APRIL 2025

Sheep reproduction RD&A alert

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

Do you provide advice and guidance to red meat producers? If so, MLA and Meridian Agriculture would value your views on the challenges, capacity and opportunities for advisory services going forwards, with a view to exploring the development of a cooperative model to support emerging livestock advisors.

Please get involved by completing the MLA Livestock Advisor Cooperative Feasibility Survey (allow 15 minutes) and let MLA and Meridian Agriculture know if you'd like to take part in a focus group discussion to help shape the development of potential business models. The survey will remain open until **Friday 2nd May**.

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If you have any questions about the survey of the project, please contact Keely Kovacevic (kkovacevic@mla.com.au).

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.

Feature project update

Less predators, more lambs

Background

Primary predation is estimated to account for 5 to 7 % of peri-natal lamb mortality with foxes, wild dogs and pigs impacting sheep producers across Australia. It is difficult to accurately quantify the impact of predation on lamb survival given the many often interrelated factors that impact lamb survival including flock management (ewes nutrition and health, ram and ewe genetics), the lambing environment (aspect, shelter and feed availability) and seasonal factors. In addition to the direct impact of predation, movement of predators through mobs of lambing ewes may be inadvertently causing mismothering even if animals are not being attacked. Current predator control before and during lambing is generally a mixture of baiting, shooting and scaring, but it is not always conducted in a coordinated manner and can have variable results.

Aim

To assess the effectiveness of best practice predator control in conjunction with other best practice ewe management on lamb survival, particularly in twin-bearing mobs, with the ultimate goal of influencing widespread adoption among sheep producers.

Project Objectives

- Engage eight producers to demonstrate and implement a property-specific Best Practice Predator Control Management Program (PCMP).
- Improve lamb survival rates to consistently above 80% and 90% for twin and single-bearing ewes, respectively, for Merino and crossbred ewes.

- Conduct a cost-benefit analysis to assess the economic performance of best practice predator control programs, assuming other best practices are already in place.
- Encourage the implementation of PCMPs on 100% of core producers' properties and 50% of observer producers' properties based on project results.

Key results

The project ran for three years from January 2021 in the Goulburn Broken Catchment in northeast Victoria. Participating producers that implemented the property specific PCMP and ewe management practices, either achieved their best lamb survival results or improved lamb survival. Implementing PCMPs 6 to 8 weeks prior to the start of lambing will reduce lamb losses to predators, even if neighbouring properties aren't baiting. Used in combination with other best practice ewe management principles (i.e. Lifetime Ewe Management), PCMPs improved lamb survival by between 2 and 9%.

For more information on the Less predators, more lambs project contact the PDS Facilitator Matt Mahoney (matt.agridome@gmail.com) or Greg Mifsud the National Wild Dog Management Coordinator (greg.mifsud@invasives.com.au).

Review papers

The role of maternal dietary protein on livestock development, production and health

Shize Xiao, Wenju Liu, Shujun Zhang and Martine Schroyen (martine.schroyen@uliege.be)

Animal Reproduction Science, Volume 276, May 2025 **OPEN ACCESS**

DOI https://doi.org/10.1016/j.anireprosci.2025.107835

Highlights

- Maternal dietary protein intake during gestation influences offspring development.
- Comparative analysis reveals common and species-specific effects.
- Key aspects are fetal growth, metabolism, immunity, reproduction, and gut health.
- Future research should focus on refining maternal feeding strategies.

Abstract

Maternal dietary protein plays a pivotal role in shaping offspring development, health, and productivity in economically important livestock species, including pigs, cattle, and sheep. Protein intake during gestation influences multiple physiological processes in the offspring, such as fetal growth, metabolic programming, muscle development, immune function, reproduction, and gut health. The specific effects of maternal protein intake vary depending on the species and the gestational period, as the demands for protein fluctuate throughout pregnancy to support fetal development and postnatal adaptation. This review systematically explores the effects of maternal protein nutrition on the offspring of different species and identifies the commonalities and differences observed in the studies. Studies indicate that maternal protein restriction can lead to lower birth weights, impaired muscle growth, altered metabolic programming, and compromised immune function in offspring, potentially affecting their long-term productivity. Conversely, excessive protein intake may also have adverse effects, such as immune dysregulation and metabolic imbalances. The impact of maternal protein levels extends beyond birth, influencing postnatal growth trajectories, reproductive performance, and gut microbiota composition. While considerable progress has been made in understanding these relationships, gaps remain in identifying the precise molecular mechanisms underlying

these effects. Future research should focus on refining dietary recommendations tailored to different livestock species, investigating the role of gestation stage-specific protein requirements, and integrating multi-omics approaches to elucidate the long-term consequences of maternal protein intake. A deeper understanding of these mechanisms will contribute to optimizing feeding strategies, enhancing animal welfare, and improving the sustainability of livestock production systems.

Scientific papers

Does melatonin enhance twin lamb survival in commercial Merino flocks in Australia?

