



Effect of supplementation frequency on intake, behavior and performance in beef steers grazing Marandu grass



J.A.S. Morais^a, M.F.S. Queiroz^a, A. Keli^b, A. Vega^b, G. Fiorentini^{a,*},
R.C. Canesin^a, R.A. Reis^{a,c}, T.T. Berchielli^{a,c}

^a Department of Animal Science, São Paulo State University (UNESP)/Campus Jaboticabal, Rod. Professor Paulo Donato Castellane, km 5, Rural, Jaboticabal, São Paulo CEP: 14884-900, Brazil

^b Departamento de Producción Animal y Ciencia de los Alimentos, Facultad de Veterinaria, Miguel Servet 177, 50013 Zaragoza, Spain

^c INCT/CA – UFV – Department of Animal Science, Av. Peter Henry Rolfs, s/n – Campus Universitário, Viçosa, Minas Gerais CEP: 36570-000, Brazil

ARTICLE INFO

Article history:

Received 21 August 2013

Received in revised form

19 December 2013

Accepted 8 January 2014

Keywords:

Alkanes

Digestibility

Diurnal grazing time

Nellore steer

Supplementation strategies

Tropical grass

ABSTRACT

Eighteen Nellore steers, with an average initial body weight (BW) of 312 ± 10.6 kg, grazing *Brachiaria brizantha* cv. Marandu were assigned to three experimental treatments consisting of different supplementation frequencies (daily [DAI], Monday through Friday [M–F] and Monday, Wednesday and Friday [MWF]). The supplement was offered at a rate of 35.0 g kg^{-1} BW per week and contained 565 g kg^{-1} corn gluten meal-60, 235 g kg^{-1} dry sugarcane yeast, 140 g kg^{-1} citric pulp and 60 g kg^{-1} mineral premix. Animal performance (ADG), dry matter (DM) intake, DM digestibility, daily grazing time and pattern of supplement intake were evaluated in the steers from February to May. The forage DM intake was estimated using the alkane pair $\text{C}_{32}:\text{C}_{33}$ and the DM apparent digestibility using the alkane C_{35} as an internal marker. A reduction in supplementation frequency did not affect animal performance, with an average weight gain of 0.69 kg/d . Supplementation frequency did not affect ($P>0.05$) forage and total (forage + supplement) DM intakes or DM digestibility. However, forage and total DM intakes and DM apparent digestibility decreased significantly ($P<0.01$) from March to May, whereas grazing time during the day (from 06:00 h to 18:00 h) increased by 22% in the same period. The animals receiving infrequent supplementation (M–F and MWF) spent a greater portion of the day grazing when not given the supplement compared to days on which they received the supplement. Reducing the frequency of supplementation from 7 to 3 d per week is a viable method to reduce labor and equipment utilization costs as this reduction did not affect intake, digestibility or animal performance in the present study.

© 2014 Elsevier B.V. All rights reserved.

Abbreviations: ADFom, acid detergent fiber (expressed exclusive of residual ash); ADG, animal performance; aNDFom, neutral detergent fiber (assayed with a heat stable amylase and expressed exclusive of residual ash); BW, body weight; CP, crude protein; DAI, supplementation frequency (daily); DM, dry matter; EE, ether extract; lignin (sa), lignin determined by solubilization of cellulose with sulfuric acid; M–F, supplementation frequency from Monday to Friday; MWF, supplementation frequency, Monday, Wednesday and Friday; N, nitrogen.

* Corresponding author at: Departamento de Zootecnia, Faculdade de Ciências Agrárias e Veterinárias de Jaboticabal, Universidade Estadual Paulista “Júlio de Mesquita Filho”, Rod. Professor Paulo Donato Castellane, km 5, Rural, Jaboticabal, São Paulo CEP: 14884-900, Brazil. Tel.: +55 16 3209 2682.

E-mail address: giovanizoot@yahoo.com.br (G. Fiorentini).

Table 1
Chemical composition (DM g kg⁻¹) of ingredients and of the mixture used as supplement.

	Ingredients			Mixture
	Corn gluten meal	Dry sugarcane yeast	Citrus pulp	
Organic matter	985	933	936	909
Crude protein	661	344	94.5	478
Ether extract	32.0	2.00	20.0	22.1
Neutral detergent fiber	109	25.3	224	91.4
Acid detergent fiber	78.2	13.0	170	75.8
Non-fibrous carbohydrates ^a	182	561	597	317
Total carbohydrates ^a	291	587	821	409
Undegradable intake protein ^b	624	364	389	493

^a Total carbohydrates (TC) = 100 – (CP + EE + Ash); non-fibrous carbohydrates = TC – NDF.

