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Comparison of udder and teat traits in Merino ewes recorded at lambing and weaning

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Introduction

Neonatal lamb mortality is the most significant health issue of Australian sheep with substantial economic, welfare and sustainability implications (Shephard et al. 2022). In Australia, neonatal mortalities are mainly caused by dystocia/birth injury and the starvation/mismothering/exposure (SME) complex, each contributing to approximately 40% of neonatal deaths (Hinch and Brien 2014). Starvation mortalities are typically regarded as multifactorial, however poor udder and teat conformation of the dam have been implicated (Jordan and Mayer 1989). Lambs born to ewes with defective udder function have double the mortality rate compared to those with sound udder conformation (Hayman et al. 1955; Griffiths et al. 2019). Smith et al. (2023) showed that udder and teat conformation traits of Australian Merino ewes are heritable, with estimates ranging from 0.09 to 0.56

across visually scored and measured traits, and that overall udder soundness was associated with lamb survival. Further, Smith et al. (2023) observed that in some instances udder conformation issues noted at birth were not readily discernible at weaning, which was consistent with the findings of Griffiths et al. (2019).

The objective of this study was to build on earlier work, providing preliminary genetic parameter estimates of udder and teat traits assessed at birth and weaning, to inform recommendations regarding the optimal time for their assessment.

This paper was originally published and presented at the AAABG Conference in Perth, July 2023.

Key findings

- Udder depth, teat size and teat placement were moderately heritable at both lambing and weaning and the traits recorded at the two stages showed high genetic correlations.
- Udder cleft showed lower heritability, and lower genetic correlation across the two stages, with increased phenotypic variance from lambing to weaning.
- Results suggest that either stage is appropriate for recording udder depth, teat size and teat placement for genetic improvement of Australian Merinos.

Materials and methods

Data source

The study was conducted during 2022 using ewes from the New England Merino Lifetime Productivity (MLP) flock (Ramsay et al. 2019), maintained by CSIRO at the FD McMaster Laboratory, Chiswick, Uralla NSW, Australia, according to MLP project protocols (AMSEA 2020). The flock was generated by artificial insemination in 2017 and 2018 from 28 genetically diverse Merino and Poll Merino sires. In 2022 ewe progeny per year-sire group ranged from 27 to 57 ewes. The flock comprised 619, 4 year old (yo) (born 2018) and 638 5 yo (born 2017) ewes, however, only those ewes that lambed in 2022 (number lambs born, NLB>0) and reared at least one lamb to weaning (number lambs weaned, NLW>0) were included in the statistical analysis (n=1,105). The ewes were natural syndicate mated within age groups for 35 days (d) commencing 28 March (d0). Lambing took place from d142-187. Lambs from the 4yo and 5yo ewes were weaned on d248 (median age 89d) and d252 (median age d93) respectively. Udder and teat traits were recorded on the ewes at lambing during lambing rounds (twice-daily), and on the days following weaning (d248-249 and d252-254 for the 4yo and 5yo ewes, respectively). Experimental procedures conducted on animals were approved by the CSIRO Armidale Animal Ethics Committee (Animal Research Authority no. 21/24).

Udder and teat appraisal

Ewes were visually scored (1-5) while in a standing position for 4 udder and teat traits at lambing (L) and weaning (W). Traits assessed were:

- udder depth (UD, size of the udder in relation to the hock, 1=smallest to 5=largest, udder floor below hock)
- udder cleft (UC, reflects udder symmetry, strength of the medial ligament and attachment to the abdomen, 1=well defined cleft (strong medial ligament), 2=evident cleft, 3=flat udder floor or ‘broken’ (weak) ligament, 4=asymmetric but both halves functioning; 5=asymmetric with one half involuted)

- teat size (TS, combination of teat width and length, 1=smallest to 5=largest.
- teat placement (TP, position of teat relative to horizontal, 1=high on udder, horizontal, 3=45° from vertical, 5=vertical).

Score 3 is considered optimal in terms of productivity and ewe health for all traits, except UC where score 1 is optimal.

At lambing, ewes were assessed by 1 of 4 trained operators during lambing rounds, and at weaning by a single operator (1 of the initial 4) in a classing crate.

Results and discussion

Phenotypes and heritabilities

Many ewes exhibited udders of moderate size with a defined udder cleft and moderately sized teats positioned at or near 45° from vertical (Table 1). The udder and teat trait heritabilities estimated here ranged from 0.09 ± 0.05 to 0.36 ± 0.09 among the two stages. These estimates were higher than those estimated previously by Smith et al. (2023) in the same ewe population and for the same traits at weaning (0.01 to 0.17), but similar to those estimated by McLaren et al. (2018) in a terminal breed (0.14 to 0.35).

The differences observed in the MLP flock across the different studies may be attributable to some refinements to the scoring system, exclusion from the current study of the ewes that were not lactating at weaning, and age of the ewes.

The heritability estimates for UD and TP were consistent across the stages (Table 2). The heritability of TS was higher at weaning than lambing, and UC was lower at weaning than lambing. The phenotypic variance of UC doubled from lambing to weaning which suggests deterioration in UC during the lactation period, with increased expression of udder asymmetry at weaning.

Table 1: Descriptive statistics, significance of fixed effects and phenotypic variance (Vp) for ewe udder depth (UD), udder cleft (UC), teat size (TS) and teat placement (TP) at lambing (L) and weaning (W).

