previous wet season. To achieve approximately 70% pasture utilization, stocking rate was increased by reducing the paddock size on day 3 and adding animals on day 8 which grazed the area until the end of the experiment. The animals had free access to dry lick with 30% urea and consumed 195 g per animal per day. Botanical composition of the reduced paddock, as well as grass densities and characteristics were assessed at the beginning of the experiment. Defoliation of 75 plants per species of the reduced paddock was measured every second-day to provide a defoliation rate for each species. The significance of the difference in chemical, structural and fracture properties between grass species was determined using ANOVA.

Results and discussion

Total pasture utilization reached 70% on day 13 (Table 1). Starting and ending biomass were 2238 and 576 kg DM ha^{-1}, respectively. The results confirm that with increasing pasture utilization, the defoliation rate of grasses varied among species. *Bothriochloa pertusa* (Bp) was the preferred species, with the highest levels of utilization after 5, 7 and 13 days. This species had the highest leaf/stem ratio and basal area ($P \leqslant 0.05$), and intermediate stem tensile resistance, stem density, bulk density and plant height. These characteristics probably allowed the steers to achieve high nutrient intake rates. The steers avoided *B. ewartiana* possibly due to its tough stems and low leaf/stem ratio.

Conclusions

In this tropical pasture the steers heavily grazed the preferred species at low to intermediate levels of overall pasture utilization (10 to 38%). In order to increase the utilization of less preferred species it was necessary to achieve high levels of pasture utilization (60 to 70%). The animals prefered species that form dense leafy patches and avoid species with tough stems of low leaf/stem ratio.

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Configuration of livestock rearing areas in order to maintain the stability of forage systems considering the biophysical hazards of humid tropical climates – Example in French Guyana

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Introduction

At the time of an agriculture development program during the 1970s in French Guyana, cow-calf systems were set up where productivity relied on intensification of grazed pastures. Besides the difficulties of adapting such systems to an environment little understood at that time, breeders and technical staffs had to face a number of biophysical hazards. The floral composition of the grassland proved to be very fragile. Several species were very invasive. Moth attacks frequently contributed to the defoliation of some areas. Rainfall levels were irregular more often than expected causing a slowing down of the growth of herbaceous species during long dry seasons (occurring more and more frequently). High levels of rainfalls reduced the pasture areas (sullied grass). Sandy soils increased the drought effects and paradoxically, because of a deep layer of underground clay, drenching increased after heavy rains. Nevertheless, the use of inputs (fertilizers, pesticides) and of mechanical operations allowed continuous pasture production. But the combination of hazards and financial load (high price of inputs and equipments) has caused breeders to consider the possibility of modifying their forage system in order to sustain its operation (Huguenin, 2008).

Materials and methods

To conduct and direct his production system, the breeder considers i) his territory, ii) his operation, iii) the herd management and the feeding needs, iv) the state of the grassland. The purpose is to achieve production objectives but also to build an estate that gets social acknowledgement in vocational and family areas. Our study dealt with the analysis of consistency between these different components of the management of a production system, which required the design of a functional scheme. To that purpose a production system jointly viewed between a biophysical and an organization system was used. (Duru and Hubert, 2003).

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The monitoring implemented on 7 farms was a data set of 3200 cattle divided in 50 groups on 1300 ha (200 plots). Multifacorial analysis (AFC H&S) included variables on: i) land/plot planning (dirt roads, plots accessibility, corral, permanent water hole, number of grassy plots/area (STH), plot size/STH), ii) herd organization (number of groups (NL), NL/ha, NL/total number of livestock, calving periods, bulls withdrawal,) iii) management of pastures (plot shifts, instant loads, transit periods, regrowth periods, shift zones, buffer-plot,), iv) state of meadows (deterioration, sullying).

Results

Four principal types of livestock territories planning have been identified (Figure 1). They also reflect different adaptation strategies to the biophysical (and socioeconomical) hazards. These strategies are along the horizontal axis of the CFA plot (Figure 1). To the right of Axis 1 are situations with a simple territory planning which leads the breeders to adopt reactive management strategies against the hazards, on a short term basis, not compatible with pastures maintenance, hence the high levels of pasture deterioration. To the left of Axis 1, the conduct is looser and adjusted to forecast choices due to a dense and structured territory planning. Between those two situations, there is continuity. The consequences of these different strategies can be seen on the state of the meadows and on the overall loads levels.

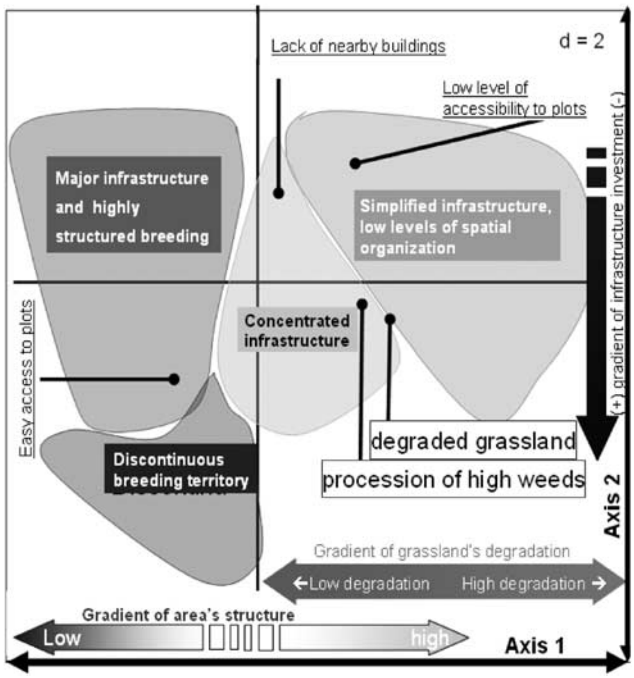

Fig. 1 Four models of livestock territory organizaion. Screening grassland factorial plots.

Conclusion

This approach of territory planning, together with the livestock management organization, allows a position of adaptation to high biophysical hazards in tropical humid areas. This analysis of different situations and their related practices provides some generic knowledge and a basis for discussion with breeders. This allows, with breeders, future planning for a strategical forecasts, action programming and day to day management. Any strategical forecast must first deal with the configuration of the operation territory.

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