

Effect of lupin supplementation during mating on the productive performance of Merino ewes in the Swartland

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The effect of lupin supplementation during mating on the reproduction of autumn-lambing Merino ewes was studied relative to an unsupplemented control group. A total of 158 ewes were available for lambing in 1985, 229 in 1987 and 185 in 1988. The diet of the ewes during the mating period was supplemented by 350 g grain (*Lupinus angustifolius*) per ewe every second day in the 1985 and 1987 lambing seasons, and by 250 g grain (*Lupinus albus*) daily during the 1988 season. Live mass and body condition of the ewes were unaffected by lupin supplementation relative to the control group over the entire observation period. Reproductive performance was also largely unaffected by lupin supplementation. Owing to the variable responses obtained from the present investigation, as well as those reported in the literature, it is impossible to unconditionally recommend the supplementation of lupin grain for Merino ewes on stubble lands for an increased reproduction rate.

Die effek van lupien-aanvulling gedurende paring op die reproduksie van Merino-ooie wat in die herfs lam, is onder tipiese Swartlandtoestande relatief tot 'n onaangevulde kontrolegroep ondersoek. 'n Totaal van 158 ooie was vir die 1985-lamseisoen, 229 vir die 1987-lamseisoen en 185 vir die 1988-lamseisoen beskikbaar. Aanvullingstelsels het die tweedaaglikse aanvulling van 350 g *Lupinus angustifolius*-pitte per ooi tydens die 1985 en 1987 lamseisoene ingesluit, terwyl 250 g *Lupinus albus*-pitte daaglik tydens paring vir die 1988 lamseisoen aangevul is. Liggaamsmassa en -kondisie van ooie is nie op enige stadium deur lupienaanvulling, relatief tot die onaangevulde kontrolegroep, beïnvloed nie. Reproduksie was grootliks onafhanklik van lupienaanvulling. Weens die veranderlike response in reproduksietempo

in die onderhawige studie, sowel as in die literatuur, is dit onmoontlik om lupien-aanvulling van Merino-ooie op stoppellande vir 'n verhoogde reprodusietempo onvoorwaardelik aan te beveel.

Keywords: Live mass, lupin supplementation, mating, Merino ewes, reproductive performance.

In South Africa, the lambing performance of woolled sheep appears to be relatively low (De Klerk, Düvel & Terblanche, 1983). Seeing that reproduction rate is of great economic importance, this matter is a cause of concern for those involved in the sheep and wool industry.

It has been demonstrated that ovulation rate and, therefore, multiple birth rate can be increased markedly by supplementation with lupins during mating (Knight, Oldham & Lindsay, 1975; Croker, Lightfoot & Marshall, 1978). It has also been suggested that a short period of lupin intake may increase ovulation rate markedly (Oldham & Lindsay, 1984; Stewart & Oldham, 1986), without influencing live mass (Oldham & Lindsay, 1984). It is, however, not clear at this stage whether increased flock productivity consistently results from lupin supplementation (Denney, 1983; Croker, Johns & Johnson, 1985).

Against this background, the response of ewes to supplementation with lupin grain was investigated under typical Swartland conditions on the Langgewens experimental farm. The investigation covered the autumn lambing seasons of three years (1985, 1987 and 1988). For ease of reference, the year of lambing was used to discern between years. Commercial Merino ewes were used for this study; 158 in 1985, 229 in 1987 and 185 in 1988. For the 1985 and 1987 lambing seasons, the ewes were stratified according to age (1½ — 5½ years), birth type (single or multiple) and live mass at the beginning of each trial, and were randomly allocated to four experimental groups. These groups were randomly allotted to four experimental treatments in a 2 × 2 factorial experiment, involving lupin supplementation with *Lupinus angustifolius* grain at a level of 350 g/head every second day versus no supplementation (control), and the grazing of oaten stubble or wheaten fallow lands. Preliminary results suggested that lupin supplementation did not interact with pasture type. As a result, only the effect of lupin supplementation as such was retained in further analyses. For the 1988 lambing season, all the available adult ewes (> 2½ years) were similarly stratified and allocated to two experimental groups, involving lupin supplementation of 250 g/head/d versus an untreated control. In this case, *Lupinus albus* grain was given as supplement to oaten stubble. The final analysis involved a nested design with supplemental treatment (lupin supplementation vs. control) nested within lambing years (1985, 1987 or 1988).

Mating with fertile rams commenced in the first week of November in all three years, after an initial period of 10 days with 2% teaser rams. The mating period extended over 35 days, during which the ewes were mated with fertile rams on a 4% basis. For the lambing seasons of 1985 and 1987, the ewes on each type of pasture were run in a single flock for the entire experimental period. Every second day, from the commencement of teasing to the 30th day of mating, these flocks were split at 10h00 and offered supplement at the given level. For the 1988 lambing season, this routine was

followed daily. Rams were separated from the ewes during supplementation and kept in a small adjoining paddock, where they, in turn, received a supplement of 250 g oat grain/head. After the experimental group had consumed their supplements, the flocks were rejoined and put back on their respective pastures.

Live mass and condition score (visually assessed on a five-point scale) were recorded every 10 days from the commencement of mating up to the 30th day of mating. After mating, all the treatment groups were combined and were managed as one flock. Reproduction results were recorded at lambing, which took place on cereal stubble lands. During 1987 and 1988, it was necessary to supplement the late pregnant ewes with 250 g oats/head/d, owing to poor nutritional conditions. Least squares procedures were used to analyse all the experimental data, according to the nested design described above. The LSML76 computer program (Harvey, 1977; 1982) was used for this purpose.