	LUD	LUC	LTS	LTP	WUD	WUC	WTS	WTP
Mean	2.99	2.21	2.70	2.87	3.17	1.97	2.75	3.08
Sd	0.68	0.69	0.68	0.55	0.48	1.00	0.54	0.37
Range	1 - 5	1 - 5	2 - 5	1 - 5	1 - 5	1 - 5	1 - 5	2 - 5
CG	***	***	***	***	ns	*	*	ns
NLB22	**	ns	*	*	-	-	-	-
NLW22	-	-	-	-	***	**	ns	***
DoA	-	-	-	-	***	***	**	***
Vp	0.35±0.02	0.45±0.02	0.42±0.02	0.27±0.01	0.21±0.01	0.96±0.04	0.29±0.01	0.13±0.01

n=1,105 for all traits; CG=contemporary group, NLB22=number lambs born 2022, NLW22=number lambs weaned 2022, DoA=day of assessment after weaning; *** P<0.001, ** P<0.01, * P<0.05, ns not significant, '- '=not tested; dam source, Total NLB, Total NLW, and days of lactation were ns effects on all traits, and ewe weight and condition scores pre-mating, late pregnancy and weaning were mostly ns (not reported here).

Table 2: Heritability (bold, diagonal), phenotypic correlations (above diagonal) and genetic correlations (below diagonal) (all ±s.e.) for ewe udder depth (UD), udder cleft (UC), teat size (TS) and teat placement (TP) at lambing (L) and weaning (W).

Trait	LUD	LUC	LTS	LTP	WUD	WUC	WTS	WTP
LUD	**0.29±0.09**	0.12±0.03	0.29±0.03	0.03±0.03	0.21±0.03	0.02±0.03	0.11±0.03	0.10±0.03
LUC	0.52±0.23	**0.17±0.07**	0.04±0.03	0.07±0.03	0.06±0.03	0.13±0.03	0.06±0.03	0.03±0.03
LTS	0.37±0.22	-0.24±0.25	**0.24±0.08**	0.42±0.03	0.11±0.03	0.26±0.03	0.31±0.03	0.28±0.03
LTP	-0.61±0.22	-0.59±0.23	0.55±0.18	**0.23±0.08**	-0.05±0.03	0.00±0.03	0.14±0.03	0.27±0.03
WUD	0.75±0.14	0.67±0.18	0.21±0.22	-0.60±0.19	**0.28±0.08**	-0.11±0.03	0.14±0.03	0.07±0.03
WUC	0.04±0.31	0.31±0.34	0.02±0.32	-0.03±0.34	0.00±0.30	**0.09±0.05**	0.05±0.03	0.06±0.03
WTS	-0.04±0.21	0.22±0.25	0.79±0.12	0.34±0.21	0.19±0.20	-0.23±0.28	**0.36±0.09**	0.33±0.03
WTP	-0.16±0.24	-0.20±0.26	0.69±0.15	0.70±0.16	0.04±0.23	-0.65±0.23	0.60±0.16	**0.24±0.08**

Phenotypic and genetic correlations

Within stages, phenotypic correlations among the udder and teat traits were low to moderate (0.04 ± 0.03 to 0.42 ± 0.03 at lambing, and -0.11 ± 0.03 to 0.33 ± 0.03 at weaning). Phenotypic correlations between individual traits across the two stages were also generally moderate ranging from 0.13 ± 0.03 (UC) to 0.31± (0.03) (TS).

At lambing, the genetic correlations between UD and UC (0.52 ± 0.23) and between UD and TP (-0.61 ±0.22) indicate that increasing UD is associated with deteriorating UC and high/horizontal TP, but at weaning those correlations were not different from zero.

At both lambing and weaning UC and TP were unfavourably correlated genetically (-0.59 ± 0.23 and -0.65 ±0.23 respectively), indicating well defined UC was associated with more vertical TP.

Moderate positive genetic correlations between TS and TP at both lambing (0.55 ±0.18) and weaning (0.60 ± 0.16) imply that large teats tend to be placed vertically. In general, the genetic correlations estimated here are consistent with those of Fernandez et al. (1997). Scores for UD (0.75 ±0.14), TS (0.79 ± 0.12) and TP (0.70 ± 0.16) at lambing and weaning were highly correlated genetically. While these genetic parameter estimates have high associated errors and should be interpreted with caution, they do suggest that for UD, TS and TP there would be minimal re-ranking between lambing and weaning. UC at lambing and weaning was not significantly correlated genetically and the estimate had a high error (0.31 ± 0.34).

Implications

Ewe udder soundness, which encompasses aspects of udder and teat conformation has been shown to impact neonatal lamb survival (Hayman et al. 1955; Griffiths et al. 2019; Smith et al. 2023).

Genetic improvement of ewe udder conformation may be a means of reducing lamb mortality. The phenotypic and genetic parameters estimated here suggest that for UD, TS and TP, there could be similar genetic gain through trait recording at either lambing or weaning. However, there are likely trade-offs relating to data collection logistics of scoring udder traits at lambing or weaning.

Breeders who do not conduct birth records are likely to favour udder scoring at weaning. This may be advantageous for the UC trait, for which harmful levels may not become evident until weaning.

