

Grazing behavior of the endemic Lagune cattle in the sub-humid Savannahs of Benin

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Abstract. The indigenous Lagune, a breed tolerant to trypanosomiasis, is an excellent candidate to meet the ongoing environmental changes sustainably. This cattle breed could be kept like small ruminants, tethered in grasslands, or free grazing. A study was conducted to assess the grazing behavior of Lagune cattle under the two grazing systems to identify the best systems for sustainable production and conservation of the breed. For this study, four Lagune cattle farms, 02 under free-roaming and 02 others in the tethered system, were selected in the original belt of the Lagune cattle, the agro-ecological (AEZ) zones of Valley and Pobe. The step-point method was used to assess plant species diversity in grazing lands. Three (03) cows per farm were monitored while grazing for 03 consecutive days. The grazing itinerary and grazing activities were registered to allow the calculation of grazing length and duration. The most consumed plant species were identified. Results showed that 133 plant species belonging to 27 families were recorded in the grazing lands in both studied AEZs. Animals walked longer per day ($p < 0.0001$) in the free grazing system (7.07 ± 1.26 km) than in the tethered system (1.77 ± 0.59 km). On the contrary, grazing duration was higher ($p < 0.0001$) in the tethered system (7.88 ± 1.31 h). The Lagune diet consisted mainly of herbs; 23 forage species from 14 families were grazed. Most of the species belong to the families of Poaceae (34.78%), Convolvulaceae (8.7%), and Euphorbiaceae (8.7%). The study suggests free grazing allows better utilization of the forage species available in grasslands. Further studies could investigate diet selection by the indigenous Lagune cattle and the nutritional balance of the animals.

Introduction

Today's challenge in animal production is finding resilient breeds that can adapt to dietary restrictions and diseases. The indigenous Lagune cattle are a good candidate in this context. It is a dwarf breed well adapted to extensive farming conditions, and the meat is appreciated for its tenderness (Salifou et al., 2013; Kassa et al., 2016). Like other taurine breeds, the breed is tolerant to trypanosomiasis and, therefore, could adapt to tsetse fly bites in wetlands. Recent work has revealed the gradual dilution of this genetic type due to uncontrolled crossbreeding with Zebus in farms looking for crossbred animals that produce more milk (Ahozonlin et al., 2019). Grasslands are the primary source of forage for the endemic Lagune cattle. There is an urgent need for Lagune cattle conservation. The breed is kept in two grazing systems, tethered or left free grazing in grasslands (Koura et al. 2022). To sustainably conserve this breed, the first step is to understand the behavior of this breed, particularly the grazing behavior. Understanding the use of pastures by this breed would make it possible to define a sustainable strategy for pasture management and improving animal productivity. A study was conducted in the sub-humid savannahs of Benin to assess the grazing behavior of Lagune cattle under their traditional grazing systems.

Methods and Study Site

The study was conducted in the sub-humid Savannahs of South-East of Benin. Two farms in free-roaming and 02 others in the tethered system were selected, in two agroecological zones (AEZs Valley and Pobe). **Indeed, one farm in free-roaming and one in tethered system were chosen in each agroecological zones.**

The common grazing lands in each farm were identified. The step-point method was used to assess species diversity in three different locations in the grazing lands of each farm. Data was collected in the 12 grazing lands, in plots of 1000 m², considering 300 step points, as described by Hardy and Walker (1991). Vouchers were produced for plant species name identification at the “Herbier National” of Benin. Then, three cows were monitored in each farm for three consecutive days to assess grazing itinerary and patterns. Grazing itineraries were recorded using a GPS (GARMIN 64s). Animal activities were appraised through 5-min interval recordings (Zampaligre and Schlecht 2017) during the grazing day and classified per type of activity (% of animals feeding, walking, or resting). Means of the recorded parameters were calculated and compared between the grazing system and the AEZs using the GLM procedure in the software SPSS statistics version 26.

Results and discussion

Botanical composition of grazing lands

Lagune cattle within the free-grazing (FG) system moved far from the stable for grazing around habitations, in fallow lands and oil palm trees groves in Pobe AEZ, and mainly in lowlands in Valley AEZ. In tethered (TT) systems, animals were often tethered in the oil palm trees groves, close to the stable. In the two areas, 133 plant species belonging to 27 families were recorded, similarly to previous findings in these areas by Aboh et al. (2009). Poaceae (16%) and the Fabaceae (16%) were the most represented families, followed by the Rubiaceae (14%) and the Asteraceae (13%) in the AEZ of Pobe. In the Valley AEZ, the Poaceae (26%), followed by the Euphorbiaceae (20%) and the Fabaceae (16%), were the most representative families. *Panicum maximum* (14.17%), *Mollotus oppositifolius* (10.08%), *Mariscus cylindristachyus* (10.58%) and *Sporobolus pyramidalis* (12.89%) were the most dominant plant species in Pobe AEZ. On the other hand, *Mariuscus cylindristachyus* (15.49%), *Sporobolus pyramidalis* (13.54%), *Tridax procumbens* (10.21%), *Brachiaria falcifera* (10.05%) were the most dominant in Valley.

Daily grazing pattern

Animals walked longer ($p < 0.0001$) distances along the grazing lands in the FG systems (7.07 ± 1.26 km per day) versus only 1.77 ± 0.59 km per day in the TT one. However, the animal spent more time ($p < 0.0001$) grazing in TT (7.88 ± 1.31 h) than in FG (4.65 ± 0.14 h). Lagune cattle commonly grazed from 9 am to 4.30 pm.

