Sheep reproduction RD&A alert

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

MLA is seeking proposals for the role of BredWell FedWell (BWFW) National Coordinator. The National Coordinator will manage the delivery of BWFW from 2026 to 2030, working alongside the MLA Project Manager to drive continued successful delivery of BWFW across Australia, including oversight of the deliverer network.

BredWell FedWell is a one-day introductory course focusing on the technical areas of genetics and nutrition and the impacts they have on the productivity and profitability of livestock businesses.

Program coordinator
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For further details on the role and BWFW program, please see the Request for Tender. Applications are due by **9:00 am AEST, 8 September 2025**.

For more information regarding this tender, please contact Mitchell Plumbe, Project Manager – Producer Adoption (mplumbe@mla.com.au 0458 273 715).

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

Fit to lamb

Background

The Fit to lamb project built on a 2021 review of the impact of lamb and ewe mortality associated with dystocia on Australian and New Zealand sheep farms. The review concluded that since the 1990's 53% of lamb mortalities reported in Australian studies were associated with dystocia. Both Merino and non-Merino ewes were impacted by dystocia with all litter sizes affected and negative impacts for farm income and sheep welfare. The RD&A gaps identified in the review informed the design of the fit to lamb project which sought to establish a database platform to collate existing and future data related to lamb mortality.

Aim

To compile a database of existing data from Australia and other countries with similar production systems and undertake meta-analyses to quantify known and potential risk factors for different causes of death in lambs, including dystocia and inform recommendations for management and selection strategies specific to ewe age, lamb birth type, breed and production environments.

Project Objectives

- Develop comprehensive baseline data for dystocia risk (plus other causes of death) to inform benchmarking and assessment of progress in reducing dystocia-related mortalities.
- Establish a database platform to determine lamb mortality risk and cause of death, combining data from multiple research projects and centres, and modelling to inform decision-support tools.
- Identify opportunities to use genetics, nutrition and management to reduce impacts of dystocia and improve lamb survival for a range sheep genotypes and production systems.
- Develop guidelines for implementation in Australia as well as in other participating countries.
- Develop RD&E priorities to address gaps and reduce potential for duplication.

Progress to date

The database currently comprises records from studies conducted between 2000 to 2024 covering 93 lambing periods and includes 42,633 records of lambing events and 70,217 records of individual lambs. Data sharing agreements are currently in place for lambing data from New Zealand and South Africa. Several analyses are currently underway focused on cause of lamb death, relationships between lambing ease and material behaviour scores and lamb mortality and the genetic basis of lamb survival. Scientific papers are being prepared which detail the outcomes of these analyses. Two were presented at the recent Association for the Advancement of Animal Breeding and Genetics (AAABG) conference which will soon be available from the [AAABG website](#):

Hebart *et al*. (2025) Genetic parameters for cause of death traits in lambs and indicators traits linked to neonatal survival. *Proc. Assoc. Advmt. Animal. Breed. Genet*. **26**: 256 - 259

Improving lamb survival has implications for production, economics and welfare. Direct selection for lamb survival is difficult given its low heritability. Selection based on cause of death could provide an alternative or supplementary strategy for improving lamb survival. This study estimated heritabilities for cause of death traits determined from necropsy, and genetic correlations between these and indicators of neonatal lamb survival. Our results support using lambing ease as an indicator trait to improve lamb survival. Although birth weight was positively genetically correlated with Dystocia A, it was negatively correlated with the starvation and mismothering and starvation, mismothering and exposure complexes, complicating its use as an indicator trait. However, the moderate genetic correlations between observed birth vigour and the starvation and mismothering complex (0.53) and between thorax circumference and Dystocia B (0.58) and a composite dystocia trait (0.47) indicate potential for indirect selection for improved lamb survival.

McEwin *et al.* (2025) A revisiting of the genetics of lamb survival and related traits as part of the fit to lamb project. *Proc. Assoc. Advmt. Animal. Breed. Genet*. **26**: 260- 263

Measurable genetic gains in lamb survival have been reported in research and industry flocks, despite low heritability estimates. The study reported herein utilised Sheep CRC Information Nucleus Flock data (2007 to 2011) and MLA Resource Flock data (2012-2023) to complete an updated univariate analysis for lamb survival and its indicator traits. Direct genetic, maternal genetic, maternal permanent environmental, common litter and genetic groups variances were estimated for 18 traits using an animal model. Direct heritability estimates were low for all lamb survival traits (0.01) and generally low for indicator traits except for birth weight (0.12), metacarpal length (0.29), crown-rump length (0.20), thorax circumference (0.12) and birth coat score (0.39). Maternal heritabilities were low and equal to or greater than direct heritabilities for lamb survival traits and were generally low for indicator traits. The proportion of phenotypic variance accounted for by permanent environmental effects or genetic groups effects was often larger than direct genetic effects for lamb survival traits and varied across indicator traits. Common litter effects accounted for the largest proportion of variation across all traits, ranging from 11% to 76%.

In summary, lamb survival traits are lowly heritable with equal proportions of variance explained by direct and maternal effects. Some indicator traits appear more heritable and may be useful in selection programs as potentially correlated traits.

For more information on the Fit to lamb project contact Caroline Jacobson (C.Jacobson@murdoch.edu.au).

Non-photoperiodic actions of Melatonin

This Collection of Reproduction, Fertility and Development papers edited by Alfonso Abecia and Graeme Martin, addresses a new area of melatonin biology. Historically, melatonin has been seen as a pineal hormone that plays one essential role – the synchronisation of reproductive and other brain-controlled functions with changes in photoperiod. Often driven by the detection of melatonin receptors in non-brain tissues, it has become clear that melatonin plays a much wider variety of roles in the function of the testis, sperm, ovary, follicles, oocyte, embryo, placenta, fetus and mammary gland. This Collection presents this broader view of melatonin biology, and how the new concepts can be applied to livestock production.

