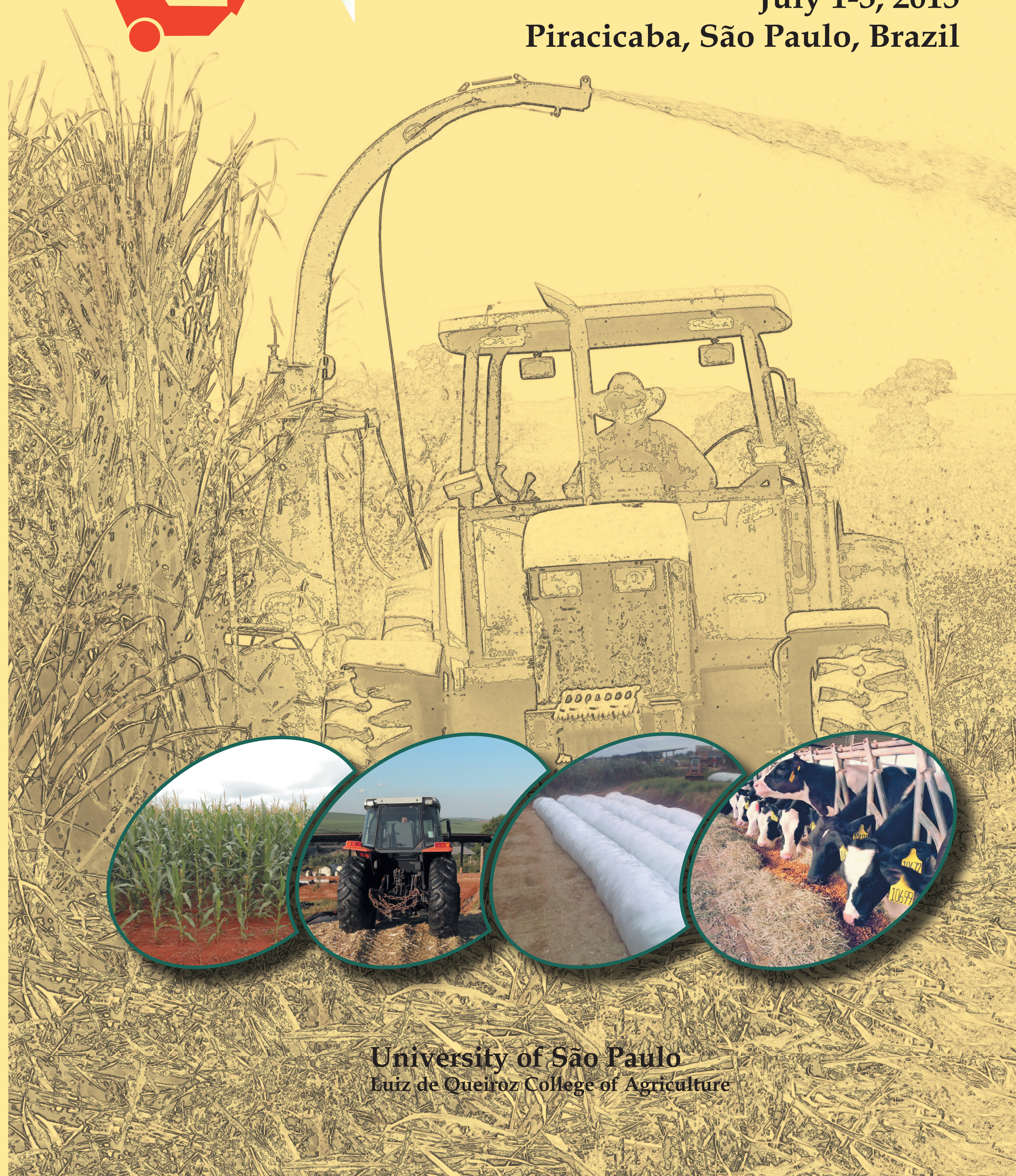
XVII International Silage Conference

July 1-3, 2015
Piracicaba, São Paulo, Brazil



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ISSN: 2175-4624
ISBN: 978-85-86481-38-3

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Proceedings of the
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Cover Design

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Printing and Book Design

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Proceedings of the
XVII International Silage Conference

XVII
I S C
2015

IV International Symposium on Forage Quality and Conservation

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Edited by

J. L. P. Daniel, G. Morais, D. Junges and L. G. Nussio

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International Silage Conference (17.: 2015 : Piracicaba, SP)
Proceedings … / edited by J. L. P. Daniel ... [et al.]. - - Piracicaba : ESALQ, 2015.
623 p. : il.