For those who already collect birth records, additional udder scores are likely a minor imposition and may offer better selection outcomes in terms of future lamb survival. Where a lamb dies as a neonate due to an udder issue of the dam, the problem would likely be identified if udder scoring were conducted at birth. If udders were not assessed until weaning, the issue may not be identifiable because the udder will go through involution returning to a dry state.

In the current study, days of lactation (DoL) was a non-significant effect on weaning udder scores, in contrast to Smith et al. (2023), and therefore requires further investigation. However, DoL can only be accurately calculated with knowledge of the date of birth, adding support to udder scores at lambing. Further, assessment of udder traits at lambing was confounded with management group, and at weaning day of assessment (DoA) was a significant effect, so both factors require consideration in udder trait data collection.

Conclusion

Udder depth, teat size and teat placement scored at lambing and weaning on Merino ewes was moderately heritable. For these 3 traits, the genetic correlations between records at lambing and weaning were high. This indicates that among ewes that have reared a lamb(s) to weaning, there would be minimal re-ranking of ewes across those stages. Udder cleft had lower heritability and lower genetic correlations from lambing to weaning than the other 3 traits. The phenotypic variance of udder cleft increased from lambing to weaning, suggesting that udder cleft issues develop during lactation and therefore may be more accurately assessed at weaning.

Full paper (including full reference list)

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Using lupins and the ram effect to improve reproductive performance in Merino ewes in southern Australia

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Introduction

The ability of lupins to increase ovulation rate by increasing the number of multiple ovulations in Merino ewes in as little as four days (Stewart and Oldham, 1986) continues to interest researchers and producers alike (Vinoles et al., 2010; Errandonea et al., 2018; Banchero et al., 2021).

Australia is the world's largest producer of lupin grain, much of which is used by the sheep industry (White et al., 2007).

Numerous studies have shown that as well as increasing ovulation rate in sheep, lupins can also improve lamb survival (Earle and Male 1988; Lindsay et al., 1990), colostrum and milk production (Bencini and Purvis 1990; Murphy et al., 1996) and weaner and wool growth (Petterson, 2000; White, 2007).

This review summarises work undertaken by the authors (Nottle et al., 1997a, b; 1988) over several years aimed at improving reproductive performance of Merinos in southern Australia by combining lupin feeding with the ram effect to minimise the number of days required for supplementation.

Key findings

- Feeding lupins to Merino flocks mated using the ram effect for 14 days can enhance ovulation rate and improve lamb survival.
- The effectiveness of lupin supplementation may vary based on the nutritional status of ewes during different stages of folliculogenesis.
- Lupin feeding at expected lambing date for 14 days did not impact birthweight, however, it significantly boosted lamb survival rates, particularly for twins.

Using lupins and the ram effect to increase ovulation rate

In southern Australia, Merino ewes are normally mated in late spring/early summer to ensure that lambs can be sold prior to end of the pasture growing season. This is possible because Merino ewes are less seasonal and can be mated prior to their spontaneous breeding season using the ram effect (Martin et al., 1986). This results in more than 90% of ewes having a silent ovulation prior to their first oestrous around 18 or 24 days later (Pearce and Oldham, 1984).

To best adapt the lupin response on farm, we reasoned that the synchrony afforded by the ram effect could be used to shorten the time needed for supplementation to 14 days. This would cover the last half of the oestrous cycle in most ewes given that more than 70–80% of ewes conceive at their first oestrus (Edey, 1972), and feeding for a longer period to cover ewes that fail to conceive at their first mating would be uneconomic.

The results from 2 on-farm trials for ewes fed a maintenance energy diet, showed that feeding 500 g/hd lupins daily for 14 days, 12 days after the introduction of vasectomised rams (or testosterone treated wethers) increased ovulation rate and subsequent lambing and weaning percentages across farms by 15.9, 12.4 and 12.% respectively (Table 1; Nottle et al., 1997a).

Table 1: Reproductive performance of Merino ewes synchronised using the ram effect and supplemented with lupin grain for 14 days, commencing 12 days after introduction of vasectomised rams on two commercial properties. Source: Nottle et al. (1997a).

Attribute	Treatment		Farm	
	Control	Lupins	Farm A	Farm B
Incidence of oestrus (%) 0–14 [c] days	16.1[a] (40/248)	14.0[a] (35/250)	15.1 (75/ 498)	na[d]
15-29 days	94.0[a] (453/482)	93.6[a] (452/ 483)	97.0[a] (483/ 498)	90.4b (422/ 467)
Incidence of non-returns to service (%)	83.9[a] (380/453)	87.2[a] (394/452)	90.3[a] (436/483)	80.1[b] (338/422)
Liveweight day 29 (kg) [e]	51.9 ± 0.5[a]	52.4 ± 0.5[a]	52.7 ± 0.5a	51.6 ± 0.4[a]
Ovulation rate	1.26[a] (189/150)	1.46[b] (247/169)	1.41[a] (221/157)	1.33[a] (215/162)
Ewes lambing per ewe exposed to rams (%)	94.6[a] (456/482)	94.8[a] (458/483)	96.0[a] (478/498)	93.4[a] (436/467)
Lambs born per ewe lambing	1.21[a] (552/456)	1.36[b] (624/458)	1.33[a] (634/478)	1.24[b] (542/436)
Lambs weaned per lamb born (%) Single	79.7[a] (287/360)	78.1[a] (228/292)	89.8[a] (289/322)	68.5[b] (226/330
Twin	68.8[a] (132/192)	73.5[a] (244/332)	89.1[a] (278/312)	46.2[b] (98/212)
Overall	75.9[a] (419/552)	75.6[a] (472/624)	89.4[a] (567/634)	59.8[b] (324/542)
Lambs weaned per ewe exposed to rams (%)	86.9 (419/482)	97.7 (472/483)	113.9 (567/498)	69.4 (324/467)

