Animal Performance and Pasture Characteristics of *Brachiaria decumbens* Stapf., *Gliricidia sepium* (Jacq.) Steud, and *Mimosa caesalpiniifolia* Benth. in Silvipastoral Systems

Alexandre C. L. de Mello
Federal Rural University of Pernambuco, Brazil

Suellen Brandão de Miranda Costa
Federal Rural University of Pernambuco, Brazil

José C. B. Dubeux Jr.
Federal Rural University of Pernambuco, Brazil

Mércia V. F. dos Santos
Federal Rural University of Pernambuco, Brazil

Valéria Xavier de Oliveira Apolinário
Federal Rural University of Pernambuco, Brazil

See next page for additional authors

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Presenter Information

Alexandre C. L. de Mello, Suellen Brandão de Miranda Costa, José C. B. Dubeux Jr., Mércia V. F. dos Santos, Valéria Xavier de Oliveira Apolinário, Fernando Tenório Filho, Marcelo Santana Meireles, and Camilla Gomes Pereira

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Alexandre Carneiro Leão de Mello [A], *Suellen Brandão de Miranda Costa* [A], *José Carlos Batista Dubeux Jr.* [A], *Mércia Virginia Ferreira dos Santos* [A], *Valéria Xavier de Oliveira Apolinário* [A], *Fernando Tenório Filho* [B], *Marcelo Santana Meireles* [B] *and Camilla Gomes Pereira* [B]

[A] Federal Rural University of Pernambuco, Brazil
[B] Agronomic Institute of Pernambuco – IPA
Contact email: mello@dz.ufrpe.br

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Introduction

Grasslands are the major source of feed for ruminants (Zanine 2005). Seasonality of production, however, is a constraint in forage-based systems. Silvopastoril systems combine different components (animals, trees, and forages) into one integrated system and may improve forage distribution across seasons. Resource use is usually more efficient both spatially and temporally, increasing land use efficiency (Nair 1993). Tree legumes present potential for silvopastoril systems because they can fix N from the atmosphere, improve cattle diet, and lead to a faster N cycle. In addition, trees provide shade and may reduce heat stress for grazing animals in warm-climate grasslands. Legume trees are commonly found in warm-season climates and present potential for use in silvopastoril systems.

This research studied the animal performance and pasture characteristics of signal grass (*Brachiaria decumbens* Stapf.) in pure stand or in silvopastoril systems with *Gliricidia sepium* (Jacq.) Steud or *Mimosa caesalpinifolia* Benth.

Material and Methods

The grazing experiment was carried out at Itambé Research Station (IPA), located at the Coastal Region of Pernambuco State, Brazil. Treatments were: (1) *B. decumbens* + *M. caesalpiniifolia* (sabiá); (2) *B. decumbens* + *G. sepium* (gliricídia); and (3) *B. decumbens* in pure stand. Experimental plots were 1-ha paddocks. The experimental design was randomized blocks, with three replications so the total experimental area was 9 ha. Legume trees were planted in double rows (15.0 m x 1.0 m x 0.5 m) and tree population was 2,500 trees/ha. Signal grass was planted in-between the double rows. Crossbred Holstein/zebu steers were used as experimental animals with an average initial weight of 175 kg. Cattle were weighed every 28 days after a 16-h fasting. Herbage mass was determined every 28 days using the double sampling technique described by Haydock and Shaw (1975). Herbage components were fractionated into green and dead/senescent material. Herbage accumulation rate was determined using exclusion cages moved every 14 days (Sollenberger and Cherney 1995). Continuous stocking with a variable stocking rate occurred over 12 grazing cycles of 28 days, totaling 336 experimental days (Feb 2012 to Jan 2013). Two animal testers were allocated to each paddock. Stocking rate was adjusted according to herbage allowance (HA). A target HA of 3 kg of green herbage (on a dry matter basis) per kg of live weight was used. Data was analyzed using SAS (SAS, 2003) and means compared by Tukey at 5% probability level.

Results and Discussion

Green herbage mass varied between grazing cycle and treatments ($P<0.05$), but herbage allowance was affected only by grazing cycle (Table 1). Herbage mass was similar among treatments at each evaluation and differences occurred only among cycles. Average green herbage mass ranged from 321 kg in May, 2012 up to 3923 kg in August, 2012. Herbage allowance (HA) did not differ among treatments but varied among grazing cycles, ranging from 0.74 kg (May, 2012) to 4.16 kg green DM/kg live weight (Oct, 2012). Stocking rate followed a similar pattern to green herbage mass with an interaction between grazing cycle and treatments. Stocking rate within each grazing cycle did not vary among treatments, but differences occurred among cycles (Table 2). Animal performance (gain per animal and gain per area) was not affected by treatment, but varied among cycles. Average daily gain (ADG) ranged from 0.21 to 0.86 kg/head/day. Herbage accumulation rate varied among cycle and ranged from 19.7 to 48.5 kg DM/ha/day (Fig. 1).

