BRACHIARIA PASTURE OCCUPATION POTENTIAL DURING THE DRY SEASON IN BRAZILIAN SAVANNAH CONDITIONS

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ABSTRACT: To have a profitable cattle creation, should be especially careful with the quality of pasture. The forage most widely used in Brazil is the Brachiaria spp. occupying 50% of the area devoted to livestock. It adapts well to poor soils as the Brazilian savannah and also fertile soils formed where there basaltic spills. The savannah presents six dry months and thus to a considerable reduction of forage due to the long period of drought. To evaluate the Brachiaria in savannah occupation potential during the dry season, one sampling was carried out in five properties with each of the locals with ten repetitions. It was necessary to develop a mold in a 0.5 m² (1.0 m high x 0.5 m large) rectangle shape. This mold was released at random and so contact the forage material was collected and stored paper bag for drying and weighing. The best averages of dry matter production are the samples R1, R2 and R3 areas containing only grazing throughout the year due to its management be appropriate to forage development conditions. But the treatments are the crop-livestock integration is not always the most productive in dry matter in the first year, but becomes sustainable due to the consortium grain production. However a good substantial content of dry matter observed in corn-brachiaria consortium areas in the off season results in the availability of straws for livestock, thus keeping the herd in a good nutritional status and adding profits to ranchers.


POTENCIAL DE OCUPAÇÃO DE PASTAGEM DE BRACHIARIA DURANTE A ESTAÇÃO SECA NAS CONDIÇÕES DE CERRADO

RESUMO: Para se ter uma pecuária rentável deve ter cuidado especialmente com a qualidade do pasto. A forragem mais utilizado no Brasil é a Brachiaria spp. ocupando 50% da área dedicados a criação de bovinos. Esta forrageira se adapta bem ao solos pobres da savana e também às áreas onde ocorreu derramamentos basálticos que contribuíram para a formação de solos alta fertilidade do solo. A região de savana apresenta seis meses de seca e com uma considerável redução de forragem devido ao longo período de seca. A fim de avaliar o potencial de ocupação dos pastos de cerrado durante o período seco foram selecionadas cinco fazendassendo cada amostra composta por dez repetições. Foi necessário desenvolver o molde em forma de retângulo com área de 0,5 m². Este molde foi lançado nas pastagens de modo que ao entrar em contato com as plantas forrageiras foram coletadas as amostras de forma posteriormente armazenadas para secagem e pesagem. Conclusões extraídas para obtenção dos melhores rendimentos médios de matéria seca nas amostras foram obtidas nas áreas R1, R2 e R3 onde apenas encontravam os pastos ocupados durante todo o ano, devido à sua gestão ser condições adequadas para o desenvolvimento de forragem. Mas o tratamento de integração lavoura-pecuária não é o mais produtivo no primeiro ano, mas a produção de matéria seca passa ser rentável devido a produção de grãos do consórcio. No entanto, um bom
índice de ocupação pode ser considerado em relação à matéria seca armazenada durante a entressafra e o consórcio de milho devido a formação de palhada para consumo animal na seca. Assim mantém o rebanho em bom estado nutricional aumentando o lucro dos agropecuaristas.


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INTRODUCTION

Today in Brazil, one of the main activities is cattle breeder. With the farming expansion, new areas have been opened, one of them is the Brazil Savannah. Being the second largest biome potentially, can count on approximately the equivalent of a quarter of the area available for agriculture and livestock. The Savannah is composed of about 200 million hectares of growing importance in the world agriculture. Regarded as the Brazilian Savannah similar to areas observed in North America, Europe, Argentina and Australia. It can be said that low fertility problems have been overcome by observing the high yields of crops and animals in the past 30 years (SPEHAR 2006). So there is a good livestock should first look at the quality of the national grassland, because this is considered the fuel for the livestock business. However, the forage most widely used in Brazil is the fodder of the genus Brachiaria from different species. Brachiaria forage occupies 50% of the area devoted to livestock. For it adapt well to poor soil like most Brazil Savannah and also grow well in high-fertility soils as areas where there was some basaltic spill resulting in Dark purple soils and Red oxisol. In Brazilian Savannah occurs six months of drought and that there is a considerable reduction in forage yield due to the long period without rain. In other words Brachiaria is resistive to cattle trampling, has a good physiological development and is well suited to the physical and climatic conditions of the savannah.

Most Brazilian producers do not make use of adequate pasture management. In order to have an economic return in agriculture is necessary to have a pasture of good production and quality and take some action, consistent with the financial producer conditions, which are as fertilizer when needed, chemical or organic, soil acidity amendment, weed control among others. With proper care these producers have to offer grazing animals all year round, thus having an increase in the same financial gain with the traditional activities worked.

