Pre-fattening of crossbred dairy bulls under grazing with glycine (*Neonotonia wightii*) and tropical grasses with rumen activator supplement

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The productive performance of 24 crossbred dairy males (5/8 Holstein x 3/8 Zebu), of 330 ± 31 d of age and liveweight (LW) from 134.02 to 228.28 kg was assessed. The animals grazed on an association of glycine (*Neonotonia wightii*) and natural pasture during the rainy season (160 d). The system of 6 ha was divided into eight paddocks. The occupation and resting times were of 5 and 35 d, respectively, with stocking rate of four animals/ha. An amount of 1.50 kg of activator supplement of the ruminal fermentation (15.20 % of CP and 9.33 MJ kg of DM^{-1} of ME was offered. A grazing pressure of 12.90 kg DM per each 100 kg of LW was maintained. The daily mean gain (DMG) was of 589.13 g of LW per animal. The system favored the fulfillment of the ingestion capacity and the CP requirements, while the ME was slightly below the requirements (1.25 MJ) for the real DMG obtained. Besides, it allowed the inclusion of a great number of animals to the fattening. These results corroborate the necessity of working with lower animal stocking rate or with supplements with higher energy content to improve the use of the pastures CP, obtain higher DMG of LW and reduce the incorporation age of the animals to the fattening.

Key words: *bovinos, herbaceous legumes, pre-fattening, productive performance*.

Meat production of quality is a necessity for the Cuban government. According to reports of the National Office of Statistics and Information of the Cuban Republic (ONEI 2013), at the end of 2012, 368620 cattle heads were slaughtered in Cuba, with total delivery of 124920.70 t, for average weight at slaughter of 338.39 kg $head^{-1}$. According to Connell *et al*. (2002), it is possible to obtain high DMG of LW, weight at slaughter and carcass yield in systems of middle intensity with crossbred dairy male bovines. The use tropical pastures associated with legumes could be a positive option for beef meat production with animals from dairy cattle rearing.

Cino and Díaz (2010), Sánchez (2012) and Díaz *et al*. (2012) informed notable economic, productive and environmental benefits with the use of grasses and tropical legumes. The nutritive quality of the grasslands improves when they are established in association with legumes. With this procedure, higher stocking rate is achieved and the DMG increases with the use of supplements (Castillo *et al*. 2003).

The activator supplements of the ruminal fermentation have been used for animals in grasslands with irrigation and fertilization of good-quality improved grasses, with 17 % of protein. These activators, rich in non-protein nitrogen, favor the microbial development, the degradation of the plant fiber and the use of nutrients, with DMG between 1000 g and 1300 g of LW $animal^{-1}$ (Jordán 2005).

The combination of a grazing system with tropical grasses where the protein quality of these species is improved when associating them with herbaceous legumes and the use of a supplement activator of the rumen fermentation could satisfy the nutritional requirements of pre-fattening dairy crossbred males and obtain favorable productive results.

The objective of this study was to assess the productive performance of dairy crossbred males, 5/8 Holstein x 3/8 Zebu in the pre-fattening stage, under grazing associated of glycine and grasses with activator supplement of the ruminal fermentation.

Materials and Methods

A total 24 crossbred males, 5/8 Holstein x 3/8 Zebu, of 330 ± 31 d of age and 134.02 kg of LW were used. These animals grazed 6 ha during the pre-fattening stage. The area was divided into eight paddocks, with self-grazing (free access to water and supplement) and without fertilization. The occupation and resting times were of 5 and 35 d, respectively. The stocking rate was of four animales ha^{-1}. The animals consumed 1.50 kg/d of activator supplement of the ruminal fermentation (table 1).

The pasture availability per rotation was calculated according to the method of Haydock and Shaw (1975), with frames of 0.25 m^2. The botanical composition was determined according to Mannetje and Haydock (1963) in a systematic design in zigzag, with 70 observations $paddock^{-1}$, on a grassland with 85.60 % of glycine (*Neonotonia wightii*), 8.40 % star grass (*Cynodon nlemfuensis*) and 6.00 % of weeds and naturalized pastures during the rainy season.

The animals were weighed monthly to calculate the accumulated DMG, duration of the stage and use of the land. The pastures samples were conducted simulating the animals' selection, as described by Senra (1977). The bromatological composition of the pasture was analyzed according to AOAC (1995). The ME was determined with the formulas of García-Trujillo and Pedroso (1989). The DM intake and the

Table 1. Composition of the ruminal fermentation activator supplement

Ingredients	Dry basis, %
Soybean meal	12.00
Sunflower meal	12.00
Rice polishing	16.00
Maize meal	7.50
Molasses	24.00
Poultry litter	10.00
Urea	3.50
Common salt	1.50
Mineral salt	1.60
Ammonium sulfate	0.50
Oil	3.00
Zeolite	1.00
Magnesium oxide	0.40
Calcium hydrate	7.00
Total	100.00
CP, %	13.70
ME, MJ	8.61

nutritional requirements were estimated according to Martín and Palma (1999). The INFOSTAT Balzarini *et al*. 2001 was used for analyzing the descriptive statistics of the results.

