

The browsing activities of goats, sheep and cattle on natural pasture in the sub-humid zone of West Africa

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Summary

The behaviour of goats, sheep and cattle grazing a shrub and tree savannah was studied during dry season (February to May), and cool season (October to January) in a sub-humid zone of West Africa. Grazing, browsing, walking, resting, ruminating and other activities were recorded every 15 minutes of the daily grazing time. Two animals of each species were followed by two observers during three consecutive days per month. When browsing the name and part of the concerned species were noted as well as the nature of browsing (eating fruits or leaves on the ground or directly on the tree) and the height reached was measured and the distance covered when following animals was recorded using a step counter..

The results show that cattle spent 27.6% of their time browsing in the dry season when goats and sheep spent 21.8% and 23.4% of their time, respectively, browsing during the same period. In the cool season, sheep and cattle decreased their time for browsing to 4.3% and 1.8%, respectively. Goats also decreased time for browsing to 16.0%, but continued to browse more than cattle and sheep. The browsing activity of cattle consisted of the direct browsing of leaves (78.7%) while that of goats and sheep consisted of both eating fruits (42.3% and 28.7% respectively) and browsing leaves (34.3% and 63.7% respectively). In the dry season, cattle (Soudanais Peul, 1.22 m at withers) browsed higher than West African Dwarf goats, (0.51 at withers) (1.2 m vs 1.0 m) that browsed in turn higher than West African Mossi sheep, (0.57 m at withers) (1.0 m vs 0.7 m). In the cool season, there were no significant differences in the browsing height between cattle and goats. In all the seasons, no significant differences were found in the number of browse species selected per day between the animal species.

Keywords: browsing, Burkina Faso, cool season, dry season, height reached

Introduction

In the sub-humid zone of West Africa in the Southern Sahelian zone, livestock is predominantly managed in traditional systems. The feeding of goats, sheep and cattle is mainly based on the exploitation of rangeland resources, which are subject to large quantitative and qualitative variations over the year (Slingerland et al., 1999; Petit, 2000). In this area leaves of shrubs and trees (browse) are regarded as important for the nutrition of grazing animals.

The contribution of browse species to the diet of free ranging ruminant animals in West Africa was reported to be between 70% and 75% (Guerin et al., 1988). The preference for browse species has been found to vary according to the study zone (Ngwa et al., 2000; Cissé et al., 2002). Goats browsed more than sheep, which consumes more browse species than cattle. Ngwa et al. (2000) concluded that goats spend 75% of their grazing time browsing while the reverse was true for sheep.

The objectives of this study were to compare the browsing behaviour of goats, sheep and cattle when grazing on natural pasture in two different seasons, to determine the nature of the browsing activity and to estimate the distance covered when following animals on natural pasture, the height reached when browsing and the number of browse species selected per grazing day.

Materials and methods

Study area and animals

The study was conducted in the South Sudanian zone of Burkina Faso between 11° and 12° N and 2°20' E and 5°30' W. Average annual rainfall varies from 900 to 1200 mm with a mean temperature between 25°C and 37°C. The vegetation is a shrub and tree savannah and a grass

layer dominated by the *Poaceae* family. Extensive agriculture (cotton, cereals and fruit trees), and livestock production are the most important human activities.

Three separate flocks of 30 goats, 25 sheep and 75 cattle were randomly selected. The goats were of the West African Dwarf breed and the sheep West African Mossi. The majority of cattle were crossbreeds of the Soudanais Peul zebu (*Bos indicus*) and the Bambara or Mere breed (*Bos taurus*). The average height at shoulder of the mature females was 0.51 ± 0.04 m for goats, 0.57 ± 0.04 m for sheep and 1.22 ± 0.08 m for cattle.

