

## Foraging strategies of cattle and goats during the late-wet and dry seasons in Southern Zimbabwe

Z. Magadzire<sup>1</sup>, I.J. Gordon<sup>2</sup> and A.W. Illius<sup>3</sup>

<sup>1</sup>Matopos Research Station, P.Bag K5137, Bulawayo, Zimbabwe

<sup>2</sup>Macaulay Institute, Craigiebuckler, Aberdeen, AB15 8QH, United Kingdom

<sup>3</sup>ICAPB University of Edinburgh, Ashworth laboratories, King's buildings, EH9 3JT

**Introduction** The chances of different livestock species surviving from one season to another in a semi-arid savanna free-ranging system depends on their ability to adjust their foraging strategies to meet their nutritional requirements (see Laca and Demment, 1996). The animal strategies consist of relevant patterns of foraging behaviour which, when employed, can mitigate the effects of seasonal changes in abundance, quality, spatial distribution and form of different food resources, thus maximising intake rate of nutrients (Arnold, 1987). Cattle and goats are expected to have different feeding behaviours since they differ in both body size and mouth morphology.

A study was carried out at Matopos Research Station to investigate the foraging strategies of cattle and goats in a mixed-species grazing system under semi-arid conditions and how these changed with seasons. The study focused on the activity patterns and the utilisation of grass and browse, which are the main food resources on rangeland.

**Materials and methods** There were 3 treatments that were based on the abundance of grass and browse biomass: control, low-grass and low-browse, with 2 paddocks per treatment. Six castrated cattle and 6 castrated goats were observed per paddock during the late-wet (April-May) and dry (August – September) seasons of 1999. Animals were observed for 4.5 hours per day (2 hours in the morning and 2.5 hours in the afternoon) and they were penned overnight. A scan of all the animals was done every 10 minutes for 30 minutes, followed by focal sampling for 2 minutes per animal (that is, a total of 12 minutes of focal sampling for each animal species at a time). The records which were taken consisted of the following activities: drinking, ruminating, resting/idling, walking and standing, lying down and interacting. For focal sampling, the starting and finishing times were recorded to the nearest minute, the difference of which gave the duration of the activity.

Statistical analyses determined the effects of animal species, season and treatment on feeding time. To determine how browsing and grazing changed in relation to each other for cattle and goats under different treatments during the late-wet and dry seasons, log ratio analysis was used (Elston, 1996). Browsing time was the numerator with grazing time as the denominator.

**Results** During the late-wet season, grass biomass was 170, 69 and 120 kg per hectare (ha) in the control, low-grass and low-browse treatments, respectively. The dry season had 28, 15 and 27 kg per ha for the control, low-grass and low-browse treatments, respectively. Goats spent significantly more time feeding during the late-wet season than did cattle (Table 1,  $F_{1,119.23} = 7.70$ ,  $P = 0.006$ ; s.e.d. = 1.797,  $P = 0.05$ ). In the dry season the proportions for cattle and goats were similar.