The live mass and condition score results for the experiment are shown in Table 1. Both parameters were unaffected by supplementation during the entire mating season in 1985 and 1987. When the ewes were mated to lamb in 1988, there was a tendency for supplemented ewes to be heavier ($P = 0,13$) and in a better condition ($P = 0,08$) than control ewes from 20 days after mating.

Reproduction results are presented in Table 2. No significant difference between supplemented and control ewes was obtained. Lambs born/ewe lambed (fecundity) was unaffected by lupin supplementation in 1985 and 1987, but tended to be higher in the supplemented group than in the control group in 1988. Lambs born/ewe mated (lambing rate) tended to be marginally higher in the supplemented group in 1985; the reverse being true in 1987. No definite advantage in lambs weaned/ewe mated (weaning rate) in favour of the supplemented group was obtained in any one of the lambing seasons.

The lack of a marked response in reproduction rate to lupin supplementation is disappointing, but not entirely unexpected. Denney (1983) found that, despite significant increases in ovulation rate in two out of four years, no improvements in the eventual reproduction rate were obtained. In his experiment, *Lupinus angustifolius* and *L. albus* grain were fed to ewes at 250 g/d, three times a week. Ovulation and lambing rates were unaffected even when lupins were fed *ad libitum* in one of the trials. In a very large scale study on commercial properties (involving 22 800 ewes), Croker *et al.* (1985) found highly variable and unpredictable responses in reproduction rate, following supplementation with 250 g *L. angustifolius* grain/d. The increase of the supplementation level to 500 g/d did not alter the variable responses thus obtained. The authors concluded that it was not possible to make an unqualified recommendation to supplement with lupin grain in order to improve reproduction in the majority of situations. The main problem appears to be an inability to predict circumstances under which supplementation with lupins is likely to improve reproduction rate. Although Geytenbeek & Allden (1986) reported small increases in the number of lambs born after supplementation with 500 g lupin or faba bean grain/d, they concluded that this biological gain was not economically justified.

Table 1 Mean live mass (\pm SE) and condition score (\pm SE) of lupin-supplemented and control ewes in 1985, 1987 and 1988

	1985		1987		1988	
	Supplemented	Control	Supplemented	Control	Supplemented	Control
Number of ewes (n)	78	80	114	115	91	94
At mating						
Live mass (kg)	47,6 \pm 0,7	48,5 \pm 0,7	44,3 \pm 0,5	44,8 \pm 0,5	50,4 \pm 0,6	50,0 \pm 0,6
Condition score	3,7 \pm 0,07	3,8 \pm 0,07	3,2 \pm 0,06	3,3 \pm 0,06	3,5 \pm 0,06	3,7 \pm 0,06
At mating + 10 days						
Live mass (kg)	49,6 \pm 0,7	49,9 \pm 0,7	46,2 \pm 0,6	46,5 \pm 0,6	52,9 \pm 0,6	52,2 \pm 0,6
Condition score	4,0 \pm 0,07	4,0 \pm 0,07	3,4 \pm 0,06	3,4 \pm 0,06	3,8 \pm 0,07	3,7 \pm 0,07
At mating + 20 days						
Live mass (kg)	50,9 \pm 0,7	51,3 \pm 0,7	46,7 \pm 0,6	46,4 \pm 0,6	52,5 \pm 0,6	51,4 \pm 0,6
Condition score	4,2 \pm 0,06	4,3 \pm 0,06	3,5 \pm 0,05	3,4 \pm 0,05	3,9 \pm 0,06	3,7 \pm 0,06
At mating + 30 days						
Live mass (kg)	50,5 \pm 0,7	50,6 \pm 0,7	46,5 \pm 0,6	46,4 \pm 0,6	52,3 \pm 0,6	50,9 \pm 0,6
Condition score	4,3 \pm 0,06	4,2 \pm 0,06	3,5 \pm 0,05	3,5 \pm 0,05	3,9 \pm 0,06	3,7 \pm 0,06

Table 2 Mean reproduction of supplemented and control ewes in 1985, 1987 and 1988

	1985		1987		1988	
	Supplemented	Control	Supplemented	Control	Supplemented	Control
Number of ewes						
Mated	78	80	114	115	91	94
Lambled	68	67	88	91	77	83
Ewes lambled						
Ewe mated	0,87	0,84	0,77	0,79	0,85	0,88
Lambs born/ewe lambled	1,18	1,15	1,22	1,24	1,30	1,24
Lambs born/ewe mated	1,03	0,96	0,93	0,97	1,10	1,10
Lambs weaned/ewe mated	0,77	0,81	0,74	0,77	0,75	0,73

When comparing the present results to those obtained in Australia, it should be stated that bitter lupins were used in the first two years of this trial, whereas Australian results generally reported data obtained on sweet cultivars. Cultivars of *L. angustifolius* currently in use in Australia, may be described as sweet, whereas cultivars produced locally are bitter (personal communication: H.J.C. Agenbach, Private Bag, Elsenburg, 1989). The supplementation protocol (350 g lupins/d on alternative days) in 1985 and 1987 also deviated from the methods used by some Australian researchers. It is furthermore known that adult ewes are more responsive to lupin supplementation than young ewes (Marshall, Croker & Lightfoot, 1979). These discrepancies were eliminated in the 1988 trial, but lupin supplementation still failed to improve overall reproduction substantially. The supplementation of Merino ewes with lupin grain on cereal stubble in the Swartland can thus not be recommended unconditionally, as was also found in Western Australia (Croker *et al.*, 1985) and New South Wales (Denney, 1983). Evidence exists that grain legumes may rather be utilized more profitably for finishing lambs to suitable market weights (Hynd & Allden, 1986). Lupin stubbles may alternatively be utilized during mating.

This resulted in improved live mass gains and a higher reproduction rate in ewes when compared to a grass/clover mixture (Kenney & Roberts, 1987).

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