

EFFECTS OF DRY MATTER CONTENT AND HETEROFERMENTATIVE INOCULANT ON THE CONSERVATION OF WHOLE-PLANT CORN SILAGE

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Introduction

Recent agronomical challenges, such as drought, pests and diseases, especially leafhopper attack, have led to corn silage harvest at higher DM content (>40%). Meanwhile, some farmers are rehydrating the forage before ensiling, sometimes in combination with heterofermentative inoculants to improve aerobic stability. Therefore, the objective of this study was to evaluate the effects of an inoculant based on heterofermentative bacteria on the fermentation, chemical composition, aerobic stability and *in situ* ruminal degradability of whole-plant corn silage that underwent water stress and leafhopper attack, ensiled at different DM contents.

Material and methods

- Whole-plant corn was harvested at two maturity stages;
- The first harvest was performed when the corn plants had approximately 32% of DM (**DM32**) and the second harvest was performed when the corn plants reached approximately 42% of DM. During the second harvest, one-half of the forage was ensiled with its original DM (**DM42**) whereas the other half was rehydrated in order to reach 32% of DM (**DM32R**);
- All three DM conditions were ensiled after application of distilled water (**Control**) or 1.5×10^5 CFU g⁻¹ of *Lentilactobacillus buchneri* NCIMB 40788 + 1.5×10^5 CFU g⁻¹ of *Lentilactobacillus hilgardii* CNCM I-4785 (Magniva® Platinum 1; **LBLH**);
- Treated forages were ensiled in 7.2 L plastic buckets (experimental silos), with 4 replicates per treatment, totalizing 24 experimental silos;
- Stored period: 90 days;
- Data were analyzed using the MIXED procedure of SAS as a completely randomized design with a 3 × 2 factorial arrangement. Means were compared by Tukey-Kramer test ($\alpha = 0.05$).



Results

Table 1. Fermentation pattern, DM loss, aerobic stability, and *in situ* ruminal degradability of corn silage

Item	Treatment ¹						SEM ²	P-value ³		
	Control			LBLH				M	I	M×I
	DM32	DM32R	DM42	DM32	DM32R	DM42				
Dry matter, % FM	29.9 ^c	32.1 ^b	40.8 ^a	29.1 ^c	32.8 ^b	40.7 ^a	0.34	<0.01	0.89	0.29
LAB, log CFU g ⁻¹ FM	6.11	6.71	7.20	8.17	7.99	7.82	0.353	0.60	<0.01	0.18
Yeasts, log CFU g ⁻¹ FM	4.15 ^a	3.14 ^{cd}	4.03 ^{ab}	3.32 ^{bc}	2.44 ^d	3.08 ^{cd}	0.169	<0.01	<0.01	0.79
Molds, log CFU g ⁻¹ FM	2.74 ^{cd}	3.40 ^{abc}	4.11 ^a	2.16 ^d	3.13 ^{bc}	3.78 ^{ab}	0.146	<0.01	<0.01	0.59
pH	3.61 ^c	3.71 ^b	3.79 ^a	3.59 ^c	3.70 ^b	3.80 ^a	0.008	<0.01	0.306	0.46
Lactic acid, % DM	7.85 ^a	6.46 ^b	4.13 ^d	7.29 ^{ab}	5.32 ^c	4.18 ^d	0.217	<0.01	<0.01	0.04
Acetic acid, % DM	2.96 ^b	1.84 ^d	1.67 ^d	3.46 ^a	2.39 ^c	1.89 ^d	0.085	<0.01	<0.01	0.17
1,2-Propanediol, mg kg ⁻¹ DM	90.1 ^b	46.5 ^b	21.6 ^b	3662 ^a	4763 ^a	584 ^b	484.0	<0.01	<0.01	<0.01
DM loss, %	4.28	4.12	4.14	4.42	4.03	4.16	0.126	0.11	0.80	0.65
Aerobic stability, d	63.0 ^b	44.8 ^b	51.4 ^b	152 ^a	126 ^a	80.4 ^b	11.55	<0.01	<0.01	0.04
In situ starch degradability 12h, %	87.4 ^b	85.8 ^c	82.6 ^d	89.9 ^a	87.2 ^b	82.4 ^d	0.62	<0.01	0.03	0.10
In situ DM degradability 12h, %	57.7 ^a	54.7 ^{ab}	50.1 ^b	58.3 ^a	55.7 ^{ab}	50.2 ^b	1.98	<0.01	0.73	0.97
In situ NDF degradability 24h, %	49.1 ^a	38.5 ^b	35.1 ^b	48.9 ^a	39.4 ^b	35.3 ^b	2.79	<0.01	0.89	0.98
In situ DM degradability 24h, %	65.2 ^a	61.9 ^{ab}	58.7 ^b	65.7 ^a	63.1 ^{ab}	58.7 ^b	1.18	<0.01	0.71	0.95

¹Control: without addition of inoculant; LBLH: inoculation with 1.5×10^5 CFU g⁻¹ of *Lentilactobacillus buchneri* + 1.5×10^5 CFU g⁻¹ of *Lentilactobacillus hilgardii*.

²Standard error of the mean. ³M: dry matter content; I: inoculant; M×I: interaction between dry matter and inoculant.

Conclusion

Inoculating corn silage with *L. buchneri* and *L. hilgardii* (at 3×10^5 CFU g⁻¹) improved the aerobic stability in both regular and rehydrated forages with 32% DM. The inoculant also enhanced the ruminal starch degradability. Thus, rehydration plus heterofermentative inoculant may improve the quality of whole corn plant ensiled at high DM content, provided water is applied in adequate volume and evenly distributed to avoid percolation across silage layers.