

The use of natural pasture in the Sahelian zone of Burkina Faso by cattle, sheep and goat and their grazing behaviour

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Summary

A study was conducted in the Sahelian zone of Burkina Faso with the aim to estimate behaviour of cattle, sheep and goats on natural pasture. A herd of cattle and flocks of sheep and goats belonging to farmers were followed during two consecutive days per month from May 2003 to April 2004, and their activities were recorded regularly every 15 min, as well as the type of pasture used. There was a decline in the feeding activities of all animal species from rainy to dry season, in relation with the decrease in forage available. This decline was more important for cattle (72% to 39%) that relied on herbaceous plants for feeding, while sheep and goats made a shift in the feeding activities from grazing to browsing in dry season.

Keywords: grazing behaviour, cattle, sheep, goat, natural pasture

Introduction

The Sahelian zone of Burkina Faso covers a significant area of around 1.5 million ha and is occupied by the Fulani ethnic group known as transhumant pastoralists specialised in ruminant production. However, the productivity of the pasture in this area is low compared to the number of animal presents. The stocking rate is estimated to be almost 760000 Tropical Livestock Units (TLU) compared to 293 600 TLU potential stocking rate based on herbaceous production (MRA, 2000). Among the studies on pasture in the Sahelian zone of Burkina Faso, little information exists on how grazing animals select their diets and habitat in such ecosystems. Such knowledge is needed for profitable animal production and the determination of the ecological impact of herbivores on pasture vegetation. The objective of this study was to determine grazing behaviour and pasture use by sheep, goat and cattle in fluctuating conditions of forage availability.

Materials and methods

The study was undertaken in the village of Tongomayel, in the Sahelian zone of Burkina Faso. The rainy season occurs from June to September with an annual rainfall ranging from 400 mm to 600 mm, followed by a long dry season from October to May.

A herd of 22 cattle of Zebu type with adult weights ranging from 250 to 300 kg, and two flocks, one of 25 sheep and another of 34 goats (25 kg and 30 kg adult weight for goats and sheep respectively) were studied on pasture.

Each animal species was followed during three consecutive whole days per month from June 2003 to April 2004. This period was divided into three seasons: rainy season (June to September), post-rainy season (October to December) and dry season (January to April). Two mature females were randomly selected each observation day and their activities recorded by one observer per animal every 15 minutes.

While browsing, the species and plant parts eaten were identified and feeding time browsing each specie was estimated. The height reached by each specie when browsing was identified and measured using a tape meter and the type of pasture exploited was noted.

The study area was mapped after photo-inter[and each pasture type was described by an inventory of woody flora and an estimation of herbaceous biomass and it's dynamic. Three random locations were chosen and a surface area of one hectare was set in each vegetation type. Individual trees and shrubs were counted and for the herbaceous cover, 10 random quadrates of 1m² were cut in October and regularly every decade.

Results and discussion

Woody vegetation composition and variation in herbaceous biomass

The herbaceous biomass decreased very quickly after the optimum stage of vegetation and the decline was more stressed in some pasture types than the others (Figure 1), in relation to the level of optimum production observed in October, and the grazing pattern in rainy season, as the area was opened to pasture.

The potential production was 741±51 kg dry matter (DM)/ha in tiger bush, 1609±193 kg DM/ha in sparse woody steppe, 1958±128 kg DM/ha in shrubby steppe and 3493 ± 227 kg DM/ha in hollow pasture. The herbaceous layer was largely dominated by *Zornia glochidiata* and *Brachiaria sp.* in the steppes, *Microchloa indica* in tiger bush and *Panicum laetum* in hollow pasture. The disappearance rate varied from 76% in hollow pasture to 83% in shrubby steppe pasture in January. In tiger bush pasture and in sparse woody steppe, a disappearance rate of 78% and 83% were of observed early in November and December respectively. The sharp decline in herbaceous biomass after the rains is typical of Sahelian pastures, and influences greatly the behaviour of ruminant species on pasture.

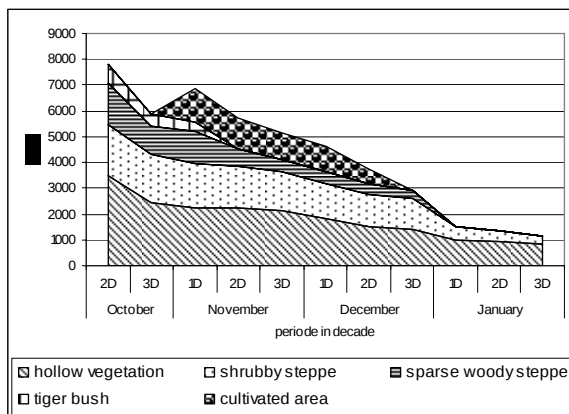


Figure 1. Evolution of herbaceous biomass in post rainy and dry seasons

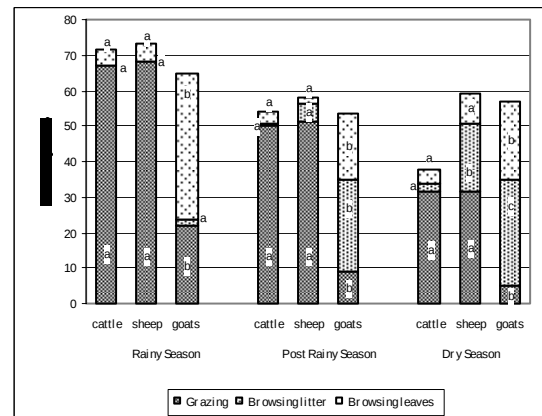


Figure 2. Feeding activities for cattle, sheep and goats in different seasons (no of recording of activity in % of total no of recording)

Table 1 shows the density of plants per hectare, the number of woody species recorded per pasture type, the contribution of species that are browsed by animal and the dominant species. Overall 42 woody species were found in the range and almost all were browsed either for their leaves and/or fruits.

