In vitro gas production and bacterial biomass estimation for lucerne silage inoculated with one of three lactic acid bacterial inoculants

F.E. Contreras-Govea[1], R.E. Muck[1], I. Filya[2], D.R. Mertens[1] and P.J. Weimer[1]
[1]*U.S. Department of Agriculture, Agricultural Research Service, U.S. Dairy Forage Research Center, Madison, Wisconsin 53706-1108 U.S.A. Email: fecontre@wisc.edu* [2]*Department of Animal Science, Uludag University, Bursa, Turkey*

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Introduction Silages inoculated with microbial inoculants frequently have a lower pH than non-inoculated crops. Less often inoculated crops have a positive effect on milk production (Weinberg & Muck, 1996). One hypothesis is that bacterial inoculants produce a probiotic effect that could enhance animal performance (Weinberg & Muck, 1996). Our objective was to use the method of Blümmel *et al*. (1997) to study differences in *in vitro* fermentation among lucerne silages inoculated with three microbial inoculants.

Material and methods Lucerne was ensiled in Weck® jars in two trials (48 and 39% DM) with four treatments (Table 1). The lucerne silages (1-g samples, wet-ground in a Büchi mixer, frozen until analysed) were incubated in sealed 160 ml serum bottles. *In vitro* gas kinetics was carried out at 39°C, and gas pressure was measured at 3, 6, 9, 24, 48 and 96 h (Weimer *et al.*, 2005). At 9 h, 4 bottles of each treatment were opened, pH measured, and microbial biomass yield estimated using the method of Blümmel *et al*. (1997). Statistical differences between treatments were determined using the MIX procedure of SAS®.

Results On average, the gas production increased linearly during the first 9 h of fermentation and was greater in control than inoculated silage. Although harvests were not statistically compared, greater GP, IVTD, and MBY were observed on second cut than first cut (Table 1). Even though treatment differences within harvests were not always significant, the trend among treatments was the same, lower GP and GE on Ecosyl MTD1 and *L. pentosus* (Agri-King, Inc.) than control and Pioneer 1174. In addition, lucerne inoculated with Ecosyl MTD1 had consistent trends toward higher IVTD and MBY than those of the control. Methane production was different among treatments, but trends were not consistent between cuts.

Table 1 Gas production (GP), *in vitro* true digestibility (IVTD), microbial biomass yield (MBY), gas efficiency (GE), methane produced (Methane), and methane efficiency (Meth E) of lucerne silage inoculated with one of four microbial inoculants. Values are means of two incubations at 9 h. Significance at $P<0.05$

Inoculant	GP (ml/g DM)	IVTD (mg/g DM)	MBY (mg/100 mg TD)	GE (ml/100 mg TD)	Methane (ml/g DM)	Meth E (ml/100 mg TD)
First cut						
Control	130a	715	25b	18a	6.8a	0.95a
Pioneer 1174	120b	713	26b	17a	6.2b	0.87b
Ecosyl MTD1	115c	723	29a	16b	5.7c	0.79c
L. pentosus	111c	704	25b	16b	5.5c	0.79c
s.e.m.	2.0	NS	1.53	1.11	0.15	0.023
Second cut						
Control	148b	788	32	19	6.4b	0.80b
Pioneer 1174	151a	786	33	19	7.7a	1.00a
Ecosyl MTD1	147b	804	34	18	7.9a	0.98a
L. pentosus	142c	806	33	18	7.8a	0.96a
s.e.m.	1.5	NS	NS	NS	0.39	0.045

Conclusions The results indicate that microbial inoculants, particularly Ecosyl MTD1, produced silages that shifted *in vitro* rumen fermentation toward less gas production and more microbial biomass than untreated silages.

References

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