Brazil is one of the largest producers in the world of flesh, and their meat is highly valued abroad, due to livestock grazing be known as the "green cattle". The world's meat eaters do not care about the financial condition and much less with the pasture conditions in which the producer is, what really matters to them is a cheap and good quality product. With increasing market in beef demand increases the production of animals, and most obtain the herd efficiency and this dedication and technical care are important to improve the quality of pasture and obtain healthy animal well managed becoming the farming activity a source of profit for the cattle breeder. As a consequence has been an increase in the population of animals per hectare, increased meat production, increasing the birth rate, increase the pregnancy rate, speed point of slaughter, with a relative decrease in food and medicine costs; finally avoids overspending.

Some time ago pasture was considered a mining activity since it had no proper management. Today's most advanced
producers know and work in different grazing systems always seeking the best quality and higher production. It is the most used the continuous grazing system and rotated. The continuous grazing is one in which the flock is kept continuously in the same pasture, i.e., capacity throughout the year. Alread}

rotational grazing is characterized by keeping the grass at rest for a period of time. This technique makes it possible to divide the area into pickets identified with names and numbers, which can be applied to the rotational grazing. The main idea of this system is that the farmers have the most control of the pasture so they can be with increased production and possible quality, so no pasture reform in short periods of time will be required unless the producer want to change the forage species.

Improper management of savannah soils has caused environmental degradation bringing low incomes, both in agriculture and in livestock. But over the years there has been the need to improve the competence of capacity to increase production and quality, and sustainability, especially in the profitability of agribusiness in the Savannah Region. With this need for innovation was developed crop-livestock integration system for degraded soils. With these systems is trying to make agriculture and Brazilian livestock integrated to sustainability with focus on the need for land reclamation for farming or intensive livestock. Environmental preservation and increased competitiveness in the Brazilian Savannah is of utmost importance because it aims to reduce production costs, indirectly making the aggregation of values due to the rational use of the areas in activity. The crop-livestock integration is used in the form of tillage in which they are desiccated forage or crop residues therein and then immediately sow the crop for home consumption and trade of surplus production. The integration process benefits both the exploitation of agriculture and the exploitation of livestock resulting in the production of straws coverage with breaking the cycle of pests, diseases and weeds, plus the ability to add value to the system. In livestock farming, improving the coordination of technical activities held the recovery of degraded pastures, maintaining high productivity of pastures and forage production mainly in the offseason.

The objective of this research was to demonstrate the potential of occupation of Brachiaria spp. in the savannah during the dry season in five different properties, with main activity to beef cattle, however with managements and modern livestock techniques.

LITERATURE REVIEW

The Brazilian Savannah is the second largest national biome that presents a set of favorable conditions to emphasize the agricultural activities. It consists of 136 million hectares for agriculture and 10 million that can be irrigated (AIDAR & KLUTHCOUSKI, 2003).

In the early 70s, the livestock was given with an extractive activity, which, however, referred only to the use of native pastures and no very representative production. Technicians and ranchers who believed in the savannah potential created credit lines and development plans, whereupon the savannah has become one of the largest centers of agriculture, affecting about 20 million hectares of reclaimed areas and could win a Nobel Prize of Peace in 1970 (KLUTHCOUSKI et. al. 2006).

At the same time, some states technically evolved in agriculture had experienced mixed stands of fodder with annual crop. This type of consortium was well accepted until the moment that warned ads intensely in single crop on the strength of use and sale of commercial popular implements in that time. Since 1991, the need to maintain the rice crop in the Brazilian savannah in Goias State farmers have developed some different associations crops with pasture was given emphasis to rice, maize, sorghum and millet with forage from Brachiaria genres, Andropogon and Panicum or fodder legumes like Stylosantes spp, Calopogonio mucunoides and Arachis pintoe. These systems were avoided applying chemicals other than those used in the seeds.
which always requires adjustment over time, which are such as fertilization and appropriate management.

In view Ferreira et. al. (2007) one of the main advantages of the implementation of Brachiaria pastures in consortium with corn is the forage accumulation at the beginning of the dry season, which can be used throughout the dry season. The grazing shortage occurs in almost all the Central Brazil. With the accumulation of forage the animals are kept at pasture until the next rainy season, avoiding spending on food supplements for the flock.

According Anghinoni et al., 2011 a consortium pasture should have a moderate grazing where the pasture can meet the nutritional needs of animals and proper management of the herd. With a good grazing animals walk less, they feed on a forage of better quality reaching more weight gain and herd efficiency with higher birth rate, decrease mortality and get higher pregnancy rate.