Browsing behaviour

Two mature females per species were randomly chosen every observation day and monitored by two observers, each following one animal. Each species was observed during three consecutive days per month in the cool season (October to January) and the dry season (February to May), giving a total of observation days per period. Observations were made during grazing time, varying from 9 to 10 hours per day. Behaviour activities were recorded in 15 min. intervals. The heights reached by a selected animal when browsing were measured and the distance covered when following animals on the pasture was recorded using a step counter.

Results and discussion

Table 1. Number of recorded grazing and browsing activities of goats, sheep and cattle in percentage of the total number of recordings per day and per season (LS means and SE).

Season Species	Dry season			Cool season			SE	Significance spp seas.	
	Goats	Sheep	Cattle	Goats	Sheep	Cattle			
Grazing	13.9 ^a	17.4 ^a	27.6 ^b	32.5 ^a	57.2 ^b	68.8 ^b	3.1	***	***
Browsing	21.8 ^a	23.4 ^a	27.6 ^a	16.0 ^a	4.3 ^b	1.8 ^b	1.7	***	***

^{a,b} Means within rows and season with different superscripts are significantly different ($P < 0.05$)

During the dry season, there was no significant difference between the browsing activities of the three animal species (Table 1). However, cattle grazed more than goats and sheep ($P < 0.05$). In the cool season, the number of recordings of browsing of goats was higher than that of sheep and cattle. Taking into account all periods in the study, goats browsed more than sheep (18.9% vs 13.9%) that browsed to the same extent as cattle (13.9% vs 14.7%). There was a greater proportion of browsing activities during the dry season than the cool season (24.3% vs 7.4%).

The browsing activities of goats consisted mainly of gleaning fruits, followed by browsing of leaves, while the reverse was observed for sheep and cattle (Table 2). The proportion of gleaned leaves was significantly higher for goats than for sheep and cattle ($P < 0.05$). Goats and sheep spent significantly higher proportion of time gleaning fruits than cattle. The proportion of browsing leaves was significantly higher for cattle than for sheep and goats. There was no significant difference between the proportions of time spent browsing fruits between the species.

Table 2. The proportion of gleaning leaves and fruits, and browsing leaves and fruits in percentage of the total number of recordings of browsing and gleaning during the study period (LS means and SE).

Species	Goats	Sheep	Cattle	SE	Significance
Gleaning leaves	11.5 ^a	2.0 ^b	2.0 ^b	1.8	**
Gleaning fruits	42.3 ^a	28.7 ^a	9.0 ^b	7.4	*
Browsing leaves	34.3 ^a	63.7 ^b	78.7 ^c	8.8	*
Browsing fruits	11.8 ^a	6.3 ^a	10.5 ^a	5.7	ns

^{a,b,c} Means within rows with different superscripts are significantly different ($P < 0.05$)

Table 3. Height (m) reached by goats, sheep and cattle, the number of browse species selected per day during each season when browsing and distance walked (km) (LS means and SE).

Season	Dry season			Cool season			SE	Significance	
Species	Goats	Sheep	Cattle	Goats	Sheep	Cattle		sp.	seas.
Height	0.9 ^a	0.7 ^b	1.1 ^c	1.0 ^a	0.6 ^b	1.0 ^a	0.04	**	**
Number	5 ^a	5 ^a	6 ^a	2 ^a	2 ^a	1 ^a	0.3	NS	***
Distance	3.3 ^a	3.4 ^a	9.0 ^b	3.9 ^a	3.4 ^a	6.2 ^b	0.3	***	*

^{a,b,c} Means within rows and season with different superscripts are significantly different (P<0.05)

From the results in Table 3 it appears that sheep and cattle browsed higher in the dry season than in the cool season. In the dry season cattle browsed higher than goats and the goats browsed higher than sheep. However, in the cool season there was no significant difference between the height reached by goats and cattle. The number of browse species selected was not significantly different between animal species but significantly different between seasons, as more browse species were selected during the dry season than in the cool season. In both seasons the distance recorded with cattle was higher than that of sheep and goats

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