Alyce M. Lowe (alyce.lowe@adeliaide.edu.au), David O. Kleemann, Jennifer M. Kelly, Andrew N. Thompson, Jarryd Krog, William H. E. J. van Wettere and Alice C. Weaver

Animals, Volume 15, Issue 7, April 2025 **OPEN ACCESS**

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Simple summary

High incidence of twin lamb mortality limits the reproductive efficiency of Merino sheep flocks. This study assessed if supplementing twin-bearing Merino ewes managed on commercial properties in Australia with melatonin implants during late pregnancy would increase lamb survival and weight at weaning. Implanting one 18 mg melatonin pellet (Regulin®, Ceva Animal Health Australia, Glenorie, New South Wales. Australia) did not improve either the lamb survival or the weight at weaning. This strategy to improve twin lamb survival cannot be recommended at this stage on commercial farms.

Abstract

In research flocks, supplementing pregnant ewes with melatonin has been shown to be a novel approach to ameliorate parturient neurological damage and improve twin lamb survival. This study investigated the commercial applicability of melatonin supplementation for Merino flocks managed under extensive grazing conditions. Multiparous twin-bearing ewes were implanted with one melatonin implant (18 mg, Regulin®) each on two properties in South Australia and one in Western Australia (n = 585) at a median 79 days of gestation, with control ewes not implanted (n = 586). Ewes were managed as per standard protocols for each property. Lambs and ewes were counted at tail docking and weaning, and the lambs were weighed at weaning. Lamb survival was not influenced by melatonin treatment at either tail docking (p = 0.327) or weaning (p = 0.546). Across all sites, lamb survival at weaning for control and melatonin treatments was 74.7% and 74.0%, respectively, with lamb weaning weight of 27.2 ± 0.1 kg and 26.8 ± 0.1 kg (p = 0.020). These results indicate that supplementing twin-bearing Merino ewes with melatonin during mid-gestation was not a practical strategy to increase either lamb survival or weaning weight on commercial farms.

Effects of exogenous melatonin in pregnant ewes on offspring performance, live weight and daily growth rate of lambs for fattening, as well as milk quality

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Animal Production Science, Volume 65, Issue 6 April 2025

DOI https://doi.org/10.1071/AN24116

Abstract

Context: Melatonin has been used in sheep as a means of increasing survival and growth of offspring. Evidence suggests that administering melatonin implants to pregnant sheep or lambs during their fattening period has positive effects.

Aims: To identify the optimal timing for melatonin treatments in ewes before lambing, and lambs during lactation.
Methods: Experiment 1 involved 49 pregnant ewes and their lambs (n = 61). Ewes were assigned to one of five groups that differed in whether and when they received a single melatonin implant before lambing (−45, −30, −15 days, or non-implanted control ewes); milk samples were collected at 30 days after lambing. Experiment 2 involved 44 lambs from 32 ewes, assigned to one of four groups that differed in when the lambs received two melatonin implants (15, 30 or 45 days of age) during lactation.
Key results: In Experiment 1, groups did not differ in live weight (LW) at birth, or at 15, 30, and 45 days after birth. Male lambs in the −30 group had ($P < 0.05$) higher LW30 and LW45 than did group 0 male lambs. The interaction effect of treatment × sex was significant for average daily growth 0–30 and 0–45; specifically, −30 male lambs grew faster than male lambs in the other three groups ($P < 0.05$). Milk samples from implanted ewes had ($P < 0.05$) higher fat content than milk from control ewes. In Experiment 2, at slaughter (90 days of age), lambs in group 45 had higher ($P < 0.05$) LW and average daily growth from weaning to 90 days of age than lambs in the other four groups. Lambs in the three groups that had received melatonin implants put on more weight ($P < 0.05$) than did the control lambs, especially lambs in group 45, which translated into significantly ($P < 0.05$) higher feed conversion rates in the treatment groups.
Conclusions: Implanting ewes 30 days before lambing was associated with increased growth rates during lactation; particularly in males. Implanting lambs at 45 days of age produced the highest growth and feed conversion rates in the fattening period.
Implications: Melatonin treatments of ewes in pregnancy and lambs during lactation are promising methods for increasing the productivity of lamb meat production systems.

The effect of freezing and thawing techniques on the in vitro quality of pellet-frozen ram semen

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Highlights

- Freezing at 400–600 × 10^6 sperm/mL maximises sperm motility, morphology and viability.
- Thawing with Tris-Citrate-Fructose media improves sperm motility and viability.
- Thawing one pellet in Tris-Citrate-Fructose improves sperm motility and viability.

