Sheep reproduction RD&A alert

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

MLA is calling for applications for MDC projects (matched funding) related to evaluating reproductive performance of shedding sheep enterprises. The terms of reference include a current review of known reproductive performance metrics of shedding sheep and collation of key production metrics captured across the reproductive cycle to further evaluate reproductive performance of shedding sheep. Project submissions should consider different types of shedding sheep enterprises and seek to include multiple shedding breeds, regions and environments. Demonstration of production and economic benefits over multiple years is a desired outcome. For more information contact Dr Melanie Smith, MLA Project Manager, Sheep & Goat Productivity Research & Development msmith@mla.com.au 0499 649 072.

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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

Managing Merino weaners to survive and thrive

Merinos play a key role in the Australian sheep meat industry, representing approximately 70% of lambs born and 55% of lambs slaughtered. Merino weaner survival remains problematic with 50% of farms reporting Merino weaner mortality above industry targets (≥4% per annum). Poor maiden reproductive performance in Merinos also remains an issue as maiden ewes typically have poorer reproductive performance compared to adult ewes, with a 24% difference in marking rate relative to mature ewes attributable largely to 22% difference in reproductive rate and to a lesser extent 3% difference in lamb survival. This has important industry impact because maidens represent 25% of Merino x Merino joinings that provide ewe replacements.

Project aim

To identify opportunities for post-weaning nutrition and management to deliver cost-effective improvements in weaner survival and subsequent reproductive performance across a range of Merino genotypes.

Project objectives

1. Identify opportunities to use nutrition and management between weaning and joining to improve Merino weaner survival and reproductive performance for a range of Merino genotypes.
2. Develop models to quantify the impact of intervention (genetics, management, nutrition) on survival and lifetime reproductive performance that can be incorporated in decision support tools to inform best-practice for different production systems.

3. Determine and formulate best practice nutritional management guidelines for Merinos between weaning and joining in regions of southern Australia ready for inclusion in MLA adoption programs (e.g. Bred Well Fed Well, Best Wool Best Lamb).
4. Demonstrate the impact of genetic selection and best practice management of Merinos between weaning and joining for commercial mixed farms across major sheep production areas in WA, VIC and NSW; 12 sites in total.
5. Contribute to the development of tools targeting practice change for managing maiden Merino ewes.

Current progress

The impact of Merino ewe weaner growth path to joining on survival and reproductive efficiency is underway at two on-farm research sites in WA (Pingelly and Kendenup) where Merino ewe weaners have been differentially fed from weaning. Weaners were stratified based on their weaning weight into a 'High' and 'Control' group. Regular monitoring of liveweight is used to inform grazing and supplementary feed strategies with the aim to achieve a 5 kg difference in weight between the High and Control groups at 12-months of age. The reproductive performance of these ewe weaners will be monitored and quantified for their maiden and subsequent joinings.

Project survey

A survey is currently underway to seek producers input on current practices related to weaner management and maiden ewe reproduction in sheep enterprises. Producer feedback from the survey will help shape the projects and inform the development and tools to assist producers to run profitable and sustainable Merino enterprises. Merino producers are encourage to click on the survey link (Managing Merino weaners to survive and thrive) and answer 10 short questions which should take 2-3 minutes.

For more information on managing Merino weaners to survive and thrive, contact Caroline Jacobson (c.jacobson@murdoch.edu.au).

Scientific papers

The impact of lamb and ewe mortality associated with dystocia on Australian and New Zealand sheep farms: A systematic review, meta-analysis and bio-economic model

Mieghan Bruce, John M. Young, David G. Masters, Gordon Refshauge, Andrew N. Thompson, Paul R. Kenyon, Ralph Behrend, Amy Lockwood, David W. Miller and Caroline Jacobson (C.Jacobson@murdoch.edu.au)

