

FEBRUARY 2022

Sheep reproduction RD&A alert

This sheep reproduction RD&A alert is an initiative of the Sheep Reproduction Strategic Partnership (SRSP).

A new feature project section has been added to this month's alert to highlight a current, or recently completed, sheep reproduction project. The Towards 90 project is the feature project for February. The project team, led by Thrive Agri Services, are seeking consultants and producers to participate in the project so read on to learn more!

This is the 14th issue of the Sheep reproduction RD&A alert. Those of you who receive the alert via email will notice a slight formatting change. The alert is now produced using the MailChimp platform which provides metrics regarding how readers engage with the information in each issue. This change will assist the SRSP to ensure the alert continues to be a useful and relevant source of sheep reproduction RD&A information to industry. All past issues of the alert will continue to be available for download from the [SRSP website](#).

The SRSP aims to help sheep producers to profitability and sustainably increase lamb production through increasing lamb survival and weaning rates and will coordinate a national approach to improving sheep reproductive performance.

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Feature project

Towards 90

Towards 90 (T90) seeks to accelerate adoption and capacity building in best practice reproductive management of adult and young ewes to achieve 90% or higher lamb survival. T90 will use an integrated adoption approach comprising focus farms implementing whole-farm system best practice management, producer demonstration (exchange) sites and small groups (teams). A key aspect of T90 will be an on-learning program based on 10 learning modules representing different components of sheep reproduction best practice.

Project objectives

1. Develop a framework and operating model for an adoption program that integrates focus farms, producer demonstration sites, small groups and consultant/advisors.
2. Develop a suite of tools and learning and reference materials on the best practice management of sheep reproduction for ewe lambs and adult sheep.
3. Develop 10 learning packages to support the small group training, including online resources and tutorials.
4. Publish online content including presentations, instructional videos, interviews, and links to producer demonstration sites.

5. Implement 10 producer demonstration sites (1-year duration) per year in 3 states (30 sites per year) for 3 years.
6. Commission 90 small groups annually (5 members per group) to undertake a 2-5 day facilitated training programs using the developed training packages developed around the producer demonstration sites.
7. Convene three annual skills conferences at the focus farms where PDS participants and small groups participate in PDS updates and hands on activities to develop skills.
8. Support a PhD project to explore the traditional adoption process and its relevance in current environment of online and digital engagement.

Current progress

Three focus farms have been recruited and development of the tools, learning and reference materials is underway. The project team are now looking for consultants and sheep producers to participate in the demonstration (exchange) sites and small group teams.

For more information on Towards 90, visit the project's website towards90.com.au.

Scientific papers

Factors associated with mortality of lambs born to ewe hoggets

Anne L. Ridler(A.L.Ridler@massey.ac.nz), Kate J. Flay, Paul R. Kenyon, Hugh T. Blair, Rene A. Corner-Thomas and Emma J. Pettigrew

Animals. Volume 12(3), February 2022 **OPEN ACCESS**

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Simple Summary

Pre-weaning lamb deaths limit the production performance from ewes that are bred as hoggets (at 6–9 months of age). The present study aimed to investigate factors that are associated with increased likelihood of lamb death and the cause of that death, in lambs and in ewe hoggets over the lambing period. This was also compared to rates in mature-age ewes and their lambs. Lambs with low birthweights or that were born as twins were more likely to die, as were lambs whose dams had greater live weight changes during pregnancy. Ewes deaths during the lambing period accounted for approximately 11% of lamb deaths. The most common cause of hogget lamb deaths was stillbirth (lamb born dead) but this was an uncommon cause of death in lambs born to mature-age ewes. Management tools to increase lamb birthweights, and supervision of ewe hoggets at lambing time, are recommended.

