XVII International Silage Conference

XVII ISC 2015

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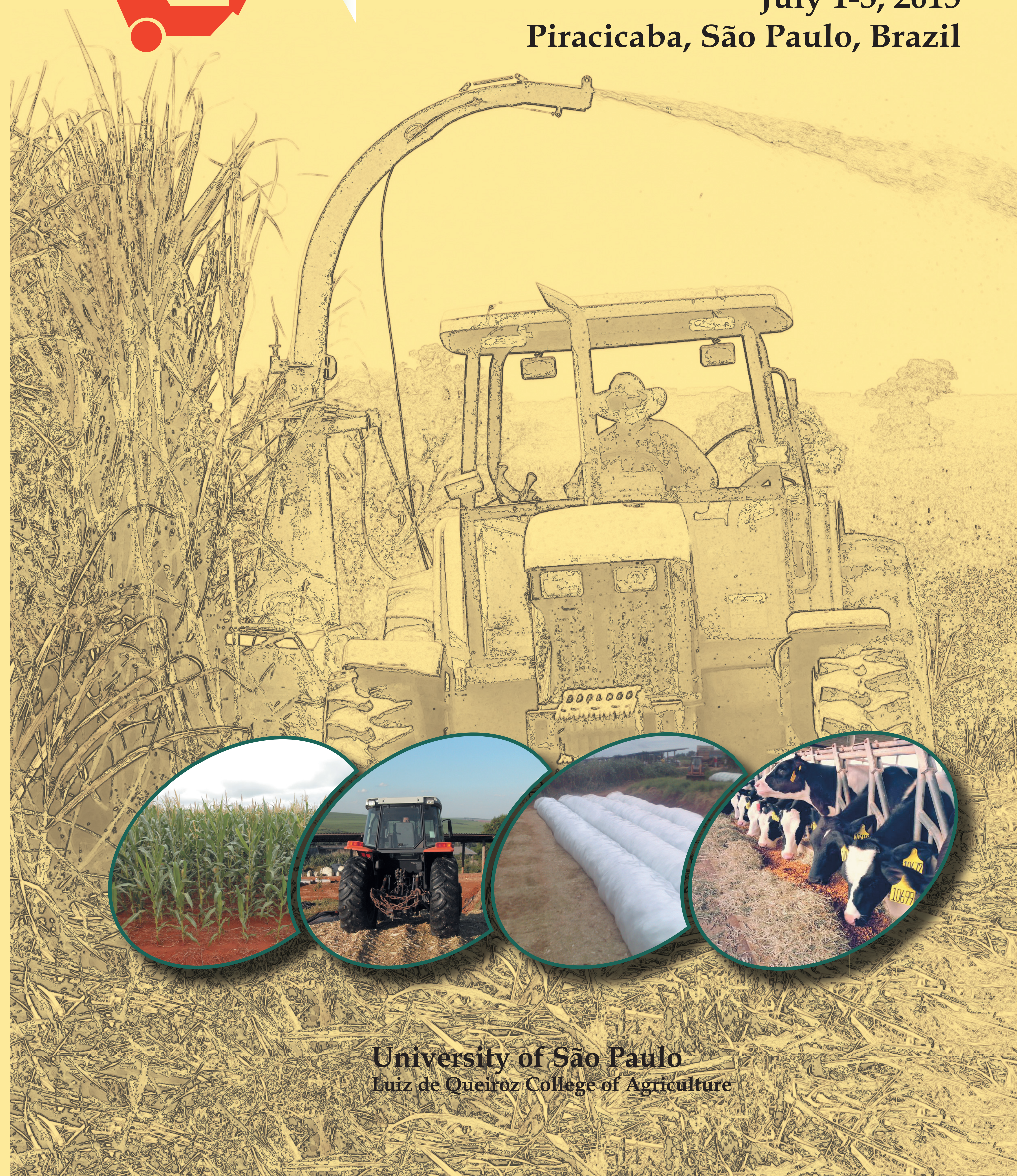

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Fermentative profile and losses in *Sorghum bicolor* silages from different cultivars

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Introduction *Sorghum bicolor* is a type of tall sorghum, higher than two meters, mainly characterized by having sweet and juicy stalk. For silage production, it has an easy cultivation, high yield, lower moisture demand and particularly good quality fermentation of the produced silage, achieved through adequate concentration of soluble carbohydrates, which are essential for lactic fermentation, without additives to stimulate fermentation, and nutritional value similar to corn silage (Gonçalves and Borges, 1997). Inside this context, we aimed to evaluate the fermentative profile and losses in *Sorghum bicolor* silages from different cultivars and two different periods of cultivation.