**MATERIAL AND METHODS**

The survey was conducted in five distinct areas listed in AI, R1, R2, R3 and F1 –Itaberaí located in the municipality of the Goiás State, near the GO-156 highway. The predominant vegetation is named Brazilian savannah, with average rainfall between 1200 and 1800 mm, with an altitude of 710 meters above sea level, 16°00'27.04 "S Latitude and 49°47'45.81"W Longitude and with an average temperature of 25 °C in regional soils classified as Red Yellow Latosol (Wikipedia, 2007).

The five areas which were withdrawn the samples are for beef cattle activity and the AI integration area compared to the single pastures as R1, R2, R3 and F1 areas. The study aimed to facilitate herd management considering the growing pasture cycle keeping the potential of grazing without taking the area occupied by animals to soil degradation and forage. The calculations were based on the production of realization of the Brachiaria material collect was necessary to develop a mold in a rectangle shape made of a galvanized pipe dimensions 0.50 x 1.0 m. This mold was released at random and so on contact with the ground the collected material constituted a replication.

The pasture was cut with a trimmer and then placed in paper bags with the name of the area and the repetition number described. So being stored in styrofoam boxes which do not occur or would suffer a representative loss of water, since the transport of all samples for weighing of green mass was necessary. Drying and weighing of dry matter were held at the Farm School FMB located in São Luís de Montes Belos. The use of the oven was necessary for a period of 24 hours at 110 °C temperature, with the exception of the sample AI area of crop-pasture a longer period was needed for 36 hours at 110 °C since it had a moisture superior to the others.

With the weight of dry matter at hand, the data were transformed to yield per hectare, and so were calculated on animal units (AU), or animal occupation during the dry season, according to Oliveira & Kluthcouski (1999). Earnings per month for 24 months can be obtained by subtracting from the gross balance the values (GBV) the TOC (total operating cost) + CMP (cost of maize production) from the area where was used the Integration of Agriculture Livestock and just subtracting the TOC from GBV (gross balance) obtained in areas where only the Brachiaria brizantha was cultivated.

**RESULTS AND DISCUSSION**

The results can be seen in Figures 1 through 6 listed including data obtained in the dry matter production. AI integration area compared to the single pastures as R1, R2, R3 and F1 areas. The study aimed to facilitate herd management considering the growing pasture cycle keeping the potential of grazing without taking the area occupied by animals to soil degradation and forage. The calculations were based on the production of
dry matter of Brachiaria and the potential use of any area used for livestock. The calculations were based on the production of dry matter of Brachiaria and the potential use of any area used for livestock. The value of the vegetative cycle was based on the period between 28 to 30 days.

**Figure 1.** AUs obtained in the field, at rest, planting single braquiária. Itaberaí – GO.

![Bar Chart](image1)

**Figure 2.-** AUs obtained in the field, at rest, planting single braquiária. Itaberaí - GO.

![Bar Chart](image2)

**Figure 3.-** AUs obtained in the field, at rest, planting single braquiária. Itaberaí – GO.

![Bar Chart](image3)
Administration is the way as a handler of each area are different because the area of integration is used for grazing during the dry season when the harvest of the crop leaving the straw and offering a forage of good quality for livestock. This technique results in increased economic profitability, as well as grain production that has also results in a
well-formed pasture in the dry season which is when the cattle suffer most under dry period occurring a need to change picket or when the cattle breeder observes problems in the nutritional status of pasture and in the health of cattle herd health.

Table 1. Number of animal unit (A.U) to occupy one hectare-plot in relation to GP (%), OD and N plots in relation to DM production (kg/ha).

<table>
<thead>
<tr>
<th>Grazing pressure (GP)</th>
<th>Occupancy days (OD) and constant (K)</th>
<th>Number of one hectare – paddocks.</th>
<th>Animal unity (AU / ha) to be raised by Picket one hectare (10,000 m) - plot when collecting the production of 0.8, 1.0 and 1.2 (kg/ha) of dry matter (DM) in a sample of 0.5 m² of Brachiaria brizantha.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(%)</td>
<td>OD K N° of plots</td>
<td>0.8 kg of DM/0,50 m² plot</td>
<td>1.0 kg of DM/0,50 m² - plot</td>
</tr>
<tr>
<td>7</td>
<td>1 20,4813 31</td>
<td>16 (0,5)*</td>
<td>20 (0,60)*</td>
</tr>
<tr>
<td>7</td>
<td>3 19,2400 11</td>
<td>15 (1,4)*</td>
<td>19 (1,7) *</td>
</tr>
<tr>
<td>7</td>
<td>5 18,1406 7</td>
<td>14-15 (2) *</td>
<td>18 (2,5) *</td>
</tr>
<tr>
<td>7</td>
<td>7 15,1172 6</td>
<td>12 (2) *</td>
<td>15 (2,5) *</td>
</tr>
</tbody>
</table>

Obs: *The numbers accompanied with asterisks mean the equivalent of the number of animals per hectare plots respecting the life cycle of Brachiaria brizantha.