Publicado com: 4. International Symposium on Forage Quality and Conservation.
Realizado em Piracicaba, SP de 1 a 3 de julho de 2015.
ISBN: 978-85-86481-38-3

1. Forragem - Conservação - Qualidade 2. Silagem I. Daniel, J. L. P., ed. II. Morais, G., ed. III. Junges, D., ed. IV. Nussio, L. G., ed. V. Título

CDD 636.08552
I61p

ISBN 978-85-86481-38-3
ISSN 2175-4624

Chemical composition of elephant grass silage with different levels of soybean molasses and enzyme-microbial inoculant

D. C. Bolson[1], D. H. Pereira[2], D. S. Pina[2], A. C. Schroeder[2], M. L. B. Bourscheidt[2], N. M. F. Silva[2], B. C. Pedreira[3] and A. M. Jesus[2]
[1]Federal University of Mato Grosso, Sinop – MT, Brazil, CEP: 78550-728,
E-mail: dheymecristina@hotmail.com; *[2]Federal University of Mato Grosso, Sinop – MT, Brazil, CEP: 78550-728; [3]Embrapa Agrosylvipastoral – Sinop, Brazil, CEP: 78550-728*

Keywords dry matter, ensilage, forage conservation, tropical forage

Introduction Forage production seasonality is one of the serious obstacles in the Brazilian livestock, which causes fluctuations in the animal production. The cultivation of forage for cutting, grass stocking piles and silage are alternatives to reduce the food shortage problem in the scarcity period. Among the plant species, elephant grass *(Pennisetum purpureum* Shum.) stands out due to its high yield and good acceptance by the animals. In this context, the aim of this study was aimed to evaluate the chemical composition of silage from elephant grass with soy molasses and enzyme-microbial inoculant addition.

Materials and methods The experiment was conducted in UFMT/Sinop campus in partnership with Embrapa Agrosylvipastoral. Elephant grass (*Pennisetum purpureum*) cv. Roxo was ground and ensiled in 30 PVC silos, with diameter of 0.1 m and 0.35 m high, with a volume of 2,75 liters, provided with Bunsen valves. We used a completely randomized design, with three replicates per treatment, with or without addition of enzyme-microbial inoculant, associated with 5 soy molasses levels (0, 4, 8, 12 e 16% in the fresh matter). The enzyme-microbial inoculant Sil All C4 contained homofermentative bacteria (*Lactobacillus plantarum*, *Pediococcus acidilactici* and *Lactobacillus salivarius*) and heterofermentative bacteria (*Enterococcus faecium*), as well as enzymes (amylase, cellulase, xylanase and hemicellulase). Soy molasses (SM) contained 79.62% dry matter (DM); 86.87% organic matter (OM); 0.59% ether extract (EE); 10.69% crude protein (CP). Samples were predried in an oven, with forced air ventilation at 55 ºC and ground to a 1.0 mm diameter. The MS analyzes were determined by AOAC (1990) method. The crude protein (CP) was obtained by determining total nitrogen, according to the micro-Kjeldahl method. The ether extract (EE) was obtained by the ANKOM XT15 method (AOCS official procedure Am 5-04). The fiber analysis in neutral detergent fiber (NDF) and acid detergent fiber (ADF) were performed according to Van Soest and Robertson (1985), while the hemicellulose levels were calculated by the difference between the NDF and ADF. The effect of the addition or not of enzyme-microbial inoculant within each soy molasses' inclusion level was evaluated using Tukey's test. Evaluation of the effect of soy molasses' inclusion levels, with and without the addition of enzyme-microbial inoculant, was adjusted by the linear, quadratic and cubic regression models, considering 0.05 significance level for type I error.

