

Effects of microbial additives on ruminal dry matter degradability of avocado (*Persia Americana*) pulp silage

D Nkosi^{A,B}, M Muya^A, RS Thomas^A, I Malebana^A, J Van Niekerk^B

^AAgricultural Research Council, Animal Production, Irene, South Africa

^B Centre for Sustainable Agriculture, University of the Free State, Bloemfontein, South Africa

^AEmail: DNkosi@arc.agric.za

Shortages of feed resources affect livestock production under emerging livestock farmers in South Africa. This can be overcome by the utilization of agro-industrial by-products, which contain valuable nutrients (De Evan *et al.*, 2019). Avocado (*Persia Americana*) pulp (AP) is a by-product from oil extraction in avocados, and contains valuable nutrients (Skenjana *et al.*, 2006) which can be beneficial to animal nutrition. The high moisture (700 g/kg DM) makes it difficult to use AP in animal nutrition; hence it should be preserved for future use. The present study evaluated the effects of microbial inoculation on ruminal DM degradation of AP silage. The silage was produced by mixing 800 g/kg AP, 150 g grape pomace (GP)/kg and 50 g sugarcane molasses/kg fresh material (FM). The mixture was treated with: 1) no additive (control), 2) Emsilage (EMS) and 3) Sil-All 4x4 W.S (Sil), and ensiled in 1.5 L anaerobic jars for 90 days. After 90 days of ensiling, silage samples were collected, dried and grounded to pass a 1 mm sieve. For the silage DM degradability study, 3 rumen cannulated Holstein cows were used. Triplicate samples of the treatments were sub-sampled, placed in polyester bags, and incubated simultaneously in the ventral rumen of each cow for 2, 4, 8, 16, 24, or 48 h.

Parameter	Treatment			SEM	P-value
	Control	EMS	Sil		
Fermentation characteristics					
WSC, g/kg DM	17.9 ^c	38.0 ^b	50.4 ^a	0.695	0.001
LAB log ¹⁰ CFU/kg	1.73 ^c	7.63 ^a	3.33 ^b	0.149	0.001
LA, g/kg DM	40.7 ^b	48.6 ^a	46.6 ^a	0.63	0.001
Degradability fraction					
A	33.4 ^b	37.3 ^a	34.4 ^b	0.33	0.004
B	34.0	36.7	34.9	3.12	0.838
C	0.07 ^b	0.03 ^c	0.09 ^a	0.01	0.001
PD	67.9	73.9	69.3	3.06	0.358
ED	57.2 ^b	49.3 ^c	62.1 ^a	0.97	0.003

WSC = water-soluble carbohydrates; LAB = lactic acid bacteria; LA = lactic acid; a = soluble fraction; b = potentially degradable fraction; c = degradation rate constant of the b fraction; PD = extent of degradation (a + b); ED = effective degradability (outflow rate = 0.05). Treatments: EMS = Emsilage; Sil = Sil-All

Table 1 Effects of treatment on the fermentation characteristics and the degradability of dry matter in ensiled avocado mixture (n = 3)

Microbial inoculation to AP silage increased lactic acid bacteria population, which subsequently increased residual fermentation substrate and lactic acid content (Table 1). Potential degradable fraction and the extent of degradation were similar amongst the silage treatments. However, the EMS treatment had higher soluble fractions and lower degradation rate of DM compared to other treatments. The Sil inoculation improved the effective degradation of silage DM compared to other treatments. Microbial inoculation improved the quality of AP silage and further work to test this silage on growth performance of ruminants is needed.

References

De Evan, T., Vintimilla, A., Marcos, C.N., José Ranilla, M. & Carro, M.D., 2019. Anim. 9, 588-601
Skenjana, A., van Ryssen, J.B.J. & van Niekerk, W.A., 2006. S. Afr. J. Anim. Sci., 36, 78-81.