Abstract

Dystocia contributes to lamb and ewe mortality in the periparturient period but impacts for extensive sheep production systems remain poorly understood. Here we show that lamb and ewe mortality associated with dystocia has important impacts on sheep production in Australia and New Zealand, and quantify financial impacts for the Australian sheep industry. A systematic review of the literature identified 11 publications published since 1990 that reported sheep mortality due to dystocia in Australia or New Zealand. Assumptions for ewe breeding flock structure and reproductive performance were based on Australian sheep industry data. The proportion of lamb mortality attributable to dystocia (including stillbirths and perinatal deaths with evidence of hypoxic injury) pooled across all studies (pooled proportional mortality ratio) was 47 % (95 % Confidence Interval (CI): 38, 55). Pooled proportional mortality ratio for Australian studies was 53 % (95 %CI: 47, 60), and for New Zealand studies was 35 % (95 %CI: 19, 51). Pooled proportional mortality ratio was

similar for lambs born to Merino and non-Merino ewes, although more data are needed to determine effects of ewe breed independent of other factors. Pooled proportional mortality ratio was higher for single lambs (59 %; 95 % CI: 55, 63) than twin (47 %; 41, 54) or triplet (49 %; 46, 52) lambs. However, the number of dystocia-associated mortalities is higher for twin-born lambs than for singles because total mortality is higher for twin-born lambs. It is estimated that approximately 7.7 million lamb deaths and 297,500 ewe deaths per year are attributable to dystocia in Australia for the national flock of 38 million breeding ewes. The whole-farm bio-economic Model of an Integrated Dryland Agricultural System (MIDAS) was used to determine the impacts of dystocia-associated ewe and lamb mortality on Australian farm profit. Dystocia is estimated to reduce Australian national farm profit by AU$780 million or $23.00 per ewe mated based on an assumed lamb sale price of AU$6.50 per kg carcass weight. These estimates do not include the costs of reduced productivity for surviving ewes and lambs, intervention, post-farmgate impacts, delayed genetic progress, or impacts on animal welfare and access into sheep meat and wool markets. Reducing dystocia through improved genetics and sheep management will improve animal welfare and farm profit.

Interactions between ewes and rams during mating can be used to predict lambing dates accurately, but not sire

Kirsty Cunningham, Andrew Van Burgel, Khama R. Kelman, Claire M. Macleay, Beth L. Paganoni (beth.paganoni@dpird.wa.gov.au) and Andrew N. Thompson

Simple Summary

The early prediction of lambing dates for ewes could improve their management at critical time points during pregnancy and throughout lambing. A pilot study used proximity sensors to measure the interactions between ewes and rams during mating to predict conception and lambing dates successfully. This study is an extension of the pilot study using multiple rams under commercial conditions. Lambing dates were predicted based on peak ewe–ram interactions during mating and then compared to the actual lambing dates observed in the paddock. Overall, 91% of lambing dates were predicted within ±6 days and 84% within ±3 days. The use of proximity sensors during mating was an effective means of predicting lambing dates. This could help improve ewe management during pregnancy and lambing and the subsequent survival and performance of their lambs.

Abstract

Ewes often lamb over extended periods so the level of nutrition during pregnancy and lambing may be suboptimal for ewes that conceived later during mating. Predicting lambing dates would allow cohorts of ewes with similar gestational ages to be managed more precisely to achieve targets for ewe nutrition, feed on offer, mob sizes and access to shelter to improve lamb survival. The interactions between ewes and rams during mating have been used to predict the time of oestrus and lambing dates successfully, but this has not been tested at a commercial scale. In this study, proximity sensors were used to measure interactions between inexperienced Merino ewes (n = 317) and experienced rams (n = 9) during a 27-day mating period under commercial production conditions. When the gestation length was assumed to be 150 days, 91% of lambing dates were predicted within ±6 days of the actual birth date of lambs and 84% of lambing dates were predicted within ±3 days. The use of proximity sensors during mating was an effective means of predicting lambing dates, and there was no significant difference in accuracy for single bearing verses multiple bearing ewes. However, DNA parentage data showed the ram corresponding with the maximum daily interactions

ratio was the sire for only 16% of all progeny, suggesting they could not be used to indicate the sire of the progeny.