Abstract

The reproductive performance of ewe hoggets is poorer than that of mature-age ewes due to production of fewer lambs with poorer survival. Scant data are available on the risk factors for, and causes of, the mortality for lambs born to ewe hoggets, the impact of ewe deaths on lamb loss, and the causes of death for lambs born to ewe hoggets vs. mature-age ewes lambing in the same circumstances. In this study, 297 lambs born to 1142 ewe hoggets were necropsied along with 273 lambs born to 1050 mature-age ewes. Low lamb birthweight, multiple litter size, and increasing ewe hogget average daily gain from breeding to late pregnancy were risk factors for lamb mortality. The most common cause of mortality for lambs born to ewe hoggets was stillbirth and the risk factors for stillbirth were similar to those for lamb mortality generally. Approximately 11% of ewe hoggets' lamb deaths were due to the death of the dam. Causes of mortality differed between lambs born to ewe hoggets vs. those born to mature-age ewes. Management practices to

increase ewe hogget lambs' birthweights (particularly those from multiple litters) and supervision of ewe hoggets at lambing time are recommended.

Impact of focus feeding on reproductive losses, prolificacy, or fecundity of estrous synchronized ewes

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Highlights

- Focus feeding after a synchronized service does not increase the reproductive losses in ewes.
- The supplementation before the review service does not increase the prolificacy or fecundity of the ewes.
- The increase in plasma urea concentrations does not correlate with reproductive losses in ewes.

Abstract

The aim of this study was to evaluate the impact of a focus feeding (energy-protein supplementation) after a fixed timed artificial insemination (TAI) and before the review service, on reproductive and metabolic variables. Multiparous Merino ewes (312) from a commercial flock (-30° 44' S; -57°39' W) grazing native pastures were synchronized with progestogens devices for 12 days (Days -14 to -2) and eCG at removal and cervical TAI (Day=0). On Day 7 post-TAI the ovulation rate (OR) was estimated, and two groups were formed: Supplemented (S; n = 155) and Control (C; n = 157). The S group was supplemented with soybean meal (1.2% of body weight) between Days 8 and 14. The review service was carried out between Days 14 and 21 using 2.5% fertile chest painted rams and the non-service return rate on Day 21 (NR-D21) calculated. Blood samples were obtained from 25 ewes of each group on Days 8, 12, 14, and 17 to evaluate non esterified fatty acid (NEFA) and urea plasma concentrations. On Day 26 OR was evaluated on the ewes with review service. Embryo losses, fertility, prolificacy, and fecundity of both services were estimated on Day 60 by transabdominal ultrasonography. No significant differences were observed in NR-D21 (65.8 vs. 63.7%), fertility (62.4 vs. 64.5%), prolificacy (1.32±0.75 vs. 1.33±0.76), fecundity (85.2 vs. 82.8%), or embryo losses from TAI service, or OR (1.16±0.37 vs. 1.15±0.36), fertility (87.7 vs. 92.4%), prolificacy (1.00±0.0 vs. 1.02±0.14) or fecundity (87.7 vs. 90.6%) of the review service for S and C groups respectively (P > 0.05). The urea concentrations increased significantly between Days 12 and 14 in S group (P < 0.05), and the NEFA concentration decreased faster with supplementation in the S group (P > 0.05). We concluded that a high energy-protein supplementation before the review service does not increase the reproductive losses from TAI, neither prolificacy nor fecundity of the review service.

Maternal reactivity of ewes at lambing is genetically linked to their behavioural reactivity in an arena test

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Journal of Animal Breeding and Genetics, Volume 130(2) March 2022

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Abstract

In sheep, the bond between the dam and her lambs is established during the first hours of a lamb's life. Genetic variability for behavioural reactivity of ewes assessed in an arena test performed 24 hr after lambing has already been reported. However, there is no evidence that this reactivity represents the ewe's maternal reactivity at lambing in outdoor conditions. The objective of this study was to investigate whether or not the behavioural reactivity of ewes in the arena test is genetically related to their maternal reactivity measured at lambing. A total of 935 Romane ewes were studied. The maternal reactivity of ewes at the outdoor lambing site was recorded in response to a human approach and to the handling of the lambs. Their behavioural reactivity was also recorded 24 hr post-lambing in the arena test that involved a separation from the litter and a human presence. Flight distance, aggressive reaction, time to restore contact with the litter, maternal behaviour scores and vocalizations recorded at the lambing site were heritable (0.12–0.34). All of these behaviours were genetically correlated with the behavioural reactivity in the arena test. The highest genetic correlations (from 0.60 to 0.90) were found amongst maternal behavioural scores, flight distance and high-pitched bleats. In conclusion, behavioural reactivity in the arena test can be used to assess early maternal reactivity in standardized conditions. Phenotyping of ewes' behavioural reactivity with a simplified arena test can be performed for genetic improvement in maternal behaviour in sheep.

