FERMENTATIVE PROFILE OF SILAGE OF BRS CAPIAÇÚ ASSOCIATED WITH DIFFERENT ADDITIVES

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Resumo: Este trabalho objetivou avaliar diferentes aditivos na silagem de capim-BRS Capiaçú (*Pennisetum purpureum Schum*.) no perfil fermentativo. O experimento foi conduzido em delineamento inteiramente casualizado, sendo utilizado o capim BRS Capiaçú com quatro aditivos (10% de glicerina bruta, 10% de inclusão de feno da casca da banana, 10% de inclusão de peseudocolmo da bananeira e 10% de inclusão de feno da folha da bananeira), cinco repetições e o tratamento testemunha (silagem exclusiva BRS Capiaçú). Não houve diferença entre os tratamentos nas perdas gasosas (P = 0,40), com média de 2,67% de MS. As perdas de efluente foram maiores (P <0,01) na silagem de pseudocaule de bananeira (68,6 kg / t NM). O menor valor de pH (3,74) foi verificado na silagem de capim associada à glicerina. A silagem de capim BRS Capiaçu associada à inclusão de 10% na matéria natural de glicerina bruta ou casca de banana pré-seca melhora o perfil de fermentação e reduz as perdas durante o armazenamento.

Key words: ammoniacal nitrogen, gas losses, ph

Introduction

The production of ruminants in Brazil is based on nutritional forage plants whose nutritional value and food varies considerably throughout the year (Rigueira et al., 2018). Thus, the storage of forage by means of silage has been technique commonly used in the various regions of the country.

Grasses of the genus *Pennisetum* have been highlighted by the large volume of mass produced with emphasis on the cultivar BRS Capiaçú that produces about 30% more mass in relation to the other cultivars of the same species (Pereira et al., 2016). However, at the ideal cutting time for silage (2.5 to 3.5 m, 90 days) of the BRS Capiaçú, the dry matter content is below 28%, considered ideal for adequate fermentation capacity. Therefore, the use of additives in order to increase the dry matter content of the ensiled mass is necessary (Rigueira et al., 2018). The use of agroindustrial by-products is a low-cost alternative in certain regions and with potential for use in the ruminant diet (Rigueira et al., 2018). However, there are gaps in the knowledge of the fermentation profile of BRS Capiaçú silage associated with different additives.

Based on the above, the objective was to evaluate the fermentation profile of BRS Capiaçú silage associated with different agroindustrial additives.

Material and methods

The experiment was conducted in the Agrarian Sciences sector of the State University of Montes Claros, Janaúba Campus.

Elephant grass cv. BRS Capiaçú (*Pennisetum purpureum* Schum.) was used with four additives (10% inclusion of crude glycerin, 10% banana tree leaf hay, 10% inclusion of banana tree pseudostem hay, 10% inclusion of pre-dried banana peel) in a completely randomized design with five replicates and a control treatment (BRS Capiaçú silage without an additive). The inclusion of by-products was based on natural matter.

The forage was collected from pre-selected areas at the UNIMONTES Experimental Farm when it reached 3.5 meters in height (90 days). The forage was harvested from five hills, and the additive was added in the respective proportions and homogenized before ensiling.

To produce the silage, experimental PVC silos of known weight were used that were 50 cm long and 10 cm in diameter. The silos were stored at room temperature on the premises of the Laboratory of Food Analysis of UNIMONTES, and they were opened 60 days after ensiling.

The silage fermentation analyses were performed as follows: pH was determined using a potentiometer (digital) according to the methodology described by Silva and Queiroz (2006), and ammoniacal nitrogen, expressed as total nitrogen ($N\text{-}NH_3$, % DM), was analyzed using an approximately 25-g silage sample, as proposed by Bolsen et al. (1992). The dry matter losses from the silages in the forms of gases and effluent were quantified by differences in weight, according to (JOBIM et al., 2007).

The collected data were submitted to analysis of variance, and when the result of the "F" test was significant, the averages were compared by Scott Knott's test using the PROC GLM function (SAS Institute Inc., Cary, NC, USA). Differences were considered significant when $P < 0.05$.

Results and Discussion

The different additives added in BRS capiaçú grass silage did not affect gas losses during fermentation of the ensiled mass for 60 days ($P = 0.40$), with a mean of 2.67% DM (Table 1). The effluent losses were higher ($P <0.01$) in the silage fed with banana pseudostem hay, which was 36.58% higher than the grass silage associated with banana leaf hay and 61.03% higher than the control and additive silage with crude glycerin and banana peel (mean of 26.73 kg / t NM).

Table 1 - Losses and fermentative characteristics of BRS Capiaçú silage associated with different agroindustrial additives

Item[1]	Treatments [2]					SEM[3]	P-Value[4]
	Control	CS+CG	CS+BP	CS+PH	CS+LH		
Losses gases (% DM)	2.61	2.68	2.68	2.72	2.68	0.04	0.40
Effluent Losses (kg/t NM)	25.9 c	22.8 c	31.5 c	68.6 a	43.5 b	5.16	<0.01
pH	4.34 b	3.74 c	4.30 b	5.36 a	4.44 b	0.13	<0.01
Ammoniacal nitrogen (% TN)	7.16 b	5.76 c	6.17 c	3.68 d	9.20 a	0.43	<0.01

Means followed by same letter in the line does not differ by Scott-Knot test at 5% probability. [1]DM – dry matter; NM- natural matter; TN – total nitrogen; [2] Control – control silage; CS – BRS Capiaçú silage; CG – crude gliceryn; BP – banana peel; PH – pseudostem banana tree hay; LH – leaf banana tree hay; 10% of inclusion in the natural matter; [3] SEM – standart error means; [4] P- Probability.

Normally, the inclusion of moisture absorbing additives of the ensiled mass reduces losses by effluents in relation to the control silage as verified by Rigueira et al., (2018). However, controversial results may occur due to the inclusion level of the additive, not increasing the dry matter content. The higher losses of effluents in the silage with banana pseudostem hay implies in losses of nutrients by percolation next to the effluent produced during silage. These losses may be indicative of a reduction in the nutritional value of the ensiled mass.

The pH values of the ensiled mass were higher in the Capiaçú silage supplemented with pseudostem hay (P <0.01). the pH of the control silage did not differ from the silages added with banana peel and banana leaf hay, mean of 4.36. The lowest pH value was verified in grass silage associated with glycerin. In the Napier grass silage associated with 10% crude glycerin, Rigueira et al. (2018)

observed a pH value of 3.9. This is because glycerol contains glycerol which is rapidly used by the homofermentative bacteria synthesizing lactic acid, which compound is responsible for the rapid reduction of the pH of the ensiled mass due to its low pKa. The levels of ammoniacal nitrogen varied among the treatments (P <0.01) with higher values in the grass silage associated with 10% of banana leaf hay.

Conclusion

BRS Capiaçú grass silage associated with a 10% inclusion in natural matter of crude glycerin or pre-dried banana peel improves the fermentation profile and reduces losses during storage.

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