Results and Discussion

The possibility of conducting the pre-fattening of dairy crossbred males, 5/8Holstein x 3/8 Zebu, with the management and feeding applied to this associated pasture of grasses and tropical legumes, where favorable productive results in respect to the LW ha^{-1} were obtained (table 2).

This system allows using great number of male bovines from dairy cattle rearing for their use in beef meat production with superior fattening technologies in grazing or pens.

Castillo *et al*. (1991), with dairy crossbred male bovines in pre-fattening, reported DMG superior to 800.00 g. animal^{-1}, but with lower stocking rate of two animals ha^{-1} during the rainy season.

The result of this research was similar to that of Monzote (1982), who obtained between 500 and 600 g animal d^{-1} for the pre-fattening stage (between 120-250 kg of LW) in an associated system of glycine and grasses. This author also used dairy crossbred animals, but with stocking rate between two and three animals per hectare and applied only mineral supplementation.

The DMG was higher than that reported by Chao *et al*. (1982) and Monzote (1982), of 567 and 477 g animal^{-1}, with four and three dairy crossbred bovines per hectare, in grazing with herbaceous legumes, predominating glycine and grasses. The difference of this result could be related with the activator supplement of the ruminal fermentation used, the differences on the botanical composition, mainly the amount of legumes of the grassland and with the pasture availability.

Jordán (2002), Anon (2011) and Posada (2011) informed a DMG of 1200 g of LW animal^{-1}, with the use of 1.50 kg of an activator of the ruminal fermentation. This is similar to that offered in this study, although the authors cited used Zebu bulls, genotype with higher potential for meat production, under grazing conditions of improved tropical grasses, with good quality, irrigation and fertilization.

The DM availability in function of the grazing pressure was of 12.90 kg of DM per 100 kg of LW^{-1}, and satisfied the ingestion capacity of the animals. However, the stocking rate of four animals per hectare could lead to the consumption of the inferior strata of the plant that have higher nutritive quality. This is shown in the DMG of LW. The results of this study coincide with those of Senra *et al*. (1985), who reported that increasing the stocking rate may reduce the pasture selection by the animal and affect the productive results.

Table 2. Productive performance of dairy crossbred male bovines 5/8 Holstein x 3/8 Zebu in associated grazing

Indicators		SD ±
Association of glycine and tropical grasses, rainy season		
Initial LW, kg	134.02	11.78
Final LW, kg	228.28	22.75
Duration, d	160.00	-
DMG, g	589.13	10.68
Supplement intake, kg DM	1.50	-
Age at sale, d	490.00	31.00
LW total cattle, kg animal^{-1}	94.26	-
LW production per area, kg ha^{-1}	913.12	-

The energy-protein composition of the grassland (12.80 % of CP and 9.60 MJ of ME) and the supplementation covered the nutritional protein requirements (table 3). However, the energy was slightly below the requirements for the LW DMG of obtained.

In systems of herbaceous legumes and grasses association for the pre-fattening of Charolais de Cuba,

Table 3. Results of the energy-protein feeding balance, ratio total N: ME of the contribution and conversion of ME and CP in the diet of pre-fattening male bovines,5/8 Holstein x 3/8 Zebu

Diet of glycine and tropical grasses with activator supplement of rumen fermentation		
DM ingestion de MS, %		5.29
Contributions	ME, MJ	49.72
	PB, g	689.00
Requirements	ME, MJ	50.55
	PB, g	571.00
Difference	ME, MJ	(1.25)
	PB, g	118.00
N: ME ratio of the contribution, g MJ $^{-1}$		2.22
ME of the DMG^{-1} contribution, MJ g^{-1}		0.08
CP dof the DMG^{-1} contribution,, g g^{-1}		1.17

Díaz *et al*. (2008 and 2011) proved that the energy was not enough for covering the nutritional requirements. Also, the elimination of extra CP as urea (Chongo 1988 and 2002) could be and additional energy cost in this system.

The energy deficit of the ration could limit the obtainment of better productive results. Besides, the necessity of using feeds with higher energy value in grazing with high botanical composition of herbaceous legumes to increase the CP use of the contribution was shown.

This system allowed supplying high number of animals to the fattening. However, it corroborated the necessity of working with lower stocking rate or using feeds of higher energy content in the ration. In this way, the pasture CP is better used, higher DMG of LW is obtained and the incorporation age of the animals to the fattening stage is reduced.

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