Factors affecting the survival of ram spermatozoa during liquid storage and options for improvement

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Animals, Volume 12(3) February 1-2022 OPEN ACCESS

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Simple Summary

The success of semen preservation is vital for the use of artificial reproductive technologies in sheep. However, reduced temperatures can cause significant damage to the sperm cell. Recent investigations in other species have identified room-temperature liquid storage as a viable alternative if spermatozoa are protected from the increased risk of lipid peroxidation, a side effect of unaltered metabolism. The following review aims to summarise the factors which contribute to the survival of ram spermatozoa during liquid storage and the role of pro-survival factors and antioxidants in helping to ameliorate the damaging effects caused by lipid peroxidation on fertility. This would contribute towards establishing a new method of semen preservation for the sheep industry which maximises fertility following storage and artificial insemination.

Abstract

Semen preservation is an essential component of reproductive technologies, as it promotes genetic gain and long-distance semen transport and multiplies the number of ewes able to be inseminated per single ejaculate. However, the reduced temperature during cold storage at 5 or 15 °C inflicts sub-lethal damage to spermatozoa, compromising sperm quality and the success of artificial breeding. New and emerging research in various species has reported the advantages of storing spermatozoa at higher temperatures, such as 23 °C; however, this topic has not been thoroughly investigated for ram spermatozoa. Despite the success of storing spermatozoa at 23 °C, sperm quality can be compromised by the damaging effects of lipid peroxidation, more commonly when metabolism is left unaltered during 23 °C storage. Additionally, given the biosafety concern surrounding the international transport of egg-yolk-containing extenders, further investigation is critical to assess the preservation ability of synthetic extenders and whether pro-survival factors could be supplemented to maximise sperm survival during storage at 23 °C.

Interactions between nutrition and the “Ram Effect” in the control of ovarian function in the Merino ewe

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Simple Summary

Clean, green, and ethical management of sheep flocks involves the use of socio-sexual stimuli (the “ram effect”) to coordinate nutritional inputs into reproductive success. However, the value of the “ram effect” is limited by three factors: (i) the proportion of the ewe flock that ovulates; (ii) ovulation rate in ewes that respond to the ram stimulus; and (iii) luteal failure after the first ram-induced ovulation, leading to short luteal phases. We tested whether these problems could be overcome by using a brief nutritional supplement (500 g lupin grain per head daily for 6 days) to stimulate ovarian activity. Lupin supplementation before ram introduction did not improve the percentage of the ewe flock that ovulates or reduce the frequency of short cycles (so will not improve the synchrony of lambing). However, lupin supplementation after ram introduction should be used to increase prolificacy.

Abstract

We tested whether short-term nutritional supplementation (500 g lupin grain per head daily) would affect the response of ewes to the ram effect. Experiment 1 (end of non-breeding season): ewes were supplemented for either Days –6 to –1 relative to ram introduction (n = 24) or for 12 days after ram introduction (Days 11 to 22 of the ram-induced cycle; n = 29). Controls (n = 30) were not supplemented. Across all groups, 94–100% of ewes ovulated. Supplementation before ram introduction did not affect ovulation rate at the ram-induced ovulation but increased it during the ram-induced cycle (Control 1.37; supplemented 1.66; $p < 0.05$). Experiment 2 (the middle of non-breeding season): the supplement was fed for Days –5 to –1 relative to ram introduction. Again, supplementation did not increase number ovulating (Control 16/29; Supplemented 10/29) but it did increase ovulation rate at the ram-induced ovulation (Control 1.31; Supplemented 1.68; $p < 0.05$). In neither experiment did supplementation affect the frequency of short cycles. Supplementation before ram introduction did not improve the percentage of ewes ovulating or reduce the frequency of short cycles (so will not improve the synchrony of lambing). However, supplementation after ram introduction can increase prolificacy.