Exploitation of pasture resources

In rainy season, the animals grazed mainly on hollow or tiger bush pasture. During the post-rainy season, they fell back on cultivated areas after the crops were harvested to feed on crop residues, especially millet straw. This is fundamental for these areas that benefit from dung left by animals as organic fertilizer. In the dry season, they used alternatively all the area and preferentially hollow and tiger bush, searching for litter (leaves, fallen fruits) of browse species.

In all seasons, the herders had an important rule when grazing paths was selected. Apart from sheep, which were left alone on pasture ¹⁴³ rainy and dry seasons, the animals were under the control of herders. This was more stressed in rainy season, to avoid crop destruction by animals and in the dry season, to target areas where there was still fodder available and to prevent the animals to walk very long distances avoiding loss of energy, as the animals at this period are very weak.

Table 1. Characteristics of the woody flora

Pasture type	Plant density (no/ha)	no of species	Browse Dominant species species (%)
Shrubby steppe	222 ± 67	15	95.8± 4.2 <i>Balanites aegyptiaca</i> <i>Acacia nilotica</i>
Sparse woody steppe	517 ± 186	27	87.2 ± 2.7 <i>Acacia Senegal</i> <i>Boscia senegalensis</i>
Hollow pasture	1051 ± 66	35	83.0± 3.7 <i>Guiera senegalensis</i> <i>Combretum micranthum</i>
Tiger bush	1590 ± 283	25	86.3 ± 2.7 <i>Pterocarpus lucens</i> <i>Combretum micranthum</i>

Grazing behaviour and browsing height

The overall feeding time decreased from the rainy season to the post rainy season and the dry season: 72%, 54% and 38% for cattle, 73%, 58% and 59% for sheep and 65%, 54% and 57% for goats in respective seasons (Figure 2).

In the rainy season cattle and sheep spent most of their time grazing, while goat preferentially browsed leaves. Browsing litter was a marginal activity for all animal species at this period as most of trees were in the foliation stage. In post-rainy season, grazing was still the most important activity of cattle and sheep due to the abundance of crop residues at this period. In the dry season, sheep showed interest for litter as well as leaves for browsing.

In general, the time devoted to browsing (leaves and litter) was almost stable for cattle (4.5%, 3.9% and 6.6% in the same seasons) and they were eating preferentially *Guiera senegalensis*. For sheep and goats, the time spent browsing increased in the dry season (4.8%, 6.4% and 28% for sheep and 43%, 44.6% and 52% for goats for rainy season, post-rainy season and dry season respectively). Sheep selected mainly *Balanites aegyptica* litter, *Bauhinia rufescens* fruits and *Guiera senegalensis* in dry season. Goats had a wide range of species browsed in all seasons and *Acacia senegal* (leaves and fruits) was the most preferred. These results confirm the browse preference of goats, herbaceous preference of cattle and the intermediary behaviour of sheep between these two animal species as reported by others authors (Dicko & Siken, 1992; Ngwa et al., 2000)

Goats were able to browse at a mean height of 1.65 m, higher than the height reached by cattle (1.47 m) and sheep (0.87 m). Cattle could reach the maximum height of 1.90m, goats 2.10m and sheep 1.17m.

Apart from feeding, resting and ruminating activities increased with the course of the seasons for all animal species and tended to substitute the feeding activities. Cattle rested about 6 times longer in the dry season than in the rainy season due to limited fodder availability and high temperatures. In all animal species, ruminating was less frequent in the rainy season (Table 2). The time spent watering did not vary among seasons and between animal species. Watering was influenced by the herder and did not show the natural behaviour of the animals.

Table 2. Some behaviour activities of cattle, sheep and goats on pasture according to season (number of recordings of the activity in % of total number of recordings per observation day).

Activities	Rainy season			Post rainy season			Dry season			SE
	Cattle	Sheep	Goat	Cattle	Sheep	Goat	Cattle	Sheep	Goat	
Walking	17.7 ^a	7.7 ^b	15.4 ^a	16.7 ^{ab}	11.9 ^a	20.9 ^b	17.6 ^a	14.2 ^a	15.2 ^a	1.23
Watering	3.6 ^a	3.5 ^a	3.3 ^a	2.8 ^a	2.3 ^a	2.7 ^a	4.8 ^a	2.9 ^b	2.8 ^b	0.23
Resting	4.6 ^a	9.8 ^a	11.6 ^a	17.2 ^a	16.4 ^a	16.4 ^a	22.9 ^a	15.3 ^{ab}	11.3 ^b	1.73
Ruminating	2.5 ^a	5.8 ^a	4.7 ^a	9.2 ^a	11.4 ^a	6.3 ^a	16.8 ^a	8.2 ^b	13.6 ^{ab}	1.48

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

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