However in other rotational grazing areas, namely cattle is to calculate the animal population, as AU, the formula recommended by OLIVEIRA and KLUTHCOUSKI (2003 and 1999) was used. The left at rest areas or better fertility cattle generally also results in good maintenance potential as observed in the R1, R2 and R3 areas.

The following parameters were used to derive the number of AU (Animal Unit); Dry mater weight = DMW/kg by 0.5 m² (1,0 m long x 0,5 m large) - plot (weight in kilograms); HECTARE AREA (ha) = 10,000 m²; GP: grazing pressure given in percentage (7%), DO: Days occupation = 7 days. TOTAL PICKETS: 50 paddocks (5 areas and 10 replications = 60 plots); WEIGHT OF THE AU: 450 kg. The final results were resumed in the multiplication of dry matter/0.5 m²-plot by adapted constant obtained through the formulation (Table 1):

AU = DMW in kg/plot 0,5 m² area x 15,1172

Animal Unit (AU / ha) to be raised by one hectare - plot where was collected the productions of 0.8, 1, 0 and 1.2 kg.ha⁻¹ of dry matter (DM) in a sample of 0.5 m² of Brachiaria. The data accompanied with asterisks mean the equivalent of the number of animals per hectare paddocks respecting the life cycle of brachiaria grazing pressure (GP) Occupancy days (OD) and constant number of paddocks of one hectare

F1 area shown in Table 2 is the results obtained an area where the producer had left for a long period, a greater number of cattle, therefore resulting in a low yield potential at the time of evaluation, or if the area grassland is with overcrowding or not have a proper management, can suffer a degradation leaving it with a much lower availability than the other used as a comparison.

According to Figure 3, the R1, R2 and R3 areas are with a forage availability greater than the others, however, these areas are located on a higher slope than the AI and F1 and were longer time at rest. Most results can be justified as result of dry matter in the R1, R2 and R3 areas due to the pasture be managed in a manner rotated respecting the rest period of the pastures at the end of the rainy climatic season.

The study of the average production of animals in the amount of AU / hectare
(Figure 6) was found to be promising agricultural activities using integrated crop-livestock. Researchers and cattle ranchers have been noted that the average capacity is 0.3 AU / hectare in the savannah, while the carrying capacity at the national level is 0.6 AU / hectare Native pasture carrying capacity varies from 0.05 to 0.3 AU / ha, while the degraded pasture support of 0.3 to 0.5 AU / hectare grazing renewed in good condition, have the ability to provide superior support to 1.8 AU / hectare may reach, when properly handled, 3 AU / hectare (KLUTHCOUSKI, 1994).

Regardless of the amount of dry matter produced (Table 1) management performed by the rotation of the flock in frequency between 6 and 7 days results in a better occupation of the area with the largest number of AU / ha. This animal rotation weekly and 7% grazing pressure the ranchers can achieve better management control activity.

In the study results have been obtained ranging from 2.02 to 3.4 AU / hectare (Figure 6). Thus the integration can be observed a score well above the average obtained in the savannah soil. In economic terms even with dry matter production of Brachiaria is lower than other areas studied with the crop-livestock integration have been noted that the average capacity is 0.3 AU / hectare in the savannah, while the carrying capacity at the national level is 0.6 AU / hectare Native pasture carrying capacity varies from 0.05 to 0.3 AU / ha, while the degraded pasture support of 0.3 to 0.5 AU / hectare grazing renewed in good condition, have the ability to provide superior support to 1.8 AU / hectare may reach, when properly handled, 3 AU / hectare (KLUTHCOUSKI, 1994).

Table 2. Economic return (income/month/ha) obtained by farmer livestock when been observed an increased working capital from areas well managed in compliance with the phenological cycle of the Brachiaria studied.

