INFUSION OF BRANCHED CHAIN AMINO ACIDS WILL INCREASE OVULATION RATE IN THE EWE

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The provision of lupin grain supplements for 4-5 days in the luteal phase will increase ovulation rate in the ewe. It is unclear why the improved nutrition gives this *response* and accordingly the following study was conducted as part of a series of experiments to investigate which nutrients could be involved.

Twenty three (BLxM) crossbred ewes 5 years of age were housed in individual pens and fed to appetite a diet of ground oaten straw supplemented with minerals; fresh feed was offered once daily. Oestrus was synchronised by two 125 ug, intramuscular injections of synthetic prostaglandin (PG) spaced 10 days apart, the first 4 days after the start of feeding. Nine days after the second PG injection all ewes were fitted with indwelling catheters in both jugular veins. On the following day, all ewes were infused with physiological saline commencing at 1700 h. On the next day, starting at 1000 h, 12 ewes *were* each infused with a mixture of branched chain amino acids (1-valine 9.5 g + l-leucine 12.3 g + 1-isoleucine 11.3 g/day) for 5 days while 11 control ewes continued on saline. All ewes received a third PG injection at the end of the infusion, and 10 days later were examined by endoscopy to determine ovulation rate. On the third day of amino acid infusion, 3 ml blood samples were taken every 20 min for 24 h and circulating levels of the various hormones were determined by R.I.A. LH was determined in all samples and prolactin (PRL) and FSH were determined in hourly samples. Samples collected 0-3 h and 21-24 h after the start of bleeding were assayed for insulin.

Ewes infused with the amino acids had an increased mean (± s.e.) ovulation rate (2.3 ± 0.2 v 1.5 ± 0.2, P<0.02). In the control group, five ewes, had a single ovulation and six had two ovulations. Nine treated ewes had two, two had three and one had four ovulations. Control ewes had a mean (± s.e.) feed intake of 665 ± 26 g which decreased to 588 ± 62 g during the infusion (difference n.s.). Over the same period, the food intake of the ewes infused with mixture of amino acids decreased from 630 ± 40 g to 327 ± 78 g (P < 0.002). Over the experimental period, live weight decreased by 4.5 kg in the control group and by 5.2 kg in the treated group (difference n.s.). Data on hormonal levels are presented in Table 1.

Table 1 Mean (± s.e.) luteal phase hormone levels (ug/l) and LH pulse interval (min) in ewes infused with a mixture of valine, leucine and isoleucine

Treatment	FSH	PRL	Insulin	LH pulse interval
Saline (n=10)	1.1 ± 0.1	19.4 ± 0.8	0.2 ± 0	261 ± 23
Amino acids (n=11)	1.2 ± 0.2	23.1 ± 2.2	0.7 ± 0.1	346 ± 85
Probability	0.72	0.1	0.001	0.344

This experiment has shown that increased supply of branched chain amino acids can increase ovulation rate in ewes fed a low quality diet. This effect does not appear to involve an increase in gonadotrophin levels (Table 1). In ewes fed low energy, low protein diets, the branched chain amino acids can act as a source of energy and we speculate that the resulting increase in circulating insulin levels (Table 1) could be involved in the ovulation response observed. Insulin or other metabolic hormones can alter ovarian response to gonadotrophin8 thus providing a possible link between nutrient status and ovarian function.

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