c Vasectomised rams joined with ewes on day 0
d na: not available.
e Least squares mean ± SE.
Within main effects and rows, means not followed by a common letter differ significantly ($P < 0.05$).
*In all studies ewes were fed 100g/ewe/d for 2 days immediately prior to the start of full supplementation to adapt ewes to lupins. As it is the author’s experience that feeding 500 g immediately results in a proportion of ewes going off lupins.

The effect of previous nutrition on the ovulatory response to lupins

The response to lupins is not consistent. In large scale on-farm trials in the 1980s the effect was negligible in terms of lambs born, ranging from - 14 to + 21 % when 250 g of lupins were fed from 14 days before joining until day 17 of mating. Increasing supplementation to 500 g did not overcome this variability (Croker et al., 1985). However, we reasoned that much of this variation might be explained by the fact that it takes 6 months for a follicle to grow and ovulate (most don’t and are lost though atresia) and that changes in nutrition, particularly undernutrition, during this time may influence this response (Fletcher, 1974; Driancourt et al., 1993). To examine this suggestion, we undertook a series of studies where nutritional handicaps were imposed at different stages of folliculogenesis and their effect on the response to lupins examined (Nottle et al., 1997b).

Experiment 1

In the first experiment, nutritional restrictions were imposed for 8 weeks, 6 months prior to mating when follicles exit the primordial pool and commence growing. These restrictions resulted in ewes losing around 10% of their liveweight.

After this period both groups were recombined and run as one flock and stocked at rates designed to maintain their pre-treatment liveweight until 3 weeks prior to ovulation when they were divided into control and lupin fed groups.

The results from this study (Table 2) showed that ovulation rate was reduced by 17% in ewes that had lost liveweight 6 months previously (1.06 vs 1.28; $P < 0.05$) and that feeding lupins for 10 days prior to ovulation could overcome this handicap and increase ovulation rate to a similar level to that achieved with lupins in the control group which had not lost weight (1.63 vs 1.57; $P > 0.05$).

Table 2: Ovulation rate (mean ± SEM) of ewes placed on a low or high plane of nutrition for 8 weeks, 6 months prior to ovulation and supplemented with lupins for 10 days prior to ovulation (Experiment 1). Source: Nottle et al. (1997b).

Attribute	Low plane of nutrition		High plane of nutrition	
	- Lupins	+ Lupins	- Lupins	+ Lupins
No. of ewes	50	49	50	49
Ewes with:				
0 CL [a]	4	3	4	1
1 CL	39	12	28	19
2 CL	7	34	18	29
Ovulation rate	1.06 ± 0.07	1.63 ± 0.09	1.28 ± 0.09	1.57 ± 0.08

[a] Corpora lutea.

Experiment 2

In the second experiment we showed that ewes which lost around 3 kg of their liveweight over 8 weeks prior to ovulation responded only slightly to lupins (13%; 1.22 v 1.38; $P = 0.06$;Table 3).

In contrast, control ewes which gained a similar amount of liveweight had a higher ovulation compared with the control group which lost weight (1.67 vs 1.22; $P < 0.001$). This group also failed to show a response to lupins (1.64 vs 1.67; $P > 0.05$; Table 3), presumably because they were already expressing their maximum ovulation rate.

Table 3: Ovulation rate (mean ± SEM) of ewes placed on a low or high plane of nutrition for 8 weeks prior to ovulation and supplemented with lupins for 10 days prior to ovulation (Experiment 2). Source: Nottle et al. (1997b).

Attribute	Low plane of nutrition		High plane of nutrition	
	- Lupins	+ Lupins	- Lupins	+ Lupins
No. of ewes	70	64	72	69
Ewes with:				
0 CL [a]	2	5	5	6
1 CL	50	34	18	18
2 CL	18	21	45	41
3 CL	0	4	4	3
4 CL	0	0	0	1
Ovulation rate	1.22 ± 0.06	1.38 ± 0.09	1.67 ± 0.08	1.64 ± 0.09

[a] Corpora lutea.

Summary

How undernutrition influences ovulation rate at the time of follicle development and immediately prior to the time of ovulation remains to be determined.

Restricting nutrition 6 months prior to ovulation may increase the number of follicles that commence growing but are lost to atresia. Restricting nutrition 8 weeks prior to ovulation may have influenced ovulation rate by reducing the number of preantral follicles that enter the antral phase and their continual development.

Whatever the effect, short term lupin feeding does not appear to involve an increase in the number of follicles present on the surface of the ovary or recruitment (Driancourt and Cahill, 1984), but rather an increase in the number of these selected to ovulate (Nottle et al., 1985) suggesting that the effect of lupins in both instances is to restore the ovulatory capacity of a follicle(s) which had been compromised previously. Alternatively, lupins may promote a follicle which was not destined to ovulate in both instances.