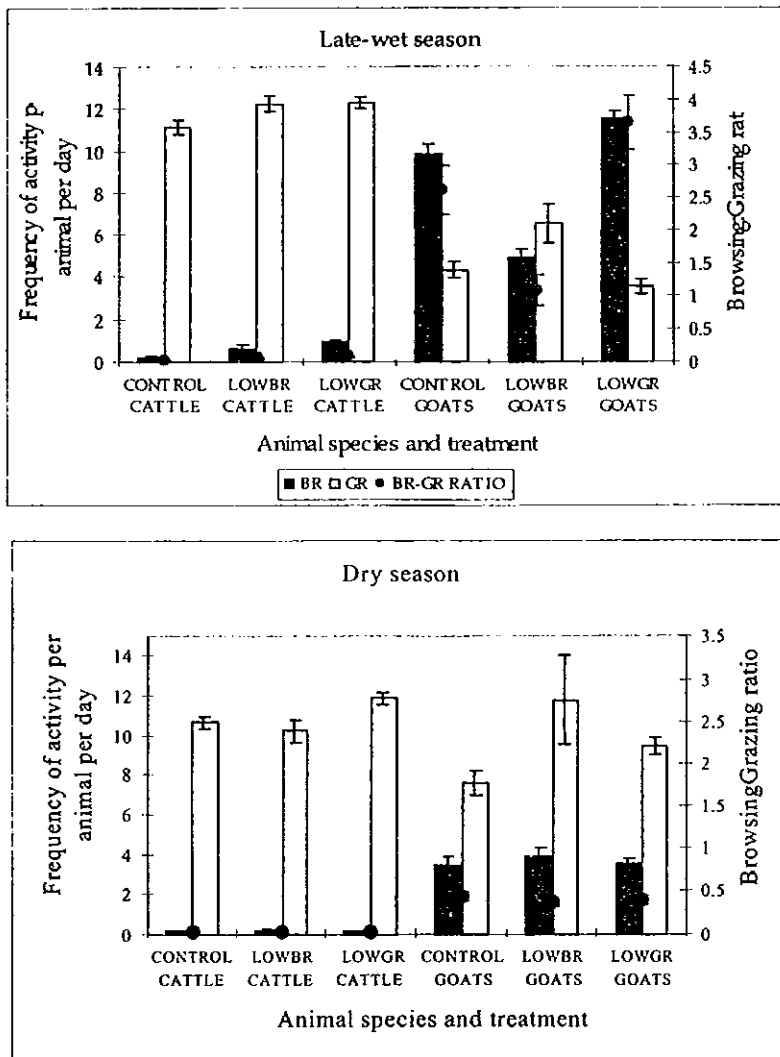
Table 1: Percentage (%) of time spent feeding by cattle and goats during the late-wet and dry seasons of 1999.

Season	Feeding time (Angular transformation of %)		Untransformed feeding time (%)	
	Cattle	Goats	Cattle	Goats
Late-wet	64.80	72.12	82	91
Dry	59.01	61.27	73	77
s.e.d.		1.797		

During the late-wet season, goats browsed more than they grazed, but the frequency of browsing was lower than grazing during the dry season due to limited availability of browse (Figure 1). However, cattle grazed more than they browsed in both seasons, resulting in significant differences in browsing to grazing ratios ( $F_{2,104.31} = 13.3$ ,  $P < 0.005$ ; s.e.d. = 0.06134,  $P = 0.001$ ). The availability of browse was central to the way in which the animals utilised browse and grass, particularly for goats.

There were no significant treatment effects on browsing or grazing time during the dry season due to limited browse biomass which resulted in lower frequencies of browsing (Figure 1,  $F_{2,104.31} = 23.15$ ,  $P < 0.0001$ ). During the late-wet season, the control and low-grass treatments had significantly higher ratios of browsing to grazing than during the dry season (s.e.d. = 0.1296,  $P = 0.001$ ).

Figure 1: Frequency of browsing and grazing for cattle and goats on different treatments in wet and dry seasons of 1999.



**Discussion** In the late-wet season, goats showed greater flexibility to the changes in browse biomass and invested more time in the relatively more available resource. The lack of response by cattle could be because the grass biomass was not limiting enough for them to shift to browse, or that they were restricted by the small size of the paddocks (1.875 hectares each). The results suggest that goats would be better able to survive under a range of rangeland conditions than would cattle.

**References**

Laca, E.A. and Demment, M.W. (1996). Foraging strategies of grazing animals. In: *The ecology and management of grazing systems*. (Ed. By J. Hodgson and A.W. Illius), pp. 137-158. Wallingford, UK, CABI International.

Arnold, G.W. (1987a). Grazing behaviour., *Ecosystems of the World. 17B. Managed Grasslands. Analytical Studies*. Elsevier Science Publishers B.V, Amsterdam, Netherlands. Pp. 129-136.

Elston, D.A. (1996). Assessment of preference among a range of options using log ratio analysis. *Ecology* **77**, 2538-2548.