

Chemical Treatment with Different Levels of Acetic Organic Acid on *Agave tequilana* Weber Variety Blue Leafes for its Disappearance *in situ* in Canulated Ruminant

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Abstract: The effect of the treatment with acetic acid in 4 different concentrations: 0, 1.25 and 2.5% (Dry Matter) in Agave blue tequilana Weber leafes 24 h after harvesting, were tested *in situ* rummen digestion of dry matter, Neutral Detergent Fibre (NDF) and Acid Detergent Fibre (ADF) in a rummen cannulated Holstain Frisian. Incubation times for *in situ* procedures were 72, 96 and 120 h. *In situ* rates of dry matter disappearance were similar ($p>0.05$) and NDF. Nevertheless, there were found significative differences ($p<0.05$) for ADF between treatments at 96 and 120 h, where concentrations of 0 and 1.25% acetic acid showed better rates of digestibility (NDF and ADF) in comparison with 2.5% acetic acid treatment. At 120 h of incubation, treatment with 1.25% treatment had the best results followed by the control.

Key words: *Agave tequilana* Weber variety blue, digestibility *in situ*, chemical treatment, cannulated ruminant

INTRODUCTION

The majority of by-products from tequila industry in Mexico produces an environmental adverse impact, with the consequent economic cost in the quality of life of the inhabitants that live near these industries (González, 2005). The leaves of agave that ensue from this process for its characteristics in cellulose concentration and hemicullosas might serve as an ingredient for ruminants (Lopez *et al.*, 2003), with the treatment adapted as source of energy or fiber (Stefanie *et al.*, 2007).

Although high in fibre ADF (Acid Detergent Fibre) = 40.28%, NDF (Neutral Detergent Fibre) = 47.11% could be conducive to a slower rate of energy release in the rumen (Bassi, 2004). This could be advantageous to agave producers, environment and ruminant producers, in order to feed in a better way their animals, because of its fibrous nature (Silveira and Franco, 2006), which would be conducive to a slower rate of energy, compared to corn (Parra-Negrete, 2007), agave treated leafes may be a substitute for corn as a source of energy (Hall, 2004). However, almost nothing is known about degradation characteristics of agave leafes fibre reaction in rumen (Iñiguez-Covarrubias *et al.*, 2001a). The *in situ* nylon bag technique has been used extensively to determine rates of protein and dry matter disappearance of various feedstuffs. In the latest years, this technique has been used to determine rates of cell wall

digestion of forages. Although, this technique is laborious and requires a cannulated animal, no other environment simulates the rumen more closely (Iñiguez-Covarrubias *et al.*, 2001b).

Objectives were to characterize rates of original, NDF and ADF disappearance of agave blue tequilana Weber leafes *in situ* (Van Soest *et al.*, 1991).

MATERIALS AND METHODS

Agave blue tequilana Weber leafes were obtained 24 h after harvesting, from a single producer. The vegetable material was chopped with a cleaver baler provided with sieve of one inch of nominal diameter. The crushed material divided in 3 portions with the purpose of treating it with three levels of acetic acid (0, 1.25 and 2.5% on the basis of the dry matter of the forage). Stove-dried test feeds were ground through a 2 mm screen using a hammer mill. After this procedure, MS-matter dries, MO-organic, PC raw protein, were measured for the method of Kjeldhal and FDN, FDA and by Goering Van Soest (1991) method.

To determine the Digestibility *in situ* (DIS) of the MS, FDA and FDN of the experimental treatments, bags were used made of polyedates of 10×15 cm with a size of pore of 52±10 µm. These bags were dried in a stove at 55°C for 24 h, cooled in a desecador, weighed and identified. Every bag filled with 5 g with the treatments, which were before

ground in a mill of hammer by sieve of 2 mm. There were incubated in the rumen (of a cow holstein friesian fistulada and canulated, 7.5 cm) in triplicate for every treatment for 72, 96 and 120 h, realizing 3 continue times; also control bags were placed, without substratum and were included in every time of incubation.

Incubation in the rumen initiated at 08:00 h. The bags were added sequentially, in order that they all should remove at the same time; later they washed with drinkable water up to remaining clean. They were left to dry to temperature set and later in stove of air forced to 55°C for 24 h; later, dry weight was registered and determined DIS of the DM and for calculations of FDA and residual FDN by means of the already described techniques. The obtained information was analyzed by means of the procedure GLM in SAS. The averages of the treatments were compared with Tukey's test establishing an alfa 0.05 to declare differences.

RESULTS AND DISCUSSION

The chemical composition of the treatments (Table 1) was similar between the experimental treatments.

There were not find significant differences ($p>0.05$) between the treatments as for the digestibility *in situ* of the dry matter (Table 2) and detergent fiber neutral (Table 3). Nevertheless, for the detergent fiber acid show in Table 4 it was found significant differences ($p<0.05$) between treatments 96 and 120 h, where the concentration

Table 1: Chemical composition of the experimental treatments

TRAT	DM	OM	CP	CF	A	ADF	NDF
	(%)						
0	94.53	78.70	5.99	26.46	15.83	40.28	47.11
1.25	95.36	83.84	4.81	24.47	11.52	36.28	41.34
2.50	96.27	81.94	3.97	22.22	14.33	35.57	39.57

DM: Dry Matter, OM: Organic Matter, CP: Crude Protein, CF: Crude Fibre, A: Total Ashes, ADF: Acid Detergent Fibre, NDF: Neutral Detergent Fibre, TRAT: Treatment

Table 2: Coefficients of digestibility *in situ* of the dry matter of the experimental treatments

Incubation time (h)	Treatments (%)			
	0	1.25	2.5	SEM ¹
72	68.89	73.55	67.21	1.63
96	64.19	69.24	58.92	2.16
120	78.00	77.21	73.01	4.51

¹Standard error estándar from media

Table 3: Coefficients of digestibility *in situ* of the detergent fiber neutral of the experimental treatments

Incubation time (h)	Treatments (%)			
	0	1.25	2.5	SEM ¹
72	63.11	70.62	56.30	2.22
96	57.54	65.83	45.24	2.57
120	73.92	74.69	64.03	5.38

¹Standard error from media

Table 4: Coefficients of digestibility *in situ* of the detergent fiber acid of the experimental treatments

Incubation time (h)	Treatments (%)			
	0	1.25	2.5	SEM ¹
72	34.36	42.27	34.13	3.23
96	34.22a	32.86a	21.97b	0.45
120	38.09b	50.27a	45.78ab	1.02

^{a,b}values are different ($p<0.05$), ¹Standard error from media

of 0 and 1.25% of acetic acid presented the best values in comparison with that of 2.5%. At 120 h the treatment with 1.25% had the best values followed by 2.5% and the control.

CONCLUSION

The best performance for the rate of disappearance *in situ* of ADF and NDA was obtained by the treatment of acetic acid to 1.25% (DM). Not finding scientific literature to border, not even previous published, similar studies, discussion could not be developed.

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