Managing Pantanal rangelands for optimizing carbon flow: effects of growing season and pasture type on dry mass accumulation

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Introduction

Pantanal is a marginal agriculture area, suitable for low inputs livestock systems. Pantanal rangelands include different habitats, which presenting a temporal and spatial variation in productivity and processes, according flooding gradient. The main grazing areas are wetland and open grassland on which cattle select grazing sites with better quality forage. In general, total average dry matter of theses areas is low with low animal carrying capacity. Thus, ranchers have been substituting natural pasture of lower quality of the higher areas by exotic pasture cultivation (mixed pasture), increasing the carrying capacity of the management units (Santos et al., 2011). This work aimed to assess the forage mass accumulation in the main grazing sites in two pastures systems to identify resting decisions to maximize the carbon flow in the system.

Material and Methods

The study was carried out at Nhumirim ranch, Pantanal Nhecolândia sub-region in two management units (MU): 1 - mixed pastures (natural + cultivated) and 2- disturbed natural pastures. In each MU two main feeding sites were identified. In both of them seven exclusion from grazing cages ($1m^2$) were allocated in order to

estimate forage and no forage mass accumulation rate, according to triple pairing methodology from September 2014 to March 2015. Aboveground plants were clipped in 0.25m^2 plots inside and outside of the exclusion cage in October 2014 (late dry season), December (early rainy season) and March 2015 (late rainy season). The dry mass accumulation (kg DM.ha^{-1}) was obtained by the difference between the forage mass from inside the cage and from the outside of the cage. All plant were separated into fodder and non-fodder species.

Results and Conclusions

The values of dry mass accumulation were higher in mixed pasture during the early season and were negative in the late rainy season (Figure 1), indicating high grazing pressure on these feeding sites. December was the more productive month because November was a rainy month. These results suggest that fencing the pastures in the months of the early rainy season (October to November) in function of the rainfall distribution could be a strategic management practice to maximize the carbon flow in the system and the forage accumulation.

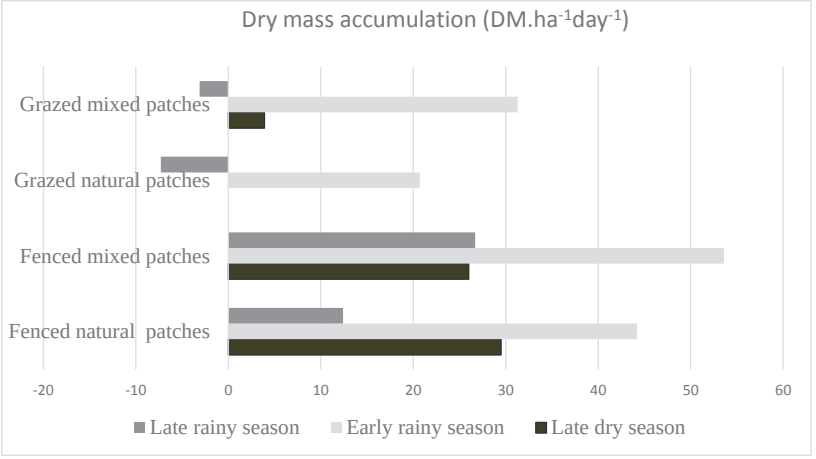

Figure 1. Aboveground dry mass accumulation rate (kg DM.ha^{-1}day^{-1}) in two pasture types (fenced vs grazed) during seasons of the hydrological year, from September 2014 to October 2015.

In these areas occurred dominance of several invasive species, many of which non-fodder species. In Figure 2 highlights dry mass accumulation rate of fodder and non-fodder species in two type of pastures.

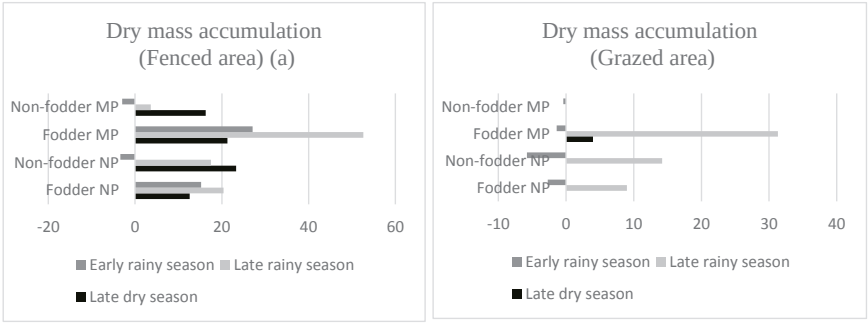

Figure 1. Aboveground dry mass accumulation rate (kg DM.ha^{-1}day^{-1}) in natural disturbed pasture (NP) and mixture pasture (MP), fenced (a) and grazed (b), during seasons of the hydrological year, from September 2014 to October 2015.

Higher proportion of non-fodder species can be seen in disturbed natural pasture. It also observes that the dry matter accumulation rate was reduced during late rainy season, as consequence of pasture cleaning. It notes that fenced patches of disturbed natural pasture presented higher proportion of non-fodder species. Thus, deferred grazing can be used during strategic season but more investigation are necessary to define the adequate length of the deferment. The cultivation of exotic forage species in open grassland can reduce the proportion of non-fodder species and invasive natural species. However, due to spatial and temporal variation of natural pastures, adaptive management strategies are necessary to mitigate and reduce greenhouse gas emissions and optimizing carbon flow.

References

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