Effectiveness of an isolated lactic acid bacteria strain on alfalfa silage

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Abstract: A Lactic acid bacteria (LAB) strain was isolated and evaluated for its ability to ferment alfalfa (*Medicago sativa* L.) into silage. The LAB strain was evaluated using the acid production ability test, morphological observation, gram staining, physiological, biochemical, and acid tolerance tests. The strain (Lc) was identified as Lactobacillus casei by sequencing 16S rDNA and was added to different moisture content alfalfa for ensiling with or without sucrose. Lc was gram-positive and catalase-negative rod bacterium and it produced acid from lactose, glucose, maltose, fructose, galactose, sucrose and did not produce acid from starch. pH values of low, medium and high moisture content alfalfa silage were significantly ($P < 0.05$) decreased by Lc. Lc increased lactic acid content, lactic: acetic ratio and decreased NH_3-N content, acetic acid content of medium moisture content alfalfa silage. Lc improved fermentation quality of alfalfa silage especially at medium moisture content and performed better when combined with sucrose.

Keywords

Lactic acid bacteria; Silage; 16S rDNA; moisture content

Table 1. Fermentation characteristics of alfalfa silage treated with Lc

Moisture content	Treatment	DM content (g kg^{-1})	pH	NH_3-N (%TN)	LA	AA	PA	BA	LA/AA
					(g kg^{-1}DM)				
High	Control	202.8^{f}	5.06^{b}	13.94^{a}	58.9^{bc}	23.3^{a}	2.5^{c}	1.4b	2.82^{def}
	Lc	206.9^{ef}	4.43^{d}	6.33^{b}	70.5^{b}	17.3^{abc}	0.4^{c}	6.7a	4.09^{bcd}
	Lc+S	214.5^{e}	4.10f^{g}	2.93^{c}	95.9^{a}	11.9^{c}	0.5^{c}	ND	8.51^{a}
Medium	Control	359.4^{d}	4.62^{c}	2.95^{c}	26.4^{d}	22.1^{a}	2.2^{c}	ND	1.21^{f}
	Lc	351.6^{d}	4.17^{f}	1.22^{d}	65.2^{b}	12.4^{c}	22.7^{a}	ND	5.20^{bc}
	Lc+S	373.3^{c}	4.02^{g}	0.93^{d}	86.3^{a}	14.3^{bc}	23.9^{a}	ND	6.02^{b}
Low	Control	438.4^{b}	5.40^{a}	1.05^{d}	34.8^{d}	20.4^{ab}	17.7^{b}	ND	1.73^{ef}
	Lc	438.3^{b}	4.29^{e}	0.73^{d}	48.4^{c}	13.8^{bc}	21.8^{a}	ND	3.57^{cde}
	Lc+S	449.6^{a}	4.15^{f}	0.76^{d}	66.0^{b}	14.3^{bc}	23.7^{a}	ND	4.68^{bcd}
SEM		19.33	0.09	0.87	4.83	1.04	2.25	1.30	0.46
M		**	**	**	**	NS	**	-	NS
Lc		NS	**	**	**	**	**	-	**
M×Lc		NS	**	**	**	NS	**	-	**

Values followed by different letters show significant differences among treatments p<0.05.

ND, not detected; S, sucrose; SEM, standard error of the mean.

** significant at 0.01, NS, not significant.