Effect of corn silage with microbial inoculants on performance and microbial nitrogen supply of feedlot lambs

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Introduction Inoculants containing homofermentative lactic acid bacteria (^{ho}LAB) are added at ensiling to enhance the fermentation process, ensuring silage with better quality. Inoculants containing heterofermentative lactic acid bacteria are added in association with ^{ho}LAB to ensure a control of aerobic deterioration of silage after silo opening, due to production of antifungal compounds from these microorganisms. Moreover, *Bacillus* species also can be used as microbiological additives to overcome the problem of silage aerobic spoilage. Thus, the animals fed with this silages can be able to consume higher amounts of nutrients due to less deterioration after silo opening. Furthermore, according Weinberg et al. (2004), LAB can survive in ruminal conditions, changing the microbial population of rumen and promoting high animal performance, e.g. act as probiotic effect. *Bacillus subtilis* are used as probiotic to pigs and poultry, but its effect in ruminants are few studied. Therefore, this study aimed to evaluate intake, daily gain and microbial nitrogen supply in lambs fed corn silage ensiled with different microbial inoculants.

Materials and Methods A corn hybrid Impacto Víptera (Syngenta) was harvested at 40.4% DM, chopped and treated with $1x10^5$cfu of *Lactobacillus plantarum* "MA18/5U" combined with $1x10^5$cfu of *L. buchneri* "CNCM I-4323" (LPLB) or $1x10^5$cfu of *B. subtilis* "AT553098" (LPBS) per gram of forage, remaining a treatment uninoculated (control silage) ensiled in three stack silos with 40 t each (closed for 85 d). Thirty crossbreed lambs (BW around 29±3.0 kg), males, were divided in ten blocks into three treatments. Animals were adapted to the environment and diets for 14 days. Diet was composed of 60% of silage and 40% of concentrate (ingredients: corn meal, soybean meal, urea and mineral supplement) and was balanced to daily gain of 200 g/d. Lambs were housed in individual pens and fed *ad libitum* twice daily (7 am and 5 pm). Orts were weighed daily and dry matter intake (DMI) was measured. On day 25, s*pot* urine was collected 4 hours after feeding with collection bags from all animals. The 10-mL urine sample was diluted with 40 mL of a 0.036 N solution of H_2SO_4 and stored at -20°C for later analysis of purine derivatives to estimate microbial nitrogen supply according to Chen and Gomes (1995). Lambs were weighed after fasting (16 hours) at the beginning and end of the experimental period (approximately 53 days of feedlot) to obtain the average daily gain (ADG). Data were analyzed as randomized block by ANOVA using MIXED procedure of SAS (v. 9.0). Differences between the means were determined using DIFF (level of significance 5%).

Results and Discussion Lambs fed with LBLP silage had lower DM intake than animals that received control and LPBS silages, which can result in lower microbial nitrogen supply. Since some factors affecting microbial nitrogen supply among these are supply of fermentable energy, supply of nitrogen compounds, rumen outflow rate (related with dry matter intake) and rumen environment (ruminal pH) (Verbic, 2002). Furthermore, animals fed LPBS silage had a higher

microbial nitrogen supply, which may be due to the use of *Bacillus subtilis*, because is a microorganism widely used as probiotic in pig and poultry diets and these microorganisms may have benefited the rumen microorganisms. Although, we have found differences on DM intake and microbial N supply the average daily gain was not affected by the different inoculants added on the ensilage.

Table 1 Dry matter intake, microbial N supply and average daily gain (ADG) of lambs fed corn silages inoculated with microbial additives.

	Control	LBLP	LPBS	SEM[2]	P value
DMI (kg/d)	1.54[a]	1.28[c]	1.46[b]	0.06	0.0001
Allatoin (mmol/d)	18.87[b]	10.85[c]	25.42[a]	2.99	0.0001
Uric acid + Hypo + Xan (mmol/d)[1]	2.56[ab]	3.08[a]	2.32[b]	0.29	0.0180
Purine derivatives (mmol/d)	21.87[b]	15.76[c]	26.85[a]	2.65	0.0001
Microbial N supply (g/d)	18.90[b]	13.60[c]	23.20[a]	2.35	0.0001
ADG (kg/d)	0.232	0.213	0.212	0.01	0.2211

[1]Sum of hypoxanthine, xanthine and uric acid. [2]SEM: Standard error of the mean.

Conclusions The use of *Lactobacillus plantarum* combined *B. subtillis* added on the ensilage of corn plant affected the dry matter intake and microbial nitrogen supply of lambs.

References

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