Melatonin rescues the development and quality of oocytes and cumulus cells after prolonged ovary preservation: An ovine in vitro model

Irene Sánchez-Ajofrín (irene.ssanchez@uclm.es), Alicia Martín-Maestro, Daniela Alejandra Medina-Chávez, Juan Ángel Laborda-Gomariz, Patricia Peris-Frau, José Julián Garde and Ana Josefa Soler

Abstract

The preservation of ovaries beyond 7 h dramatically decreases the developmental potential of oocytes to reach the blastocyst stage during in vitro embryo production. Here we investigated the protective effects of melatonin in the ovarian preservation solution after prolonged storage (7 h) in ovine as an animal model. Slaughterhouse adult sheep ovaries were preserved in saline solution for 2 h (Control) and 7 h (Control stress), and with melatonin for 7 h and at different concentrations (Melatonin 10^{-3}, 10^{-5}, 10^{-7}, 10^{-9}, and 10^{-11} M). First, the fertilizing ability, embryo development rates, and blastocyst quality were investigated. Notably, a concentration of 10^{-9} M melatonin showed the greatest number ($p < 0.05$) of blastocysts produced after 7 h of ovary storage (24.75 ± 1.57%) and was comparable ($p > 0.05$) to that obtained after just 2 h of storage in the untreated Control (30.77 ± 1.57%). Then, oocyte quality parameters showed that, compared to Control stress, Melatonin actively reduced intracellular ROS content, caspase-3 activity, DNA fragmentation, and the abundance of pro-apoptotic transcripts BAX and CASP3, while increasing that of GDF9 and GPX1. In cumulus cells, flow cytometry results showed that melatonin decreased apoptosis and increased mitochondrial activity ($p < 0.05$). In addition, there was a greater ($p < 0.05$) abundance of HAS2, STAR, and PTGS mRNA transcripts in Melatonin compared to Control stress. These findings reveal a melatonin-mediated developmental rescue of oocytes against ischemic damage during ovary preservation which represents a promising strategy for successfully producing embryos when prolonged ovarian transport times are required.

AAAS Short Communications

The following Short Communications were submitted to the Australian Association of Animal Sciences (AAAS) 35th biennial conference 'Anchoring knowledge – exploring the animal science ecosystem'. They were published in Volume 34 of Animal Science in Australia which is an accessory publication to Volume 62, Numbers 10 & 11 of Animal Production Science. Scroll to the bottom of the page to access the pdf.

Effect of encapsulated fennel extract on motility and viability of frozen-thawed ram sperm

E. Haghvirdilou (haghverdi2000@gmail.com), A. Karimi and M. Nazari

Animal Science in Australia **34**, vi July 2022

Factors affecting lamb birth weight, gestation length, survival and litter size in Poll Dorset sheep

G. J. L. Sawyer (gregory.s@sydney.edu.au), S. Doolan, I. J. Roberts, J. A. Imaz, G. Refshauge, S. P. de Graaf and L. A. Gonzalez

Animal Science in Australia **34**, x July 2022

Using historic data to understand the cost of an extra condition score in sheep

S. F. Walkom (swalkom@une.edu.au) and A. A. Swan

Pilot study on plasma markers of energy balance in pregnant sheep on farm

K. DiGiacomo (kristyd@unimelb.edu.au), J. Conlan, J. W. V. Preston, F. Zamuner and B. J. Leury

Validation of temperature classification using remote-sensing technology during oestrous synchrony in Merino ewes

B. E. Lewis Baida (bobbie.lewisbaida@adelaide.edu.au), A. M. Swinbourne, S. T. Leu and W. H. E. J. van Wettere

The accuracy of the Optium Neo™ handheld glucose-ketone meter for testing ewe blood samples

G. Refshauge (gordon.refshauge@dpi.nsw.gov.au), B. W. Holman, M. T. Newell, D. L. Hopkins, S. R. McGrath, M. Vials and R. C. Hayes

Automatic monitoring of body weight of Poll Dorset ewes in late gestation and lactation

G. J. L. Sawyer (gregory.s@sydney.edu.au), I. J. Roberts, J. A. Imaz, G. Refshauge, S. P. de Graaf and L. A. Gonzalez

Back to basics – the importance of understanding ewe joining practices

A. L. Bates (abates@csu.edu.au), S. R. McGrath, S. M. Robertson, M. B. Allworth and G. Refshauge

Observation of Merino ewe body condition score on lamb live weight and survival to weaning