In summary, this study demonstrated that nutrition, in particular undernutrition, at different stages of folliculogenesis, could influence the ovulatory response to lupins. Variability in response among commercial flocks may stem from this factor.

Our results suggest that for ewes losing weight during mating in late spring/early summer, might see minor increases in ovulation rate with lupin supplementation, but this may not translate into more lambs born. Ewes with a body condition score of 4 or more (Russel et al., 1969) are unlikely to respond because they are already expressing their maximum ovulatory potential.

In short, a ewe's net nutritional status (Lindsay, 1976) across the 6 months it takes a follicle to grow can influence the response to lupins, with implications for previously identified static (months), dynamic (weeks) and acute (days) effects (Coop, 1966; Fletcher, 1971; Scaramuzzi et al., 2006).

Lupins could help mitigate nutritional deficiencies, particularly those from 6 months prior, a period coinciding with ewes' lactation and significant nutritional demands (Cahill et al., 1984).

Using lupins and the ram effect to increase lamb survival

Around the same time these trials were being undertaken, Kleemann and Walker (2005) completed an extensive survey of reproductive performance of maiden and mature Merinos on 43 properties over 4 years in southern Australia.

The results from this study showed that ovulation rate in Merino flocks was already relatively high (average 1.41) which meant that many producers were already achieving 100% lambing and the real problem was lamb survival with an average of 44% of twin lambs lost before weaning.

This led us to refocus our strategy on lamb survival. Given that synchrony from the ram effect results in a concentrated lambing, we reasoned that feeding lupins for 14 days starting 12 days after the onset of lambing (Day 0 = introduction of teasers or rams) may be a more effective use of supplementation, as many producers practice some form of supplementation around lambing in March/April when pasture is in poor supply and quality. Work around this time had also shown that feeding lupins immediately prior to parturition could increase lamb birth weight (Earl and Male, 1988) and colostrum production (Murphy et al., 1996). Both had been identified previously as major factors in determining lamb survival (Lindsay et al., 1990).

To examine this strategy, an initial study was done on-farm using one of the same farms as the previously discussed studies. In this trial ewes were fed wheaten hay and oats that met the energy requirements of late pregnant/lactating ewes (ARC, 1980). This was fed 6 weeks prior to the predicted start of lambing. One group was supplemented with 500g of lupins for 14 days (fed 3 times per week) commencing 12 days after the expected start of lambing (Nottle et al., 1998). The results from year 1 of the trial showed that the number of lambs weaned increased by 8.3 % (Table 4). Surprisingly birth weight was unchanged, whereas weaning weight was on average 1.4 kg higher.

A more detailed study was undertaken the following year. The results from this study confirmed that birth weight was not increased, but lamb survival was similarly increased by 8.8%, particularly in twin lambs where the increase was 10.8% (Table 4). Again, lambs were on average 1.3 kg heavier at tail docking around 8 weeks after birth.

Based on these findings we suggested that these increases were the result of increased colostrum and milk production. Something which others had shown previously (Murphy et al., 1996; Bencini and Purvis, 1990) and confirming a need for bypass protein for ewes late in pregnancy even when their energy requirements were being met (ARC, 1980).

Table 4: Effect of feeding lupins to ewes mated using the ram effect for 14 days commencing 12 days after the expected start of lambing on lamb weight at birth and tail docking/weaning, and on lamb survival in Years 1 and 2. Source: Nottle et al. (1998).

Attribute	Treatment		Probability value
	Control	Lupins	
Year 1			
No. of ewes allocated	340	340	
No. of ewes at weaning	332	326	
Lambs weaned / 100 ewes allocated	77.9 (265/ 340)	84.4 (287/ 340)	
Birth weight (kg)	4.88 ± 0.10[a]	4.87 ± 0.09	0.71
Weaning weight (kg)	23.0 ± 0.50	24.4 ± 0.50	0.06
Year 2			
No. of ewes allocated	163	162	
No of ewes at tail docking	157	153	
Lambs tail docked / 100 ewes allocated	89.6 (146/163)	96.9 (157/162)	
Birth weight (kg) – Single	5.12 ± 0.12	5.26 ± 0.12	
– Twin	3.61 ± 0.18	3.58 ± 0.19	
– Overall	4.37 ± 0.11	4.42 ± 0.11	0.70
Ewe live weight at tail docking (kg)	67.9 ± 0.80	67.0 ± 0.80	0.43
Lambs tail docked per lamb born (%) – Single	82.5 (94/114)	88.6 (101/114)	
– Twin	74.3 (52/70)	82.3 (56/68)	
– Overall	79.3 (146/184)	86.3 (157/182)	0.000

[a] Least squares mean ± SE.

*For the lambing strategy oats and lupins were fed out 3 times per week i.e. Mon (1000 g/ewe), Wed (1000 g) and Fri (1500 g) for ease of management.

Economic considerations

The economic viability of feeding any supplement is based on several factors with duration being a major determinant. The aim of the present review was to highlight that the ram effect can be used to limit the period of lupin feeding to improve reproductive performance to 14 days.

In a recent analysis of the economic viability of a range of strategies to increase/rebuild Merino flocks in southern Australia, Brien et al. (2023) concluded that our strategy to improve ovulation rate was amongst the top 6 strategies of the 17 examined.

