

Short-term Lupin Feeding: Can it Decrease Ovulation Rate in Merino Ewes?

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Low ovulation rate (OR) is a significant problem in Australian Merino ewes and contributes to reproductive wastage and economic loss to Australian sheep producers. OR can be increased through short-term lupin feeding regimes of only 4 to 6 days, however, these treatments must be given at a specific time (days 9 to 14) in the oestrous cycle of the ewe (Scaramuzzi *et al* 2006). While this target period is well established, preliminary evidence indicates that feeding lupins on days 15 to 17 of the oestrous cycle may decrease ovulation rate, thereby negating gains achieved earlier in the cycle (Smith and Stewart 1990; Stewart 1990). Confirmation of these findings would limit the implementation of short-term feeding regimes in commercial ewe flocks where there would be considerable variation in the timing of ovulation. Therefore, the aims of the current study were to determine whether mean OR in Merino ewes fed lupins on days 15 to 17 of the oestrous cycle was lower than ewes fed the control diet or similar to ewes fed lupins on days 9 to 14, and to examine possible mechanisms underlying these effects.

Ninety Merino ewes (age 3-8 years) were randomly allocated to one of three treatment groups according to mean body condition score (2.85 ± 0.03) and liveweight (62.40 ± 0.62 kg) and their oestrous cycles were synchronised with Eazibreed® Sheep CIDRs (Pfizer, Australia). Ewes were housed in individual pens and fed a commercially formulated maintenance pellet (ME = 7.6 MJ/kg DM, CP = 5.6% DM, Control, $n = 30$) or the Control diet supplemented with 500 g/day lupin grain (ME = 13.5 MJ/kg DM, CP = 35.5% DM) over either days 9 to 14 (Lupins 9-14, $n = 30$) or days 15 to 17 of the cycle (Lupins 15-17, $n = 30$). Treatment diets were fed in a cross-over design over two cycles and OR was measured via transrectal ultrasonography (Aloka SSD-500, 7.5 MHz, Vinales *et al* 2004) and laparoscopy (Evans and Maxwell, 1987). Proportion of ewes ovulating and mean ovulation rate were analysed using Chi-squared and Mixed model procedure, respectively, in the SAS program.

A greater proportion of ewes over both Lupin groups ovulated compared with the Control (Table 1). Mean OR tended ($p = 0.11$) to be higher in ewes fed Lupins 9-14 than ewes fed the Control or Lupins 15-17 diets, indicating successful targeting of the critical period for increasing OR in the oestrous cycle. Mean OR of ewes with Lupins 15-17 ration was not significantly different from that of ewes fed the Control diet ($p = 0.95$). This disagrees with previous hypotheses indicating a reduction in OR when feeding high protein or energy feeds during this period of the oestrous cycle. Further analyses will determine whether blood variables such as glucose or insulin are related to OR, thereby providing evidence for a mechanism linking short-term feeding and OR. Further work extending lupin feeding from days 9 to 17 is required to confirm the findings of the current study.

Table 1. Mean ovulation rate over two cycles in ewes fed a control diet or supplemented with lupins on days 9 to 14 or days 15 to 17 of the oestrous cycle

Treatment	N	Proportion of ewes ovulating % ^a	Mean ovulation rate of ovulating ewes (\pm s.e.)
Control	56	70 (39 / 56)	1.33 \pm 0.09
Lupins day 9 - 14	51	82 (42 / 51)	1.52 \pm 0.08
Lupins day 15 - 17	55	84 (46 / 55)	1.33 \pm 0.08

^a P values for difference between Control and Lupins 15-17 ($p = 0.082$); Control and Lupins 9-14 ($p = 0.126$).

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