Factors associated with mortality of lambs born to ewe hoggets

Anne L. Ridler (a.l.ridler@massey.ac.nz), Kate J. Flay, Paul R. Kenyon, Hugh T. Blair, Rene A. Corner-Thomas and Emma J. Pettigrew

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Lower reproductive rate and lamb survival contribute to lower lamb marking rate in maiden ewes compared to multiparous ewes

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Simple Summary

The reproductive performance of ewes in their first breeding season (maiden ewes) can be poorer and more variable than at subsequent breeding seasons. However, the extent and causes of the poorer reproductive performance of maiden ewes on Australian sheep farms are not well understood. We used a survey of Australian sheep farmers to compare the reproductive performance of maiden ewes in their first breeding season to multiparous ewes (ewes that have been bred two or more times) on the same farms. We found that the difference in lamb marking rate between non-Merino ewe lambs and multiparous ewes on the same farm was 58%, and for maiden Merino two-tooth ewes, the difference in marking rate compared to multiparous ewes was 22% lower. Poorer reproduction in maiden ewes was due to a combination of poorer reproductive success to mid-pregnancy (reproductive rate), plus poorer survival of lambs between mid-pregnancy and lamb marking. Reproductive performance for maiden Merino two-tooth ewes was correlated with multiparous ewes on the same farm, whereas the reproductive performance of non-Merino ewe lambs was more variable and not associated with the reproductive performance of their multiparous counterparts. The reproductive efficiency of maiden ewes could be improved by addressing factors that improve the reproductive rate and lamb survival between scanning and lamb marking.

Abstract

Suboptimal reproductive performance of maiden (primiparous) ewes remains a source of inefficiency for the Australian sheep industry. However, the extent and causes of the poorer reproductive performance of maiden ewes on Australian sheep farms are not well understood. Here, we show the reproductive performance of maiden ewes relative to their multiparous counterparts on the same farms across Australia using a cohort survey. The difference in marking rate for non-Merino maiden ewe lambs compared to multiparous ewes was 58% (74 vs. 132%; $p < 0.001$), and this was attributable to a 50% difference in

reproductive rate (109 vs. 159%; $p < 0.001$) and 16% difference in lamb survival to marking (67 vs. 83%; $p < 0.001$). The difference in marking rate for maiden Merino two-tooth ewes lambing at approximately 2 years-of-age compared to mature multiparous ewes was 22% (80 vs. 102%; $p < 0.001$) and this was attributable to a 24% difference in reproductive rate (108 vs. 132%; $p < 0.001$) and 3% difference for lamb survival (75 vs. 78%; $p < 0.05$). Positive correlations for reproduction traits (reproductive rate, lamb survival and marking rate) between maidens and multiparous ewes were observed for maiden Merino two-tooth ewes ($p < 0.001$), but these correlations were weak or non-existent for non-Merino ewe lambs. Strategies to improve both reproductive rate and lamb survival can address the poorer and more variable reproductive performance of maiden ewes.

Upcoming events

Date	Event	Location
8 March 2022	Livestock Technology Expo MLA, AWI & Sheep Connect SA	Keith, SA
10 March 2022	Livestock Technology Expo MLA, AWI & Sheep Connect SA	Kapunda, SA
16 March 2022	The importance of trace minerals for ewes at lambing MLA	Webinar
25 March 2022	Leading Sheep MeatUp Forum & Dinner Leading Sheep & MLA	Longreach, Qld
29 March 2022	Livestock Forum Red Meat and Wool Growth Program, PIRSA	Mt Gambier, SA
30 March 2022	Macquarie MLP Field Day AMSEA, AWI, NSW DPI	Trangie, NSW
30 March 2022	Livestock Forum Red Meat and Wool Growth Program, PIRSA	Murray Bridge, SA
31 March 2022	Livestock Forum Red Meat and Wool Growth Program, PIRSA	Wunkar, SA

Funding calls

Program	Open	Close
Producer Demonstration Sites Meat & Livestock Australia	1 April 2022	13 May 2022