Abstract

The post-thaw quality of pellet-frozen ram semen was evaluated based on (i) sperm concentration, (ii) thawing diluent, and (iii) the number of pellets thawed simultaneously. Ejaculates from three Merino rams were collected, with four replicates per ram (n = 12 ejaculates) for each experiment. In Experiment 1, ejaculates were frozen at 200, 400, 600 or 800 × 106 sperm/ mL. In Experiment 2, ejaculates were frozen at 600 × 106 sperm/ mL and thawed in a dry test tube (control) or with 1 + 3 tris-citrate-fructose, tris-citrate-fructose+egg yolk, PBS+dye, PBS alone or IVF media (Emcare). In Experiment 3, groups of 1, 2 or 3 pellets were thawed in tris-citrate-fructose or a dry test tube (control). Post-thaw samples were tested for motility, acrosome and membrane integrity (FITC-PNA/PI) at 0, 3, and 6 h (all Experiments) and morphology at 0 h (Experiment 1). At 3 and 6 h post-thaw, motility was reduced at 200 × 10^6 sperm/mL compared to other concentrations ($P < 0.05$). Across all time points, samples frozen at 800 × 10^6 sperm/mL ($P < 0.05$) showed lower viability, while freezing at 200 × 10^6 sperm/mL increased morphological abnormalities ($P < 0.05$). Thawing pellets with tris-citrate-fructose media resulted in higher motility, acrosome and membrane integrity 0, 3 and 6 h post-thaw ($P > 0.05$). Thawing one-pellet in tris-citrate-fructose improved motility and viability post-thaw ($P < 0.05$) compared to multiple pellets, while the number of pellets thawed had no

significant effect when dry-thawed ($P > 0.05$). The results suggest that the optimal post-thaw quality is achieved when semen is frozen between 400 and 600 × 106 sperm/mL and thawed in tris-citrate-fructose media, one pellet at a time.

Ultrasonographic analyses of fetal gastrointestinal characteristics and correlations with gestational age and maturity in sheep

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Small Ruminant Research, Volume 246, May 2025

DOI https://doi.org/10.1016/j.smallrumres.2025.107485

Highlights

- Characterization of fetal gastrointestinal ultrasound in late-gestation sheep.
- Increasing GI scores and frequency of segmental dilation with advancing gestational age.
- Forestomach and intestinal motility detected at 126- and 130-days gestation.

Abstract

This observational study aimed to describe the ultrasonographic development of the fetal gastrointestinal (GI) tract in late-gestation ewes and to determine the statistical probabilities of detecting the onset and progressive changes to the GI parameters with advancing gestational age. A grading scale based on studies in other species was applied, specifically for the onset and progressive changes in intestinal wall definition, luminal content characteristics, peristalsis, and segmental dilation. Based on these characteristics, a GI score was assigned to each fetus during serial ultrasonographic examinations until term (median 148 days). With advancing gestational age, progressive maturation and increasing GI scores were observed, with probabilities greater than 90 % for detecting GI scores of 3 and 4 at term. Intestinal wall definition was well-defined with 50 % and greater than 90 % detection probabilities at days 130 and 132 of gestation, respectively. The onset of detectable motility was similar for the forestomach, abomasum, and intestines between 126 and 130 days of gestation. A greater than 90 % probability of detecting motility of the forestomach, abomasum, and intestine were present at 148-, 148-, and 138-days gestation, respectively. As gestational age advanced, intestinal luminal content changed from mixed echogenic to anechoic, and the onset of purposeful segmental dilation progressed from occasional to rhythmic in frequency. At term, there was approximately 90 % or greater probability of observing anechoic luminal content and rhythmic segmental dilation, respectively. Future studies are needed in high-risk pregnancies to determine the predictiveness of fetal GI characteristics as a measure of readiness for birth and potential correlates with neonatal morbidity and mortality in the peripartum period.

The impact of genetic selection for increased production on fitness traits of small ruminants

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Highlights

- High selection pressure in some small ruminant breeds result in adverse effects.
- Genetic antagonisms exist between production, fertility and health traits.
- Balanced breeding objectives will achieve an optimized genetic response.
- New technology can measure a range of different traits to provide novel phenotypes.

Abstract

Many sheep and goat breeds worldwide are subjected to high levels of selection emphasis to increase production of meat, milk and fibres. The continuous selection on a small number of traits have resulted in unintended consequences, mostly as adverse effects on the fitness of animals. Selection for increased dairy production led to an increase in mastitis incidence, while selection for increased meat yield impacted on the prevalence of MSTN and CLPG mutations. Reproduction efficiency is the single most important trait in any small ruminant production system. Selection for increased litter sizes in small ruminants has resulted in increased numbers of triplet and quadruplet pregnancies, with an associated increase in mortalities and reproductive wastage. To optimize a genetic response, a balanced approach should be followed to set breeding objectives that include some of these fitness traits. Selection for increased resilience to even one stressor (such as mastitis) could result in an improvement of overall robustness. As the accurate recording of health and welfare traits is currently a limitation, mitigation strategies should include the generation of novel phenotypes which could also be included in genomic solutions to address the current shortcomings of breeding programs.

Upcoming events

Date	Event	Location
20 May 2025	Coota collects: how to gather sheep data using eIDs NSW Local Land Services	Cootamundra, NSW
22 May 2025	Hi-tech in Tullibigeal: get sheep and goat eID ready NSW Local Land Services	Tullibegeal, NSW
27 May 2025	Bat above your average, West Wyalong! Use eIDs to collect sheep data NSW Local Land Services	West Wyalong, NSW
29 May 2025	Hey Hay! Improve your flock with a free data collection workshop NSW Local Land Services	Hay, NSW

Funding calls

Program	Open	Close
MLA Producer Demonstration Site	1 April 2025	12 May 2025