^b According to Fox et al. (2000), g kg⁻¹ of the crude protein.

1. Introduction

Approximately half of the steers produced worldwide are reared in tropical and subtropical countries (Jank et al., 2005). In these countries, animal production systems are highly dependent on the use of natural resources as the basis of economical animal nutrition. The production of dry matter by tropical and subtropical forages is influenced by strong seasonal changes, resulting in important fluctuations in both quality and quantity (Da Silva and Carvalho, 2005) and hence in animal performance. Supplemental feeding to balance the nutrients in the diet of grazing animals could be an important tool in a nutritional strategy to increase productivity in grazing systems.

Factors, such as supplement type and quantity, the quantity and quality of forage available, season of the year and animal category to be supplemented, must be considered in a supplementation program. However, economic considerations can be crucial for the decision-making process with regard to the employment of this technology. For this reason, alternatives have been sought to minimize production costs without compromising production levels. One of the ways to achieve this objective is to diminish labor expenses and to utilize machinery and equipment for supplement distribution by reducing the frequency at which supplements are provided to the animals (Drewnoski and Poore, 2012). In general, studies have indicated that the effects of supplementation frequency on animal performance are small and that supplementation can be used as a tool to reduce operational costs (Huston et al., 1999; Bohnert et al., 2002a,b). However, little research has addressed the effects of supplementation frequency on Zebu cattle grazing Marandu grass, one of the forages most utilized in tropical areas. Therefore, the objective of this study was to determine the effect of reducing supplement frequency on the performance, forage intake, digestibility and ingestive behavior of Nelore steers maintained on a tropical pasture of *Brachiaria brizantha* cv. Marandu.

2. Materials and methods

2.1. Animals and diets

Eighteen Nelore steers, with an initial average initial body weight (BW) of 312 ± 10.6 kg, were allowed to graze on *B. brizantha* cv. Marandu. The animals were randomly distributed into three treatments consisting of three different frequencies of supplementation: daily (DAI, 7 times per week, supplement equivalent to 5 g kg⁻¹ of BW per dose); from Monday to Friday (M–F, 5 times per week, supplement equivalent to 7 g kg⁻¹ of BW per dose) and Monday, Wednesday and Friday (MWF, 3 times per week, supplement equivalent to 11.7 g kg⁻¹ of BW per dose). The supplement was provided to the animals at 08:00 h in plastic troughs within each paddock with an accessibility of 50 cm linear per head. The supplement was composed of 565 g kg⁻¹ corn gluten meal-60, 235 g kg⁻¹ dry sugarcane yeast, 140 g kg⁻¹ citrus pulp and 60 g kg⁻¹ mineral premix (Ca, 155 g kg⁻¹; P, 80 g kg⁻¹; Mg, 10 g kg⁻¹; S, 40 g kg⁻¹; Na, 130 g kg⁻¹; Cu, 1.35 mg kg⁻¹; Mn, 1.04 mg kg⁻¹; Zn, 5 mg kg⁻¹; I, 100 mg kg⁻¹; Co, 80 mg kg⁻¹; Se, 26 mg kg⁻¹; F (max.), 800 mg kg⁻¹). The chemical composition of the different ingredients is given in Table 1. The raw materials were chosen among those highly available locally and provided by-pass protein (corn gluten meal), energy (citrus pulp) and rumen degradable protein (sugar cane dry yeast). The last ingredient was also used as a flavoring agent. All the procedures involving the use of animals were approved by the São Paulo State University Ethics, Bioethics and Animal Welfare Committee.

2.2. Experimental design

The experiment was performed from February 2 to May 28, 2006, at a location (Brazil, 21°15'22" south, 48°18'58" west and 595 m above sea level) owned by the Agrarian Sciences and Veterinary College, São Paulo State University, SP. The climate is classified as humid subtropical climate (Köppen international system: Cwa), i.e., mesothermic with a dry winter; the average maximum annual temperature is 22.3 °C, and the average minimum annual temperature is 15.1 °C. The average annual precipitation is 140 cm, with 85% of the rainfall occurring between the months of October and March.

Download English Version:

<https://daneshyari.com/en/article/2419644>

Download Persian Version:

<https://daneshyari.com/article/2419644>

[Daneshyari.com](https://daneshyari.com)