Conclusion

Animal performance and pasture characteristics were similar for signal grass in a pure stand or in silvopastoral systems with *Gliricidia sepium* (Jacq.) Steud or *Mimosa*

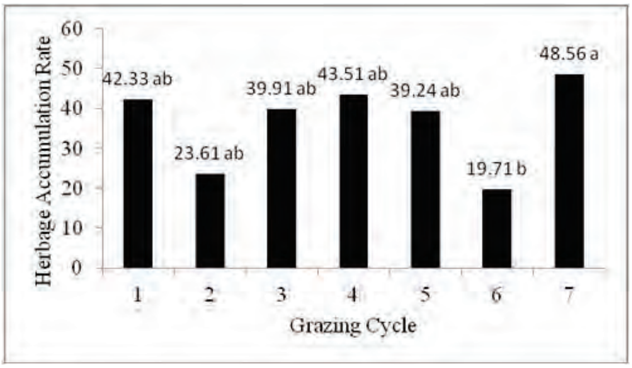

Figure 1. Herbage accumulation rate of *Brachiaria decumbens* Stapf. at different grazing cycles; average of three blocks.

caeslpinifolia Benth. Potential environmental and economical benefits from the tree component must be analyzed. Long-term results are also important in order to make a conclusive decision regarding the benefit of each system.

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Table 1. Green dry herbage mass (kg DM/ha) and herbage allowance (kg green DM/kg live weight) in different grazing cycles; average of three blocks

Grazing cycle (date)	Green dry herbage mass (kg DM/ha)			Herbage allowance (kg green DM/kg live weight)
	Signal grass	Signal grass + Gliricidia	Signal grass +Sabiá	
1 (Feb/ 2012)	2994 aB	2805 aB	2957 aAB	3.05 B
2 (Mar/ 2012)	1874 aBC	1914 aBC	1900 aB	2.95 BC
3 (Apr/ 2012)	1682 aC	1627 aBC	1682 aB	3.03 B
4 (May/ 2012)	327 aD	316 aC	319 aC	0.74 D
5 (Jun/ 2012)	991 aCD	978 aC	957 aBC	2.18 BC
6 (Jul/ 2012)	2193 aBC	2093 aBC	1903 aB	2.89 BC
7 (Aug/ 2012)	4249 aA	4080 aA	3441 aA	3.40 AB
8 (Sept/ 2012)	1145 aCD	1146 aC	1099 aBC	2.06 C
9 (Oct/ 2012)	2511 aBC	2504 aB	2283 aAB	4.16 A
10 (Nov/ 2012)	1962 aBC	2010 aBC	1941 aB	2.94 BC
11 (Dec/ 2012)	867 aCD	890 aC	892 aBC	2.47 BC
12 (Jan/ 2012)	1338 aCD	1147 aC	1204 aBC	2.77 BC
Standard error		477		0.41

*Means followed by the same letter, small letter within the row and capital letters within the column, do not differ by Tukey test (P > 0.05).

Table 2. Stocking rate (AU/ha), average daily gain (ADG, kg/hd/day), and gain per area (GPA, kg/ha) in the different grazing cycles; average of three blocks.

Grazing cycle (date)	Stocking rate (AU/ha)			ADG (kg/day)	GPA (kg/ha)
	Signal grass	Signal grass + Gliricidia	Signal grass +Sabiá		
1 (Feb/2012)	2.99 aA	2.81 aA	2.64 aAB	0.69 AB	56.25 AB
2 (March/2012)	1.75 aBC	1.77 aB	1.77 aBC	0.60 AB	29.82 ABC
3 (April/2012)	1.53 aBC	1.51 aBC	1.45 aBC	0.43 B	17.98 BC
4 (May/2012)	1.19 aC	1.21 aBC	1.06 aC	0.54 B	17.49 C
5 (June/2012)	1.24 aC	1.26 aBC	1.09 aC	0.21 B	7.27 C
6 (July/2012)	1.95 aB	1.81 aB	1.97 aB	0.60 AB	33.01 ABC
7 (August/2012)	3.51 aA	3.14 aA	2.65 aA	0.72 AB	63.82 A
8 (Sept/2012)	1.36 aBC	1.51 aBC	1.33 aBC	0.86 A	34.93 ABC
9 (Oct/2012)	1.48 aBC	1.52 aBC	1.36 aBC	0.26 B	9.38 C
10 (Nov/2012)	1.67 aBC	1.72 aBC	1.68 aBC	0.71 AB	36.26 ABC
11 (Dec/2012)	0.97 aC	1.04 aC	0.97 aC	0.33 B	9.65 C
12 (Jan/2012)	1.33 aBC	1.09 aC	1.11 aC	0.31 B	8.90 C
Standard error		0.24		0.11	7.44