

The Effects of Zeolite (Clinoptilolite) Supplementation on *In Vitro* Ruminant Digestion

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Introduction

- Cattle are known to contribute green house gas emissions through respiration, feces, and urine.
- NH₃ a product of protein metabolism has received much attention due to the increase demand for animal based proteins.
- Feed additives such as Zeolite (clinoptilolite) may be used to absorb NH₃ to decrease the exchange to the environment.
- However, little research has been done involving the effects of Zeolite on ruminant digestion.
- The objective of this study is to assess the effects of Zeolite (ZE) supplementation on *in vitro* rumen dry matter digestibility (IVDMD) of alfalfa at a 5% inclusion rate.

Method

- 96 test tubes containing 1 gram of alfalfa and 50 ml mixture of ruminal fluid and artificial saliva were incubated in a 39° C bath for hours 0, 1, 2, 4, 6, 8, 12, 24, and 48 hours.
- 6 blanks containing ruminal fluid and artificial saliva were used to account for endogenous losses.
- Whatman filter papers (#54) were weighed, labeled, and used for residue filtration.
- Calculation of percent digestion using equation: $1.00 - ((R-F) - \text{blank}/\text{oven-dried sample weight}) * 100 = \text{percent digestibility}$ (R = weight of residue and filter paper, F = weight of filter paper).

Results

Table 1. Effects of ZE supplementation on *in vitro* fermentation for trt (alfalfa + ZE (5%)) and ctrl (alfalfa). Mean was a percentage of total feed fermented during incubation.

Trt	Hours	N	Mean	Std. dev	SE	
Trt	0	6	18.1	5.47	2.23	
	1	6	19.0	1.64	0.67	
	2	6	22.8	2.51	1.02	
	4	6	24.9	2.15	0.88	
	6	6	28.9	1.59	0.65	
	12	5	32	1.32	0.59	
	24	2	44.9	0.71	0.5	
	48	6	53.5	1.05	0.43	
	Ctrl	0	5	20.2	2.89	1.29
		1	6	22.1	3.26	1.33
2		6	21.1	1.14	0.46	
4		5	27.2	1.67	0.75	
6		4	27.4	0.79	0.39	
12		6	30.9	1.98	0.81	
24		6	45.3	1.55	0.63	
48		6	54.3	1.58	0.65	

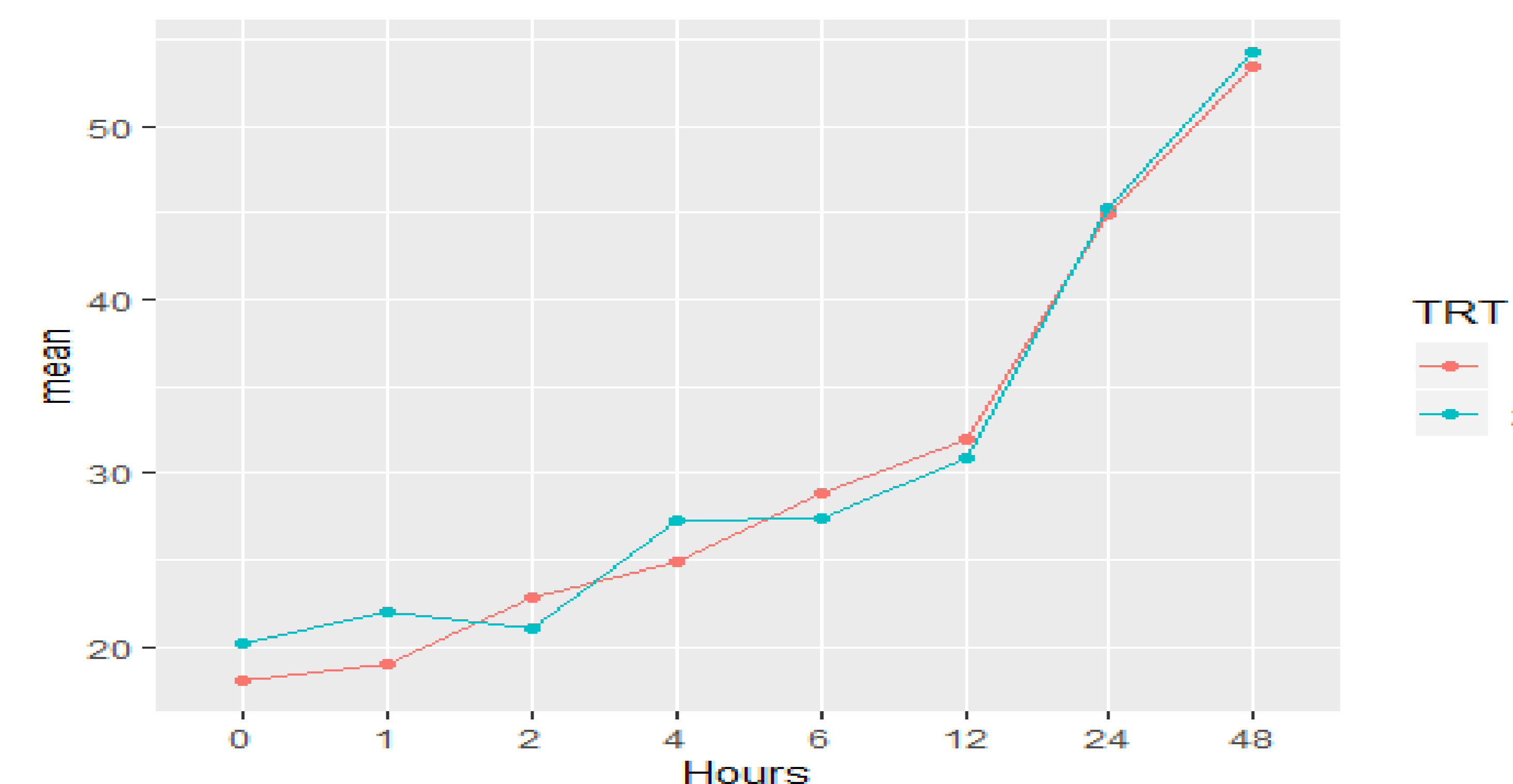


Fig 1. The differences in means for 1 (ZE + alfalfa) and 2 (alfalfa) over a 48-hour incubation period.

Discussion

- ZE supplementation was found not to influence *in vitro* digestibility of alfalfa.
- No significant difference was seen across treatments when averaged over hours (mean \pm SE, 30.5 ± 0.38 and 31.1 ± 0.37 % Digested/hr, p value = 0.266).
- Previous data indicates that inclusion of ZE may reduce cost of gain and/or influence liver abscess rates (unpublished data), it was uncertain if that would come at the cost of reduced digestibility of feed.
- Future research would also like to involve the nitrogen binding efficiency ZE following IVDMD.
- In conclusion, these data support the concept that there is likely minimal impacts of ZE on feed use, while they may provide improvements in environmental impact.

Contact Information

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Reference

Tilley, J. M. A., and R. A. Terry. 1963. A two-stage technique for the *in vitro* digestion of forage crops. *Grass Forage Sci.* doi:10.1111/j.1365-2494.1963.tb00335.x.