Digestibility and nitrogen balance of sheep feeds with corn silage inoculated with *Lactobacillus plantarum* and relocated

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Keyword air exposure, inoculant, re-ensilage, total digestible nutrients

Introduction The relocation is characterized by the storage of silage, conventionally produced, in a new silo. However, the relocation time can last for hours or even days, exposing the forage mass to oxygen, making it susceptible to deterioration. The deterioration process may reduce the nutritional value of silage and consequently affect the nutrients digestibility, especially in silages with a good fermentation process potentiated. Thus, the aim with this study was to determine the relocation time effect of silages inoculated with *L. plantarum* on digestibility and nitrogen balance of sheep.

Material and Methods The corn was harvested when dry matter (DM) concentration was at 32.5%. The experimental treatments consisted of: C = control silage (not inoculated and not relocated); R-12h = reallocated by 12 h; IR-12h = inoculated with *L. plantarum* (1.0×10^5 colony forms units (CFU) per gram of fresh forage) relocated for 12 h; and R-24h = reallocated by 24 h, all with six repetitions. Twenty-four 200-L plastic gallon silos were used as experimental silos. The silos were opened after 30 d of storage time and relocated for 12 and 24 h. The silos were opened 45 d after relocation and the animals started to be supplied. For this assay, 24 Santa Inês sheeps, male, with initial body height 17.5 ± 1.83 kg were used during 21 d (14 d for management, feeding and environment adaptation + 7 d for sampling). For determination of nutrient digestibility, the feed and 10% of total feces of each animal were sampled. The percentage of total digestible nutrients were determined according to Sniffen et al. (1992). The nitrogen balance was calculated from the nitrogen in the feed provided, orts, feces and urine. The animal test was approved by the Animal Use Ethics Commission (CEUA) of UFRA, protocol Nº. 022/2016 (CEUA). A randomized block design was used and the variables were analyzed using the R software. Significant differences were assessed at the 5% probability level using 3 orthogonal contrasts: C x R-12h, IR-12h and R-24h; R-12h and IR-12h x R-24h; R-12h x IR-12h.

Results and Discussion The C silage EED was lower than other silages (Table 1). The lower EED is due to the higher [1]NDF intake from the control silage (1.51% BW^2) than non-relocated silage (1.34% BW), resulting in shorter EE stay time in the gastrointestinal tract. The NFCD and TDND in C silage was higher than in relocated silage (R-12h, IR-12h and R-24h) .The lower digestibility of these nutrients in relocated corn silage is due to the fact that they were exposed to oxygen during

[1]NDF = neutral detergent fiber; [2]BW = body weight

the process. According to Coelho et al. (2018), the relocation causes a decrease in the NFC, proportionally increasing the NDF concentration, resulting in a decrease in the digestibility of the feed. The relocation time of corn silages, with and without inoculant, did not alter the nitrogen balance from sheep (Table 1).

Table 1 Digestibility and nitrogen balance of sheep feed with *L. plantarum* corn silages and relocated.

Variables	Treatments				Contrast (P)		
	C[1]	R-12h[2]	IR-12h[3]	R-24h[4]	I[5]	II[6]	III[7]
Digestibility (%)							
DMD[8]	56.73	57.41	56.27	55.71	0.998	0.581	0.563
OMD[9]	55.21	52.06	54.28	53.49	0.583	0.932	0.607
CPD[10]	49.06	50.62	48.50	48.90	0.899	0.801	0.534
EED[11]	54.31	85.15	75.56	76.74	<0.05	0.222	0.531
NDFD[12]	62.41	56.21	56.57	52.34	0.129	0.418	0.950
NFCD[13]	75.79	64.60	68.79	71.42	<0.05	0.185	0.304
TDN[14]	77.40	68.33	67.68	67.85	<0.05	0.962	0.867
Nitrogen balance (g/d)							
IN[15]	6.38	6.66	6.61	7.18	0.359	0.242	0.745
AN[16]	3.02	2.86	3.06	3.15	1.000	0.579	0.605
RN[17]	2.68	2.70	2.92	2.99	0.561	0.611	0.586

[1]control; [2]silage relocated for 12h; [3]inoculated silage and relocated for 12h; [4] relocated silage for 24h; [5]I = non-relocated corn silage x relocated corn silage; [6]II = corn silage, inoculated or not, and relocated for 12h x corn silage relocated for 24h; [7]III = inoculated corn silage and relocated for 12 h x non-inoculated corn silage and relocated for 12 h; [8]dry matter digestibility; [9]organic matter digestibility; [10]crude protein digestibility; [11]ether extract digestibility; [12]neutral detergent fiber digestibility; [13]non-fibrous carbohydrates digestibility; [14]total digestible nutrients; [15]nitrogen intake; [16]nitrogen absorbed; [17]nitrogen retained.

Conclusion The reallocation of corn silage for 12 (with or without) or 24h reduces the DNFC and TDN. However, it increases the digestibility of the ether extract. The use of *L.plantarum* strains in silages relocated for 12h does not affect nutrient digestibility.

References

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