<table>
<thead>
<tr>
<th>SITES</th>
<th>CARCASS – Gross an net weight and number of arrobas</th>
<th>MEAT - price of arroba @</th>
<th>CORN GRAIN - 60 kg/bag.</th>
<th>GROSS BALANCE</th>
<th>Net income/month/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREA</td>
<td>UA</td>
<td>GROSS 100%</td>
<td>NET 50%</td>
<td>@=R$140,00</td>
<td>154,6</td>
</tr>
<tr>
<td>AI</td>
<td>2,67</td>
<td>1201,5 = 80,1</td>
<td>600,75 = 40,05</td>
<td>R$ 5.607,00</td>
<td>R$ 5.411,00</td>
</tr>
<tr>
<td>F1</td>
<td>2,02</td>
<td>909,0 = 60,6</td>
<td>454,50 = 30,3</td>
<td>R$ 4.242,00</td>
<td>--------------</td>
</tr>
<tr>
<td>R1</td>
<td>3,4</td>
<td>1530,0 = 102</td>
<td>765,00 = 51</td>
<td>R$ 7.140,00</td>
<td>--------------</td>
</tr>
<tr>
<td>R3</td>
<td>3,28</td>
<td>1476,0 = 98,4</td>
<td>738,00 = 49,2</td>
<td>R$ 6.888,00</td>
<td>--------------</td>
</tr>
</tbody>
</table>

Discount do TOC - R$ 2.619,06
Discount do CCGP - R$ 2.189,80
SOM +TOC = CCGP - R$ 4 808,86

1 - Cost of corn grain 60 kg - bag = R$ 35,00
2 - Cost of @beef = R $ 140.00
3 - TOC – Total operating costs to produce one arroba beef = R$ in Brazilian munsy = 101,58/@ in 2014, with the accumulation of 7,43 % inflation, the cost spent R$ 109.13 in 24 months of 2015.
4 – Cost of corn grain production – mean CCGP from Regions: West + South Center = West Center. 2015/2016

Obs: AI - Area with livestock farming integration in the first year. R1, R2, R3 - Areas formed with single braquiária who was at rest. F1 - Area formed with single Brachiaria grazing in the dry season.

The crop-livestock integration allows the intensification and increasing land use efficiency, providing higher yields in less time and at lower area, decreasing including gas emission rates of greenhouse per unit of food produced (SOARES et al., 2009). According to Macedo (2009) and Smith et al., (2009) the new trend of CLSs, following the guidelines issued by the incorporation of trees in agriculture and livestock systems setting up what is called integrated crop-livestock-forest systems (CLPFS) combining tree species adapted to...
productive forage in spacing and number of trees needed to maintain productive pasture adapted to shaded systems (MACEDO, 2009), according to the old university recommendations on the importance of maintaining the shaded pasture areas with large trees.

The economic results reflect (Table 2) the need to seek high yields. The study was achieved the corn production of 9276 kg / ha (154.6 bags of 60 kg / ha) when the
\[\text{AU} = \frac{\text{PDM/kg x Area of one hectare (m²) x PP x OD x n° of plots x n° de animal rotation}}{100}\]

where
\[\text{AU/ha} = \frac{\text{PDM/kg x 10000 m² x 100}}{\text{kg/0.5 m² x Constant value (Table 1)}}\]
\[7 x 7 x 6 x 0.5 x 450 \text{ kg}\]
\[\text{AU} = \frac{\text{DMW/kg in 0.5m² x 15.1172}}{(\text{constant K}) = \text{number of 450 kg-animals.ha}^{-1}}\]

Other values of K (15.1172) may be observed when using other related calculated constants in Table 2. (18.1406, 19.2400, 20.4813) according to GP, OD and number of plots.

High corn production is attributed to the high fertility of some Savannah soil stains where there were the basaltic spills and the agricultural activity became profitable. This production is considered as considered high yield but assuming a production of 70 bags / ha to the price of R$35,00, Value of R$2 450,00 could be accomplished by selling of grain corn. Adding to the values obtained with cattle sale associated to a mean management technology the integration agriculture – livestock may be a sustainable activity (Table 2).

New technologies have encouraged conducting social assessment studies economic, incorporating methodologies that consider the environmental accounting in Systems Integration Crop Farming (SICF) as an alternative for the recovery of degraded grasslands, totaling extensive portion of the Brazilian territory. This technology prevents the opening of new frontier areas, mainly in the Brazilian regions of the West and North already well explored.

CONCLUSION

a) The lower results with the treatment of AI and F1 areas while is not the most efficient in the production of dry matter but become sustainable when properly handled and thus in the off season when good quality forage are produced.

b) The AI area has a high pasture production index in the off season, because after the rainy season straw fodder is created which is a good source of feed for livestock. With this herd spends a dry season in a good nutritional status, thus increasing the profits of producers caused by the reduction of animal weight loss.

c) The days of occupying 7 for 7 days and 7% grazing pressure results in more AUs per area unit, in addition respecting the phenological cycle of Brachiaria.

d) The corn may be considered as an aggregate income resulting in increased economic return in reason to grain sale.

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