In relation to improving lamb survival, pregnancy scanning for twins now allows producers to treat this group differently during lambing. A more economic strategy, than that originally developed by us, may be to supplement only these ewes. In this regard, Brien (pers comm) concluded that using our lambing strategy, but feeding only twin-bearing ewes lupins in late pregnancy ranked second out of the same 17 strategies examined in their study (Brien et al., 2023).

Conclusion

Together our results show that on-farm lupin feeding for 14 days in Merino flocks mated using the ram effect can be used to increase ovulation rate as well as improve lamb survival.

The unanswered question is whether combining both strategies can have an additive effect on reproductive performance with the potential to increase weaning percentages by upwards of 20% or possibly more, given that this work was conducted under controlled conditions where ewes with an average body condition score of 3, were fed at maintenance energy levels during mating and lambing. This is not normally the case for most farms in southern Australia as pastures are, or have already, senesced at mating and are often in poor supply around lambing in autumn. This results in ewes losing weight, reducing lamb birth weights, particularly for twins.

Importantly we have also showed that feeding lupins at mating may also overcome nutritional handicaps on ovulation rate imposed up to 6 months earlier, which coincides with the nutritional drain that is lactation.

Whether feeding lupins at mating and/or at lambing can also improve lifetime production including growth rate, wool production, and reproductive performance (so called fetal programming; Martin, 2022) also remains to be determined. However, such an effect may justify the cost of feeding lupins alone.

Full paper (including full reference list)

Acknowledgements

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Transitioning to electronic identification (eID) for sheep and goats – Key dates and resources

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Background

On 9 September 2022, Australian Agriculture Ministers agreed to a National Implementation Plan toward the nationwide implementation of sheep and goat electronic identification (eID) tagging and tracing.

In Western Australia, this means that any sheep or goats born from 1 January 2025 onwards will require an eID. Saleyards and abattoirs will need to be set up to scan eIDs from 1 July 2025. Full implementation, including the need to eID tag all older sheep and goats, will come into effect on 1 July 2026.

The State Government has committed $25.6 million toward this transition through the Department of Primary Industries and Regional Development (DPIRD).

Key messages

- Lambs and kids born on or after 1 January 2025 will need an eID applied within 6 months of age, or before it is moved from the property, whichever comes first. Stock born prior to 1 January 2025 can still use visual tags when moving off property but must have an eID if departing from 1 July 2026 onwards.
- All saleyards and processors will need to scan incoming animals with eIDs from 1 July 2025.
- By full implementation, on 1 July 2026, all sheep and goats departing a property/facility must have an eID and must be scanned wherever they are arriving.
- DPIRD is working with industry to support a smooth transition.
- Financial support is available to ease the financial burden of adopting an electronic identification system.
- While the adoption of an electronic system is mandatory there are production benefits for sheep and goat producers.

Know your obligations

The Biosecurity and Agriculture Management (Identification and Movement of Stock and Apiaries) Regulations 2013 currently sets out rules for tracing the movement of stock. Updated regulations are being developed to cater for the new eID regime, while phasing out the use of visual tags.

These regulations will aim to meet the National Sheep and Goat Standards that have been developed in consultation with industry and across each Australian jurisdiction. There will be opportunities to provide comment and input on the proposed regulations.

DPIRD supporting the transition

The State Government is committed to supporting the sheep and goat industries transition towards an eID as smoothly as possible. Two financial support packages are currently being delivered by DPIRD:

1. The Tag Incentive Payment Scheme reduces the cost of the sheep and goat eIDs by $0.75 per eID. This amount comes off the price of eIDs purchased from TIP Scheme registered tag manufacturers. Purchasers of eIDs don't need to do anything to access this subsidy except purchase an NLIS-approved eID. Accredited eIDs are currently produced by Shearwell, Leader, Enduro Tags, Allflex and Datamars. Over 2.2 million sky blue eIDs were sold using the TIP Scheme in 2023. The scheme is continuing in 2024 for black eIDs.
2. Round One of an Infrastructure Grant Scheme, valued at $3.52 million, opened in November 2023 and has been specifically targeted to a closed cohort of downstream operators where the greatest need for early adoption of sheep and goat eID traceability was needed. Round Two opened in March 2024 and will provide grants, capped at $10,000 each to smaller, seasonal operators as well as community and grower groups.

Visit the electronic identification for sheep and goats webpage for more information.

Business efficiencies worth investigating

The 100th edition of Ovine Observer released in September 2023, included a case study of a producer successfully using electronic identification for production benefit.

Clayton South, a Wagin farmer with approximately 4000 Dohne ewes has been using eID for nearly 10 years. From 2008 to 2014 Clayton was able to increase his lambing rate from 88% to 101%. Clayton is among a growing number of producers that are finding financial benefit in using eIDs in decision making. As well as reproductive performance, eIDs are being used to monitor and improve weaning weights, carcass weight and quality, fleece weight and pest and disease resistance.

Incorporating eID systems throughout the value chain is likely to bring other efficiencies. This was the experience in Victoria, where eID has been mandatory since 2017. Saleyards have seen an improvement in stock management through the movement and sales process and report a reduction of mistakes that were often made due to their old paper-based system. Watch the YouTube video from Victoria Department of Primary Industries to see how the transition has worked for them.

