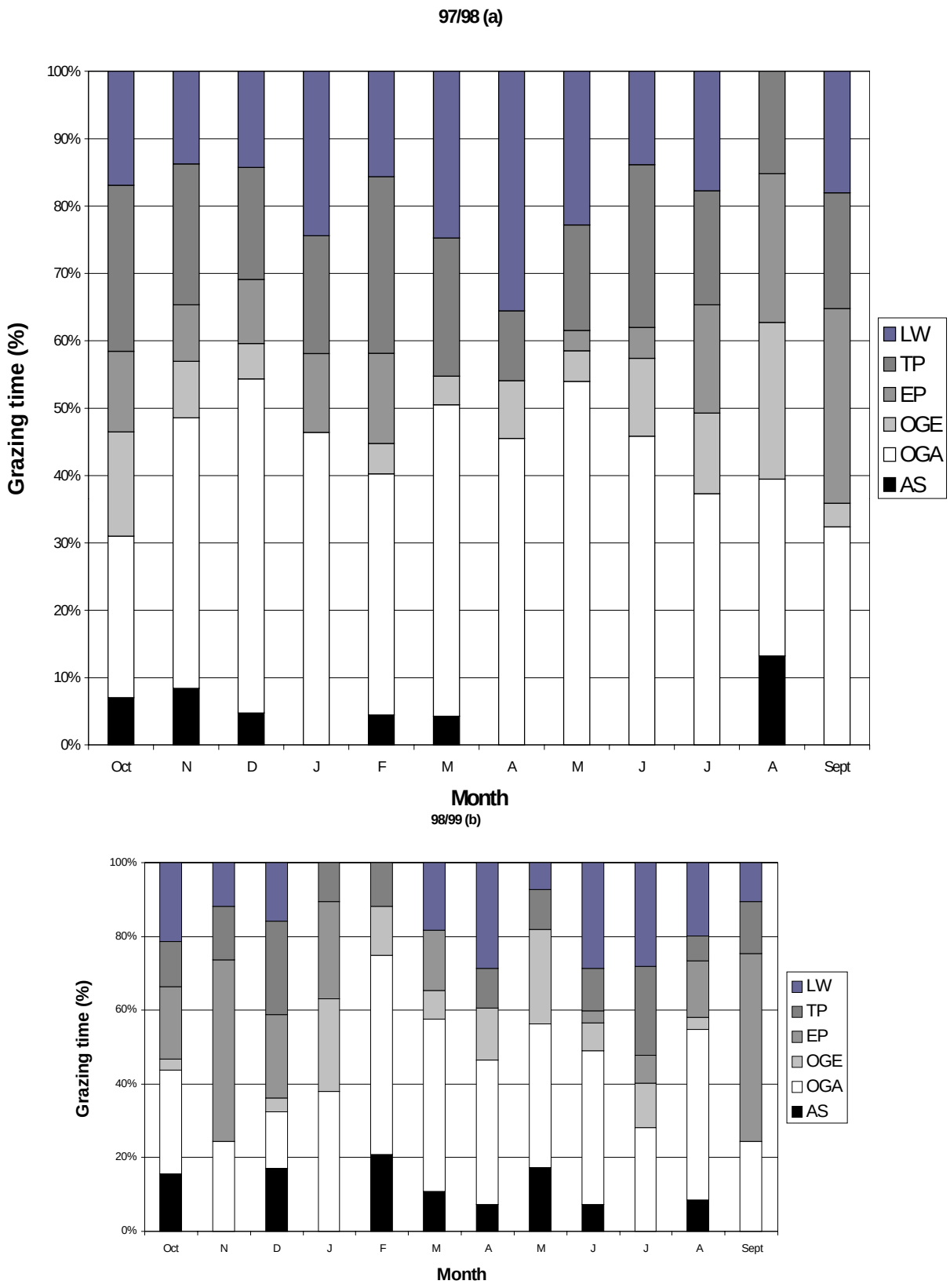

Figure 2. Physiognomy grazing time of cattle from October 1997 to September 1998 (a) and from October 1998 to September 1999 (b). LW = lowlands and temporay canals; TP = temporary ponds; EPP = edge of permanent ponds; OGE = open grasslands with dominance of *E. muticus*; OGA = open grasslands with dominance of *A. purpusii* and *Andropogon* spp; AS = arboreal savanna.