Foraging was the primary activity in both feeding systems (Zampaligre et al. 2017), with a mean daily foraging time of 224.84 ± 24 min. Animals rested at midday when the heat was at its peak. The duration of grazing varied significantly ($p < 0.001$) according to the grazing system and zones. Daily foraging time was higher in FG than in TT systems (Fig. 1). Indeed, foraging time represented 56.05% and 72.34% of grazing time in Valley and Pobe AEZs, respectively. In addition, the activity resting also held a significant proportion in the TT systems, which seemed to be replaced by moving/walking in the FG system. Consequently, animals in FG drink a lot, while that tethered chew more.

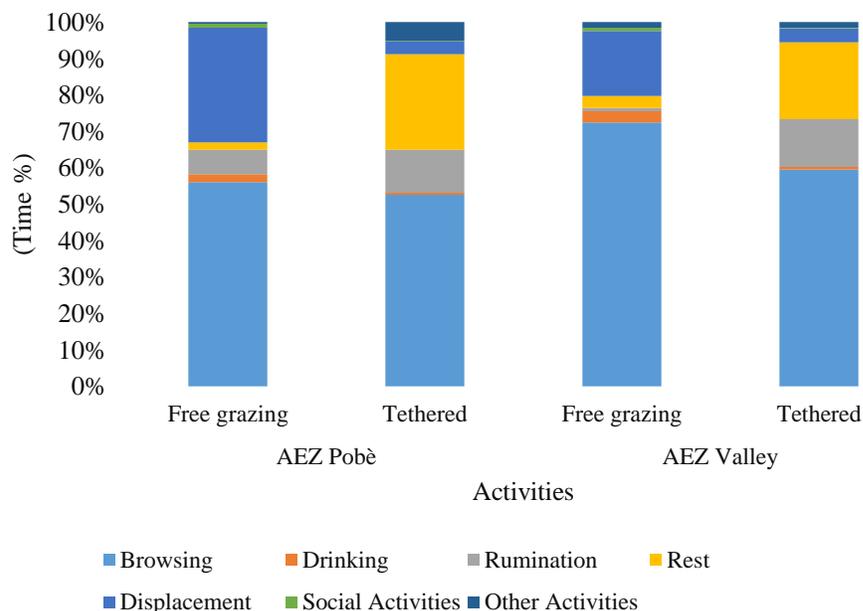


Figure 1. Grazing pattern by Lagune cattle in the sub-humid savannahs of southern Benin

Most consumed plant species

The Lagune cattle diet consisted mainly of herbs; 23 forage species from 14 families were grazed (Table 1). Most of the species belong to the families of Poaceae (34.78%), Convolvulaceae (8.7%), and Euphorbiaceae (8.7%). Grasses contributed significantly ($p < 0.001$) less to the diet in the FG system (59.84%) than in TT one (70.70%). *Panicum maximum* (16.22%) and *Mariscus cylindristachyus* (12.32%) contributed the most to the diet.

Table 1. Most consumed forage species by Lagune cattle in Pobe and Valley agro-ecological zones

Scientific names	Families	Life form	Local names	ZAE Pobe	AEZ Valley
Trees					
<i>Eleais guineensis</i>	Arecaceae	Ph	Deman (F)		
Grasses					
<i>Andropogon gayanus</i>	Poaceae	H	Sonore (P);	-	+
<i>Brachiaria falcifera</i>	Poaceae	Th	Cakate (P)	+	+
<i>Digitaria horizontalis</i>	Poaceae	Th	Tamataiji (P)	+	+
<i>Finger millet indica</i>	Poaceae	H	Wùcigaagare (P)	+	+
<i>Imperata cylindrical</i>	Poaceae	Gr	Soweje (P)	+	+
<i>Mariscus cylindristachyus</i>	Cyperaceae	H	Ayare (P)	+	+
<i>Panicum maximum</i>	Poaceae	H	Gayéri (P), Weko (F)	+	+
<i>Pennisetum pedicellatum</i>	Poaceae	Th	Bulune (P)	+	+
<i>Sporobolus pyramidalis</i>	Poaceae	H	Seraji (P)	+	+
Legumes					
<i>Boerhavia diffused</i>	Nyctaginaceae	np	Terena (P)	+	+
<i>Centrosema pubescens</i>	Fabaceae	Imp	Ayikoun gbéton (F)	+	+
<i>Cleome Viscosa</i>	Cleomaceae	Th	Agbodokaya (F)	-	+
<i>Commelina benghalensis</i>	Commelinaceae	Th	Lincakɔɔ (P)	+	+
<i>Euphorbia heterophylla</i>	Euphorbiaceae	Th	Gold (Y)	+	+
<i>Ipomea aquatica</i>	Convolvulaceae	Th	Dɛlbi (P)	-	+

<i>Ipomoea involucrata</i>	Convolvulaceae	Th	Kolikpa (F)	+	+
<i>Mallotus oppositifolius</i>	Euphorbiaceae	pm	Kise kise (F)	+	+
<i>Mitracarpus hirtus</i>	Rubiaceae	Th	Godoko (F)	+	+
<i>Sida acuta</i>	Malvaceae	Th	Gawetii(P)	+	+
<i>Talinum triangular</i>	Talinaceae	nph	Glassé man (F)	+	+
<i>Tridax procumbens</i>	Asteraceae	Ch	Hladogbo (F)	+	+

F: Fon, P: Peulh, Y: Yoruba, Th: Therophytes, mp: Microphanerophytes, H: Hemicryptophytes, nph: Nanophanerophytes, Ch: Chaméphytes, Lnp: Lianes nanophanérophytes. (+): Presence of the species in the corresponding zone and (-) absence of the species in the zone.

Conclusions

The study suggests that Lagune cattle are mainly grazers, and free grazing allows better utilization of the forage species available in grazing lands. Further studies could investigate diet selection by the indigenous Lagune cattle and the nutritional balance of the animals.

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