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EFFECT OF MONENSIN ON ENERGY METABOLISM OF PREGNANT EWES

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Altering ruminal fermentation so that more propionate and less acetate are produced by the micro-organisms may increase feed efficiency, because microbial production of propionate is more efficient than acetate production. Such a change,' if achieved, may be of particular value to the pregnant animal, since rate of glucose utilization, and hence need for gluconeogenic precursors such as propionate, increases during pregnancy. We tried to determine if Monensin? could alter the ruminal fermentation pattern and hence increase the rate of glucose entry in pregnant ewes.

Eight uniparous Merino ewes (43.8 ± 0.7 kg) were continuously fed a diet of 90% hammermilled lucerne hay (560 g DOM, 31.8 g N/kg DM) and 10% hominy meal at 39.5 g DM/$kg^{3/4}$, an amount calculated to meet net energy requirements of the ewes 100 days after mating. Monensin (20 mg/kg) was added to the feed of four ewes. Rate of entry of 2-^{3}H-glucose was measured 104 and 118 days after mating, as were concentration of βOH butyrate in the ewes' venous plasma and molar proportions of volatile fatty acids and number of protozoa in the ewes' ruminal fluid. We planned that measurements also be made at 132 and 146 days after mating but four of the eight ewes (two each treatment) contracted toxoplasmosis and aborted between 125 and 130 days after mating. The experiment was terminated at that stage.

Monensin decreased the molar proportion of ruminal acetate (62.2 ± 0.4 v. 67.3 ± 0.7, P<0.05) and increased the molar proportion of ruminal propionate (28.4 ± 0.5 v. 22.8 ± 0.6, P<0.05), but did not affect the molar proportions of the other volatile fatty acids. The number of protozoans in the rumen was reduced by Monensin ((3.148 ± 0.619 v. 5.115 ± 0.47) x 10^{6}, P<0. 05). 2-^{3}H-glucose entry rate increased (P<0.05) at 104 days after mating (5.80 ± 0.11 v. 5.13 ± 0.20 mg glucose/min/$kg^{3/4}$, P<0.05) but there was no difference 118 days after mating (5.42 ± 0.14 v. 5.23 ± 0.39 mg glucose/min/$kg^{3/4}$). However, whilst plasma βOH butyrate concentrations were no different 104 days after mating (3.58 ± 0.15 v. 4.44 ± 1.19 mg βOH butyrate/dl) the plasma concentrations in Monensin-treated ewes were significantly lower at 118 days after mating (3.5 ± 0.10 v. 6.18 ± 3.59 mg βOH butyrate/dl, P<0.05).

The variation in the measured parameters between 104 and 118 days after mating largely reflects the level of feed intake. The net energy requirements of a ewe pregnant with one foetus are some 10% higher at 118 than at 104 days after mating. Whereas an increased supply of exogenous glucose precursors could increase glucose entry rate where there was no net synthesis of glucose from maternal tissue (as at 104 days), when glucose production exceeds supply of exogenous precursors an increase (in precursors) would result in decreased tissue catabolism and lower βOH butyrate concentrations (as at 118 days after mating). The results are consistent with Monensin increasing the supply of glucose precursors to the pregnant ewes.

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†Monensin (trade name, Rumensin), is a product of Eli Lilly and Company.