Materials and methods The experiment was conducted in University Federal of Mato Grosso in partnership with Embrapa Agrosylvipastoral. Sorghum was grown on a useful area of 600m², with due soil preparation and fertilization. The plots had 0.75 m spacing between planting rows with10 m length, resulting in 120.000 plants per hectare populations, with 10 rows per plot and a population of 9 plants per meter. The sorghum crop cycle lasted 90 days for the cultivars seeded on 28/02/2012 and 100 days for the cultivars seededon18/02/2012. The silages were prepared in 20 PVC mini-silos, with a volume of 2.75 liters, provided with Bunsen valves. Two sorghum cultivars of Embrapa, varieties CMSX 647 and BRS 506 early and late, were evaluated with two periods of cultivation (90 and 100 days), resulting in four treatments and five replicates per treatment: T1 – Early variety (90) CMSX 647, T2 – Late variety (100) CMSX 647, T3 - Early variety (90) BRS 506 and T4 - Late variety (100) BRS 506. After opening the silos, we evaluated titratable acidity and pH, according to methodologies from Silva and Queiroz (2002). Evaluations of the produced effluent were quantified as the difference in the weight of the silo and sandbag set before and after ensiling, compared with the fresh mass of the ensiled sample. The loss in dry matter (DM), which results from gas production, was determined by the difference of gross weight of DM at the ensiling and at the opening, relating with the ensiled DM, discounting the total weight of the set at the ensiling and opening. Total dry matter loss (TDM_L) was determined by the difference between the gross weight of DM at the ensiling and at the opening, compared with the ensiled DM. The experiment followed a completely randomized design, with five replicates per treatment. The analyzed characteristics were compared by partition of square sum of treatment in orthogonal contrasts, assessing: Contrast1=CMSXvsBRS; Contrast2 =CMSX 90vs CMSX100 and Contrast3 =BRS90vsBRS100, at 5% probability for type I error.

Results and discussion Values of dry matter (DM), pH, titratable acidity (TAC), effluent losses (EFF_L), gas losses (GAS_L) and total dry matter losses (TDM_L) are presented in

Table 1. Dry matter (DM) contents were significant (P<0.05) when CMSX 90 and CMSX 100were compared, as well as BRS 90 vs BRS 100.The DM content varies with the age of cut, type of stem and the percentage of grains. The pH range is in the optimal pattern of an ideal silage, between 3.8 and 4.2 (McDonald et al., 1991), ranging from 3.62 (CMSX 90 andBRS100) to 3.72 (BRS 90), with significant difference (P<0.05) only between BRS 90 and BRS100). Values of TAC ranged from 20.70 in BRS 90 to 25.01 in CMSX 90. Significance was found (P<0.05) in comparison with CMSX and BRS and comparing CMSX 90 and BRS100.

Table 1 Dry matter, fermentation profile, effluent losses, gas losses and dry matter loss of *Sorghum bicolor* silages

	Treatments				SEM[3]	Contrast *P*-value*		
	CMSX90	CMSX100	BRS90	BRS100		1	2	3
DM[1]	24.51	23.83	22.50	26.17	0.35	0.2239	0.0014	<0.0001
pH	3.62	3.63	3.72	3.62	0.16	0.1055	0.7460	0.0456
TAC[2]	25.01	23.51	20.70	21.97	0.64	<0.0001	0.0212	0.0779
EFF_L[3]	4.64	5.67	4.67	3.14	0.28	<0.0001	0.0021	<0.0001
GAS_L[3]	16.90	18.29	13.47	18.30	1.08	0.3540	0.7203	0.1174
TDM_L[3]	20.88	23.10	15.80	20.96	1.04	0.0973	0.5528	0.0849

[1] %; [2]Expressed in mL of 0.1N NaOH until pH reached 7.0; [3]% DM; [4]Error of the means; *Contrast 1 = CMSX vs BRS; Contrast 2 = CMSX 90 vs CMSX 100 and Contrast 3 = BRS 90 vs BRS 100

Effluent losses were higher for CMSX100 and lower for BRS100, being significant (P<0.05) for all contrasts. According to McDonald et al. (1991), these values are within the suitable considered limit for silage, ranging around 5-7% of total energy losses in the process, though not desirable during ensiling. Gas losses did not differ (P<0.05) in the evaluated contrasts, but were relatively high. Total DM losses were considered high, even if they have not been significant between treatments, with an average of 20.19%. According to Gourley and Lusk (1977), low DM losses are expected in silages with high content of soluble carbohydrates and DM greater than 20%. These losses are mainly from the formation of effluent, since high moisture content at the time of ensiling leads to greater losses of DM.

Conclusion The evaluated cultivars of *Sorghum bicolor* showed potential of ensilage, with adequate fermentative profile and low losses, with potential use in animal feed.

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