

Relative effects of flavomycin, narasin and virginiamycin on rumen fermentation in vitro

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Overconsumption of grain leads to acidosis in ruminants due to a rapid increase in lactic acid concentration in the rumen. Antimicrobial feed additives differ in their efficacy in reducing lactic acid production by a mixed rumen population (eg 1). In this study the antimicrobial feed additives flavomycin, narasin and virginiamycin were compared in vitro.

Each antibiotic feed additive (at 0, 2, 8 or 16 µg active ingredient/mL rumen fluid) was added to 30 mL of strained, ovine rumen fluid and excess substrate (5 g of ground wheat). Triplicate cultures were incubated in a shaking water bath at 38°C until pH inhibited fermentation. Final pH was between 4.53 and 4.94. Volatile fatty acids (VFA) were quantified using gas chromatography. L-lactic acid was determined enzymatically after adding 0.5 mL 10% HClO₄ to a 5 mL aliquot, centrifuging and adjusting to pH 7 with 1 M NaOH.

	Active (µg/mL)	Virginiamycin	Flavomycin	Narasin
Lactate (mmol/L)	0	32.3 ± 2.4 ^a	32.1 ± 2.01	39.8 ± 2.01
	2	24.3 ± 2.4 ^{ab}	37.6 ± 2.01 ^x	31.8 ± 2.01
	8	18.6 ± 2.4 ^{bx}	40.0 ± 2.01	40.9 ± 2.46
	16	21.2 ± 2.01 ^{ab}	53.3 ± 2.01 ^{ax}	36.0 ± 2.01 ^y
Total VFA (mmol/L)	0	167.5 ± 2.93	174.7 ± 3.58	156.1 ± 2.93
	2	163.6 ± 3.58	161.8 ± 2.93	164.0 ± 2.93
	8	158.0 ± 2.93	158.4 ± 2.93	160.9 ± 2.93
	16	155.0 ± 2.93	160.7 ± 2.93	162.7 ± 2.93
Acetate : propionate (Ac : Pr)	0	1.76 ± 0.02 ^a	1.75 ± 0.026	1.79 ± 0.02 ^a
	2	1.38 ± 0.032	1.71 ± 0.02 ^a	1.55 ± 0.02 ^a
	8	1.24 ± 0.02 ^a	1.62 ± 0.026	1.51 ± 0.026
	16	1.26 ± 0.026	1.73 ± 0.03 ^x	1.33 ± 0.02 ^b

Values are least squares means ± sem. Values with different superscripts differ ($P < 0.05$): ab indicate differences within columns, xy indicate differences within rows.

Virginiamycin and narasin were effective in enhancing propionate production, but narasin was ineffective in inhibiting lactic acid production (Table). Flavomycin was ineffective either in reducing lactic acid production or in enhancing propionate production. Flavomycin is unlikely to be effective in preventing acidosis. If virginiamycin or narasin are used as feed additives while animals are introduced slowly to a grain diet then propionate production may be enhanced. This effect of virginiamycin is consistent with results obtained in vivo in sheep (2).

1. Nagaraja TG, Taylor MB, Harmon DL, Boyer JE. In vitro lactic acid inhibition and alterations in volatile fatty acid production by antimicrobial feed additives. *J Animal Sci* 1987;65:1064-76.
2. Godfrey SI, Boyce MD, Rowe JB, Speijers EJ. Changes within the digestive tract of sheep following engorgement with barley. *Austr J Agric Res* 1992;44:1093-101.