Industry engagement

The WA National Livestock Identification Scheme (NLIS) Sheep and Goat Advisory Group (SGAG) was established in November 2021 as a forum to discuss, consult, develop, and communicate traceability enhancements across the commercial sheep and goat supply chain. The SGAG has played a key role in assisting DPIRD develop its assistance program and continues to provide input into, and practical advice on, the implementation of DPIRD activities. SGAG members include value chain participants, grower groups and industry representative groups. The next meeting with SGAG meeting will occur in March 2024.

The recent changes to dates for when the new electronic system must be in place came about through discussions with industry via the Sheep and Goat Advisory Group. The staged approach Western Australia is currently implementing was agreed on in consultation with the group and is designed to provide enough time for all of industry to have their systems in place ahead of full implementation on 1 July 2026.

Where to get the eID facts

If you are not already a user of eIDs, then now is a good time to talk to someone that is using them or have started the adoption process.

Each state has a different timeline toward full eID implementation for sheep and goats and any information you may receive from outside of Western Australia may not be relevant, or accurate, to what will be required at your local level. DPIRD continues to update its website, its online resources and is actively attending field days across the state to promote these requirements.

To be sure that the information that you are reading is accurate and relevant, use or check what you hear against information supplied directly from DPIRD at agric.wa.gov.au/eid-sheep-and-goats. If you are still not sure, then drop an email to eIDTeam@dpird.wa.gov.au.

For more information

If you have any questions about sheep and goat eID, please contact eIDTeam@dpird.wa.gov.au

More information relating to the content in this article can be found at:

- Tahara case study (Edition 100 of the Ovine Observer newsletter)
- Other case studies in use of eID for improved farm production
- Agriculture Victoria Transition to Electronic Identification of Sheep and Goats in Victoria - YouTube
- Accredited SG tags (integritysystems.com.au)
- Electronic identification for sheep and goats | Agriculture and Food

Managing feed and water in 2024

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Proactive planning of feed and water management is important for livestock producers to be prepared for any scenario, such as various breaks to start the 2024 season. Contingency plans can be established to assist in decision making during difficult times. Taking the time to produce a feed and water budget is a good start to ensure you meet your livestock's requirements in various scenarios. These plans should also be reviewed frequently as seasons change and adjust accordingly. Work with your business advisors to formulate plans that meet your enterprise requirements and cashflow.

Feed budgeting

Grain and hay prices and availability should be considered when planning a feed budget. In completing a plan, consideration of type of feed, such as a full pellet ration or other alternative or novel feeds should be given. Important information to know when supplementary feeding includes dry matter, metabolizable energy, crude protein, and fibre content of feeds. These pieces of information are important to have an accurate and cost-efficient ration. In cases where this information is unknown, testing can be completed by a commercial feed quality testing laboratory. To help determine the cost of supplementation, DPIRD's Feed Cost Calculator is a useful tool.

Pregnant ewes

Adequate condition is essential for pregnant or joined ewes to produce positive lambing outcomes. This is particularly important for twin bearing ewes. Condition scoring is a practice that can indicate the adequacy of the provided nutrition and help determine the ration. To condition score, select 20 random sheep to get the average of the mob. Ewes should be on average a condition score 3 to have optimum production.

To maintain condition score 3, supplementary feeding may be required. When determining the rates, consider the energy and protein required to maintain condition score. It costs more to gain condition score than to maintain it, so assessing condition score regularly is important to inform your feeding strategies. The Supplementary Feeding Calculator for Pregnant and Lactating Ewes as well as the Annual Feed Budget for Sheep Enterprises can help determine the required feed amounts to meet energy demand.

Using other tools such as pregnancy scanning is important to identify the energy requirements for twin and single bearing ewes. As pregnancy progresses the energy requirement increases. Using a competent pregnancy scanning contractor to identify the numbers of lambs being carried, can help decisions when allocating feed according to energy requirements. To compare pregnancy scanning results to the rest of the WA flock you can use the Pregnancy Scanning Benchmarks tool.

Weaners

Growing sheep are also in need of nutritional supplementation to ensure survival and productivity. Weaner sheep need energy and protein to increase liveweight by 50g/hd/day to achieve a 1.5 kg liveweight gain each month. For a 25 kg Merino weaner, 7 MJ of energy and 12% crude protein is required.

Confinement feeding

Confinement feeding is an option to help feed sheep to optimise growth and delay grazing. Confinement reduces the energy used by animals by decreasing the walking distances to feed and water. Deferred grazing on paddocks allows pastures to keep ground cover, continue to grow post season break, and help pasture production later in spring.

When transitioning to confinement feeding make sure that any supplementary feed is introduced gradually to decrease acidosis risk and scouring. Grain should be introduced over a 2 week period, building up to a full ration, with the addition of good quality hay. In cases of scouring, reduce the grain in the ration until the rumen adjusts, then build up the grain gradually to the required level.

Low in calcium cereals, such as barley, oats, wheat and triticale, will require 1.5% of finely ground limestone to ensure the animals calcium-phosphorus balance is maintained. Drenches are also advised to prevent and repair any muscle damage, selenium and vitamin E should be included. Advice on selenium and vitamin E deficiencies in sheep and cattle is available on DPIRD’s website.