B. Brougham (billie-jaye.brougham@adelaide.edu.au), A. M. Swinbourne, Willis, A. C. Weaver, D. O. Kleemann and W. H. E. J. van Wettere

Investigating the cause and prevention of red gut in lambs grazing lucerne

T. Dobrijevic, E. Dal Grande and C. L. Trengove (colin.trengove@adelaide.edu.au)

Evaluating amino acid profiles and birth traits between single and twin Merino lambs

L. J. Flanagan (leesa-joy.flanagan@adelaide.edu.au), M. L. Hebart, F. D. Brien, S. A McCoard and M. Caetano

Stage of maturity and energy intake level influences protein and fat deposition in cross-bred lambs

T. P. Keogh (tkeogh@csu.edu.au), V. H. Oddy, M. B. Allworth and S. R. McGrath

Animal Science in Australia **34**, lxxxix July 2022

Understanding the incidence of dystocia related death in ewes: a key to unlocking ewe survival

M. C. McQuillan (mmcquillan@csu.edu.au), E. Glanville, C. Jacobson, L. Sherriff, D. M. McGill, A. Whale and M. B. Allworth

Animal Science in Australia **34**, xcix July 2022

The effect of metabolic state on parturition duration in twin-bearing Merino ewes

A. L. Munn (amy.munn@adelaide.edu.au), W. H. E. J. van Wettere. M. F. Swinbourne and A. C. Weaver

Animal Science in Australia **34**, ci July 2022

Beneficial responses to a novel probiotic in feedlot lambs

G. J. Mutton (g.mutton@uq.net.au), M. J. Callaghan, K. J. Harper, P. J. Dart and D. M. McNeill

Animal Science in Australia **34**, cii July 2022

Observations on risk of dystocia and lamb survival from high and low birthweight rams

S. M. Robertson (surobertson@csu.edu.au), J. C. Broster, B. J. King and M. A. Friend

Animal Science in Australia **34**, cxiv July 2022

Associations between high ambient temperature and poor fertility of ewes

S. M. Robertson (surobertson@csu.edu.au) and M. A. Friend

Animal Science in Australia **34**, cxv July 2022

Autumn lambing systems that integrate dual-purpose crops provide benefits across environments

L. J. Watt (lucy.watt@csiro.au), L. W. Bell and P. W. Hunt

Animal Science in Australia **34**, cxxiii July 2022

Awareness of breeding ewe management practices by producers with extensive sheep enterprises

L. Broughton and S. F. Hatcher (sue@makinoutcomes.com.au)

Animal Science in Australia **34**, cxlv July 2022

Improving Merino sheep reproductive performance in the NSW rangelands

S. F. Hatcher (sue@makinoutcomes.com.au) and L. Broughton

Animal Science in Australia **34**, cl July 2022

Project final reports

Priority list of endemic diseases for the red meat industry — 2022 update

Richard Shephard (admin@herdhealth.com.au), John Webb Ware, Ben Bloomfield and Geoff Niethe

Meat & Livestock Australia – 30 June 2022
Priority list of endemic diseases for the red meat industry - 2022-update

Upcoming events

Date	Event	Location
3 August 2022	RAMping up Repro Sheep Connect NSW	Laggan, NSW
5 August 2022	MeatUp Forum Meat & Livestock Australia	Northam, WA, NSW
5 August 2022	Winning With Weaners Sheep Connect NSW	Cootamundra, NSW
9 August 2022	RAMping Up Repro Sheep Connect NSW	Young, NSW
10 August 2022	RAMping Up Repro Sheep Connect NSW	Stockinbingal-Milvale, NSW
11 August 2022	RAMping Up Repro Sheep Connect NSW	Barmedman, NSW
15 August 2022	RAMping UP Repro Sheep Connect NSW	Dunedoo, NSW
16 August 2022	MeatUp Forum Meat & Livestock Australia	Wagga Wagga, NSW
23 August 2022	RAMping Up Repro Sheep Connect NSW	Cudal, NSW

Funding calls

Program	Open	Close
Shedders Reproductive Performance Meat & Livestock Australia	18 July 2022	29 August 2022