Chemical composition of elephantgrass silage with cotton processing residue treated with urea

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Introduction The elephantgrass (*Pennisetum purpureum* Schum.) has high dry matter production and is largely used small farms in Brazil. In order to reduce losses in the elephantgrass silage, water holding foods have been added to make the fermentative pattern better. Among them, the residues of agriculture production are interesting because they have high availability and low cost. The ammonization improved nutritive value of cotton residue processing, as was demonstrated by Quadros et al. (2012), with the reduction of the fiber and increase of crude protein. The objective of this work was to evaluate the chemical composition of elephantgrass silage with two proportions (5 and 10% DM) of cotton processing residue, ammoniated or not with urea (0, 4 and 8% DM).

Materials and Methods The experiment was conducted at the Bahia State University, Campus – IX, Barreiras, Bahia, Brazil, in the Laboratory of the Animal Production Research Center, in December 2011. It was used a completely randomized design with 7 treatments and 3 replicates. The treatments were: EG100 = elephantgrass (control); CR5 = 5% cotton residue; CR10 = 10% cotton residue; CR5 4U = 5% cotton residue treated with 4% urea; CR5 8U = 5% cotton residue treated with 8% urea; CR10 4U = 10% cotton residue treated with 4% urea, and CR10 8U = 10% cotton residue treated with 8% urea.

The residue was gotten in regional cotton processing industry. The cotton residue was treated with 0, 4 and 8% urea (DM basis), and the urea was diluted with water to increase the moisture content to 30%. This treatment occurred during 28 days and after that the material was aerated for 72 hours before ensiling. It was used elephantgrass cv. Purple with 60 days of regrowth (15% DM). The grass was cut and chopped in particle sizes from 2 to 3 cm. After homogenization between the chopped material and the cotton residue, the forage mass was ensiled in mini silos, made with 20 L plastic buckets containing 4 kg of sand in the bottom to capture the effluent. The grass and the residue were mixed according to each treatment and compressed using feet, reaching an average density of 570 kg/m3. After 50 days, the silos were opened. At the opening of the silos samples were collected, dried in forced air circulation oven at a temperature of 50 º C for 72 hours. Then the samples were ground in a Wiley mill through 1 mm sieve. After that, the concentration of dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), neutral detergent insoluble nitrogen in relation to the total nitrogen (NDIN/TN) and nitrogen acid detergent insoluble in relation to the total nitrogen (NDIN/TN) were determined, according Silva and Queiroz (2002). Data were subjected to analysis of variance and means were compared by Tukey test at 5% probability, using the statistical program ASSISTAT.

Results and Discussion The dry matter (DM) concentration of silages increased with the addition of the residue from 13.34% in control to 21.25% with the inclusion of 10% of CR (Table 1). Treatments showed an average increase of 37% compared to the control. The addition of CR influenced the dry matter content in the silage because of its high dry matter

content (93%). The DM concentrations observed in this work were less than ideal for a good fermentation in elephant grass silages (25%) (Rezende et al., 2008).

The CP concentration did not differ (P>0.05). However NDF and ADF increased with the addition of CR, mainly in treatments with urea. The use of 10% of CR was effective for the reduction of NDF, and treatments with 5 to 10% of this residue were similar to treatment control for the ADF. This effect may have occurred by complexation of lignin with cell wall nitrogen supplied by the addition of urea (Rosa and Fadel, 2001). Also highlights the fact that the CR is rich in NDF (73.4%) (Quadros et al., 2012). It is observed that the levels of NDIN and ADIN showed significant increases for treatments that were ammoniated, meaning that 90% of total nitrogen is attached to the cell wall, made it unavailable for the rumen microorganisms action.

Table 1 Chemical composition of elephantgrass silages with two proportions (5 and 10%) of residue of cotton processing, ammoniated with urea (0, 4 and 8%).

Treatments	DM	CP	NDF	ADF	NDIN (%TN)	ADIN (%TN)
EG100%	13.3c	6.9a	65.4cd	39.7b	19.0b	6.5d
CR5%	15.7b	7.1a	61.5de	41.0b	22.5b	16.8cd
CR10%	19.8a	7.3a	59.3e	40.8b	28.5b	25.5bc
CR5% U4%	16.7b	6.6a	72.2ab	52.5a	54.3a	35.5ab
CR 5% U8%	19.5a	7.4a	68.8bc	51.4a	56.8a	44.4a
CR10% U4%	16.6b	7.8a	72.8a	53.1a	49.2a	38.0a
CR 10% U8%	21.2a	7.3a	70.7ab	50.7a	52.6a	41.7a
CV (%)	3.6	8.0	2.1	2.7	13.9	13.2

Means followed by the same letter in the column do not differ according to Tukey test (P>0.05).

Conclusions The addition of residue of cotton processing ammoniated did not improve the chemical composition of elephantgrass silage. However, without urea treatment, the residue increased the content of dry matter without changing the components of the fiber and nitrogen of silages.

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