Results and discussion There was no interaction between enzyme-microbial inoculant and soy molasses levels (Table 1). The inclusion or not of enzyme-microbial inoculant did not affect levels of DM, NDF, ADF, hemicellulose or EE. Inoculation increased the CP content, as the inoculant provides fermentation improvements, with a quick drop in pH and lower proteolysis, preventing nitrogen losses. The DM content in creased linearly according to the addition of SM (P<0.05), quantitatively an increase of 0.45 % for each 1% of SM added.

Table 1 Effect of the addition or not of enzyme-microbial inoculant and of the inclusion levels of soy molasses over the chemical composition of silage from elephant grass

	Inoculant		*P*-value	Soy Molasses levels					*P*-value	SEM[2]	Int[3]
	Without	With		0%	4%	8%	12%	16%			
DM (%)	19.39a	19.66a	0.1495	15.98	17.71	19.13	21.55	23.26	<0.0001	0.50	0.1142
OM[1]	89.42a	88.96b	<0.0001	88.47	89.17	89.55	89.45	89.32	<0.0001	0.32	0.1324
CP[1]	9.74b	10.18a	0.0018	9.32	9.61	9.87	10.35	10.65	<0.0001	0.42	0.1927
EE[1]	4.20a	4.02a	0.6792	3.22	3.76	4.05	4.03	5.49	0.0206	1.74	0.9836
NDF[1]	49.70a	49.58a	0.8728	60.94	54.04	47.77	44.35	41.04	<0.0001	1.12	0.3714
ADF[1]	30.13a	29.59a	0.3800	37.58	32.99	28.64	27.42	22.65	<0.0001	0.97	0.5065
HEM[1]	18.98a	19.83a	0.3461	23.36	21.04	19.13	16.93	16.57	0.0005	1.11	0.8211

[1] % DM; [2] standard error mean; [3] Interaction between variables; Means in the same row, followed by lowercase letters did not statistically differ, according to Tukey's Test with 5% probability for Type I error I.. $\hat{Y}_{DM} = 15.84 + 0.4554*SML$ ($r^2 = 96.75$); $\hat{Y}_{OM} = 88.55 + 0.1938*SML - 0.0094*SML^2$ ($R^2 =59.00$); $\hat{Y}_{CP} = 9.28 + 0.0813*SML$ ($r^2 =63.87$); $\hat{Y}_{EE} = 3.15 + 0.1264*SML$ ($r^2 =39.46$); $\hat{Y}_{NDF} = 59.53 - 1.1274*SML$ ($r^2 = 89.98$); $\hat{Y}_{ADF} = 36.94 - 0.8855*SML$ ($r^2 = 89.92$); $\hat{Y}_{HEM} = 23.02 - 0.4620*SML$ ($r^2 = 61.93$)

Addition of soy molasses had a quadratic effect on OM content, with a maximum content of 89.5% at 10.31% SM level. However, the decrease with the inoculation can be understood as an increase in bacterial population, and the consequent increase in consumption of soluble carbohydrates, which is part of the OM. The CP levels linearly raised (P<0.05) according to the increasing concentration of SM, which is explained by the CP content of the SM, changing positively the chemical composition of silage. The values of NDF, ADF and hemicellulose linearly decreased (P<0.05) according to the increased SM concentration, due to the low content of fibrous compounds. Gradual inclusion of SM linearly increased the EE content (P<0.05) of the silage, possibly because the EE content of the additive is higher than the EE grass content, which may interfere with the animal consumption at the highest level of SM inclusion.

Conclusion It is recommended the inclusion of 4% soy molasses (% natural material) of elephant grass silage for improved chemical composition of the silage, with increasing dry matter and crude protein.

References

AOAC. 1990. Official Methods of Analysis, 15th ed. Association of Official Analytical Chemists, Arlington, VA.

Van Soest, P.J., and J.B. Robertson. 1985. Analysis of forages and fibrous foods. Ithaca: Cornell University, 202p.