Chemical composition and digestibility of corn silage inoculated with *Lactobacillus buchneri* CNCM I-4323

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Introduction After opening silos, there is intense bacteria, moulds and yeasts activity that cause spoilage of the silages and reduce the feed quality. In this sense, the heterofermentative lactic acid bacteria, as *Lactobacillus buchneri*, are applied because reduce spoilage during aerobic exposure, and some strains of this microorganism may produce the ferulic acid esterase enzyme (Nsereko et al., 2008) that act on the fiber content (reduce or alter the structure) and improve the silage quality. Thus, our aim was to evaluate the influence of *L. buchneri* application on chemical composition and digestibility of corn silages.

Material and Methods A corn hybrid Impacto Víptera (Syngenta) was harvested at 279 g/kg of dry matter (DM), and chopped to achieve a theoretical length averaging 10 mm. It was evaluated forage ensiled without (control) or with $1x10^5$ cfu of *L. buchneri* CNCM I-4323 per gram of fresh matter. Inoculant was dissolved in water (0.7 L/t) and then applied with spray mounted on the fresh forage under constant mixing. The similar amount of water was applied in control silage. Eight silos were filled with 350 kg of corn forage each. Inoculation and packing was completed on the same day. After 229 days of ensiling, the silos were opened and samples were taken for characterization of silages. DM, mineral matter (MM), organic matter (OM), total nitrogen (TN) and ether extract (EE) was determined following the recommendations of AOAC (1996). The crude protein (CP) was obtained by the product between the TN and the factor 6.25. Neutral detergent fiber (aNDF) and acid detergent fiber (ADF) contents were estimated using the techniques described by Van Soest et al. (1991). Residual N (NDIN and ADIN) was analyzed. Lignin was determined after solubilization the cellulose in 72% sulfuric acid (Van Soest and Robertson, 1985). The total carbohydrates (CHO) and non-structural carbohydrates (NSC) were calculated according to Sniffen et al. (1992). *In vitro* apparent OM digestibility (IVDOM) was estimated by the gas production, as described by Mauricio et al. (1999). The IVDOM was estimated as described below:
IVDOM (g/kg) = 14.88 + ((0.889*gas24) + (0.045*CP) + (0.065*Ash))
where: gas24 equals the gas production in 24 h (mL 0.2 g^{-1} of DM) and the CP and ash contents are expressed in g/kg of DM.
The trial was conducted in a completely randomized design, with 16 replicates. Data were subjected to ANOVA by mixed model using the MIXED procedure of SAS (v. 9.0). Differences between the means were determined using DIFF. Significant differences were declared at 5% and tendencies between 5% and 10%.

Results and Discussion Silage inoculated with *L. buchneri* presented higher DM, ash and NSC contents and lower OM, EE, CP and NDF contents than control silage (Table 1). According to Nsereko et al. (2008), some *L. buchneri* strains can produce the ferulate esterase on silage. This might be the case of the strain used in this study, although we did not directly investigate it. Ferulic acid esterase releases ferulic acid from cell-wall arabinoxylans (Kang et al., 2009) and directly decreases fiber content, a mechanism that can account for the observed reduction of NDF and the consequent increase in NSC. There was higher IVDOM when used

the inoculant probably due to the lower NDF content and higher NSC. Gas production technique considers the conversion of all the main rich sources of metabolizable energy, such as pectins, starch, cellulose and hemicellulose into gases. Therefore, the higher NSC content produces more gas and allows obtaining higher IVDOM.

Table 1 Chemical composition and digestibility (g/kg of DM) of corn silages inoculated with *Lactobacillus buchneri* (LB).

Item	Control	LB	P value	SEM[1]
DM	242	257	0.09	0.596
Ash	34	38	0.04	0.114
OM	966	962	0.04	0.114
EE	40	37	0.01	0.090
CP	89	84	0.02	0.169
aNDF	312	284	0.08	1.090
apNDF[2]	284	261	0.12	1.040
ADF	179	167	0.20	0.644
Lignin (sa)	38	46	0.13	0.384
NDIN/TN	221	213	0.48	0.811
ADIN/TN	167	151	0.25	0.941
CHO	837	840	0.13	0.184
NSC	552	586	0.04	1.142
IVDOM	634	659	0.02	0.488

*Means followed by different letters differ by F test ($P<0.05$). [1]SEM = standard error mean; [2]apNDF = NDF corrected for residual ash and protein.

Conclusions Application of *Lactobacillus buchneri* reduced the fiber contents and improved the in vitro digestibility of organic matter.

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