The reintroduction of sheep to pasture after confinement feeding must be managed carefully. The change in diet from grain to fresh pastures can cause health problems, such as pulpy kidney. Ensure vaccination for pulpy kidney is up to date and release sheep from confinement gradually, after they have had their ration for the day and aren’t hungry and continue to feed hay and grain over at least a few days.

Water

Access to quality water is essential for all livestock over dry periods, and the availability of water is a rising issue is some areas. Sheep require fresh water with a salinity level less than 4,000 milligrams of salt per litre to maintain good rumen function.

To help make early decisions to either reduce stock or cart water you can budget water consumption and test the water quality.

Summary

Monitoring stock feed and water consumption, condition scores, liveweight and general performance is important to ensure that all their requirements are being met. If there are any changes, adjust accordingly or review and act on previously established contingency plans.

Information on water and feed budgeting, nutrition management and other key seasonal information is available on DPIRD’s ‘Season 2024’ webpage.

DPIRD and AWI Extension WA webinar: Tackling Tough Times

DPIRD and AWI Extension WA have teamed up to present a two-part webinar for sheep producers to provide information and help plan for the season ahead.

The free webinars, to be held on 8 and 9 April at 1pm, will provide updates on climate and markets, as well as information from industry experts to aid decision making considerations and scenario planning for the season ahead.

The Monday session will provide a seasonal update and climate outlook from DPIRD research scientist Ian Foster, as well as neXtgen Agri CEO Dr Mark Ferguson outlining opportunities to identify high performing animals and selection strategies to breed your perfect sheep.

Terry Melrose from the Regional Mens Health Initiative will address the importance of mental health in decision making on farm, and The Livestock Collective's Holly Ludeman will provide an update on the latest activities and initiatives they are undertaking.

The Tuesday session includes an update on the wool market from Greg Tilbrook, AWN's Wool and Livestock State Manager, in addition, DPIRD research scientist Richard George will provide an update on the WaterSmart Farms program and the latest desalination and water catchment information.

Respected consultant, John Young, from Farming Systems Analysis Service will outline strategies and tactics to plan for the season ahead, while Facey Group's Agricultural Research and Extension Coordinator Kaitlyn Anderson and sheep producer, Audrey Bird, will discuss confinement feeding.

AWI Extension WA's project manager Georgia Pugh will also give an overview of upcoming local events.

The webinars will include time to ask questions of each presenter, plus the option to ask questions throughout with the chat function.

To register to attend the Tackling Tough Times webinar on Monday, 8 and Tuesday, 9 April 2024 visit www.agric.wa.gov.au/season2024.

The webinar will be recorded and posted online after the event on the same webpage.

Next generation Lambing Planner app

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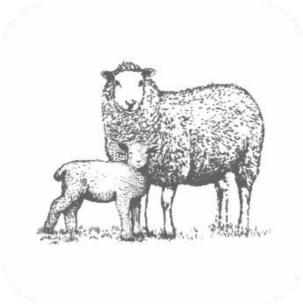
The next generation of Lambing Planner app has now been released.



The Lambing Planner app has come a long way since its paper-based days, originally developed by DPIRD and the ASHEEP & BEEF grower group with support from MLA and AWI.

The free app helps producers plan and assess the effect of joining dates and lambing dates on key management activities during the reproductive cycle. This can assist in improving operational efficiencies and flock potential.

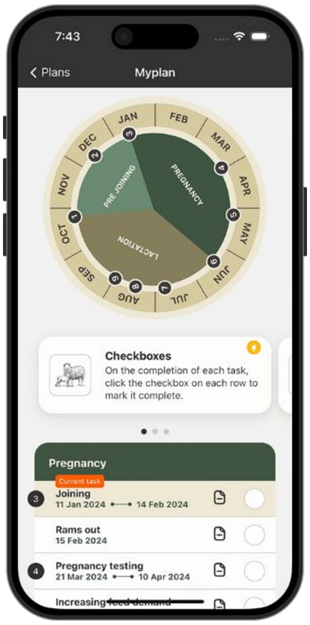
The new app has added features to improve its functionality and ease of use. Features such as registering an account, allowing reminders for key dates and saving the plans to the cloud to allow access on other devices.

Tasks can also be marked as complete, notes can be added, and plans can be uploaded to digital calendars, or shared via PDF.

The app still has the key nutrition and condition scoring information included as well as best practice guides, with the addition of an instructional explainer video.

The updated Lambing Planner app is free to download on iOS and the update will soon be available for Android devices.

For more information and links to download visit https://www.dpird.wa.gov.au/online-tools/livestock-calculators/lambing-planner/.



The paper-based tool is still available from DPIRD's Katanning office by emailing katanning.csc@dpird.wa.gov.au or telephoning 9821 3333.

StockedUp newsletter

Are you **StockedUp** this season? DPIRD is excited to announce the launch of the n-ewe StockedUp newsletter for WA sheep and cattle industries!

The first edition of the quarterly e-publication was released in March.

StockedUp:

- covers research, project and staff updates
- keeps you informed on the latest management and production advice
- provides a variety of resources to support seasonal challenges
- promotes the latest news and livestock events.

We would like to extend an invitation to you to subscribe to the StockedUp newsletter. To receive the newsletter simply complete the relevant information on the registration form.

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