Effect of melatonin treatment of pregnant Sarda ewes on lactation and lamb development
S. Luridiana, M. Ouadday, M. C. Mura, B. Ben Smida, G. Cosso and V. Carcangiu

Differential effect of melatonin on ram spermatozoa depending on the allelic variant of the RsaI polymorphism of the MTR1A gene, incubation medium and season
Victoria Peña-Delgado, Agustí Noya, Melissa Carvajal-Serna, José A Abecia, Rosaura Pérez-Pe and Adriana Casao

The melatonin system is expressed in the ovine uterus: effect of the day of the oestrous cycle and undernutrition
C. Sosa, E. Laurenzana, V. de Brun, A. Meikle and J. A. Abecia

Review papers

Artificial intelligence-assisted selection strategies in sheep: Linking reproductive traits with behavioral indicators

Ebru Emsen, Muzeyyen Kutluca Korkmaz and Bahadir Baran Odevci

Simple Summary
Sheep farmers aim to breed animals that are healthy, fertile, and able to care for their lambs. Traditionally, they have selected animals based on physical traits and past performance. However, watching animals to identify important behaviors, like readiness to mate or how well a mother cares for her lamb, can be time-consuming and difficult. This study explores how modern technologies such as cameras, movement sensors, and computer systems using artificial intelligence can help farmers make better breeding decisions. These tools can track the behavior of sheep and detect signs like increased activity before mating or how close a mother stays to her lamb. By turning these behaviors into useful information, farmers can select animals more effectively and improve the health and survival of future generations. This new approach also reduces the need for stressful handling of animals and supports more humane farming. Our work shows how technology can be used in a smart and responsible way to help both farmers and animals, leading to more productive and sustainable sheep farming.

Abstract
Reproductive efficiency is a critical determinant of productivity and profitability in sheep farming. Traditional selection methods have largely relied on phenotypic traits and historical reproductive records, which are often limited by subjectivity and delayed feedback. Recent advancements in artificial intelligence (AI), including video tracking, wearable sensors, and machine learning (ML) algorithms, offer new opportunities to identify behavior-based indicators linked to key reproductive traits such as estrus, lambing, and maternal

behavior. This review synthesizes the current research on AI-powered behavioral monitoring tools and proposes a conceptual model, ReproBehaviorNet, that maps age- and sex-specific behaviors to biological processes and AI applications, supporting real-time decision-making in both intensive and semi-intensive systems. The integration of accelerometers, GPS systems, and computer vision models enables continuous, non-invasive monitoring, leading to earlier detection of reproductive events and greater breeding precision. However, the implementation of such technologies also presents challenges, including the need for high-quality data, a costly infrastructure, and technical expertise that may limit access for small-scale producers. Despite these barriers, AI-assisted behavioral phenotyping has the potential to improve genetic progress, animal welfare, and sustainability. Interdisciplinary collaboration and responsible innovation are essential to ensure the equitable and effective adoption of these technologies in diverse farming contexts.

Scientific papers

Reproductive seasonality influences follicle dynamics and the ovarian extracellular matrix structural properties in ewes

Johanne Grosbois (johanne.grosbois@ulb.be), Vlastimil Srsen, Alba Muñoz Grande, Helen M Picton, and Evelyn E Telfer

In brief
Although sheep have been widely used as a large animal model for human ovarian biology, unlike women, they display a marked seasonality of breeding activity, the underlying mechanisms and extent of ovarian changes of which remain largely undefined. This study reveals the active remodeling of the ovarian extracellular matrix across the reproductive season, which could be an additional driver responsible for the observed variations in ovarian morphometry and follicle dynamics.

Abstract
Ovarian function requires dynamic tissue remodeling provided by its extracellular matrix (ECM). In seasonal breeders, ovaries undergo an additional circannual cycle of recrudescence and regression. While increasing evidence suggests that the ECM impacts normal ovarian cyclicity and function, how its components are remodeled across reproductive seasonality has not been explored in large mammals. Using immunohistological and in vitro experiments, we investigated the influence of reproductive seasonality on ovarian morphometry, ECM properties and follicle developmental potential in vitro. Ovarian weight and volume were reduced during anestrus (P < 0.001). Neither follicular density nor the proportion of preantral follicles and earlier stages of development were impacted by the season, but the percentage of antral follicles increased during anestrus (P = 0.028), while corpora lutea were only present in ovaries collected during the breeding season. Concomitantly, ovarian ECM composition was significantly remodeled, with stromal collagen and fibronectin significantly increased (P < 0.01) and laminin decreased (P = 0.032) during anestrus compared to the breeding season. This correlated with thicker collagen fibers both in the stroma and in the tunica albuginea during anestrus. In vitro, preantral follicles isolated from their native environment exhibited a season-dependent pattern of follicular integrity, survival, antrum formation and growth. These results suggest the establishment of a stiffer ovarian microenvironment during anestrus, which, together with endocrine changes, regulates follicle growth, demise and the ovulatory response.

Methionine supplementation-induced alteration of sheep seminal plasma miRNAs and proteome

Jessica Townsend , Zongkai Peng , Mehmet Kizilaslan , Todd Taylor , Zhibo Yang , Nagib Ahsan (nahsan@ou.edu), Hasan Khatib (hkhatib@wisc.edu)

Abstract

Seminal plasma (SP) primarily serves as the transport medium for sperm; however, protein and miRNA expression in SP have been found to be indicative of reproductive function and have been used to identify changes in spermatogenesis. It is also postulated that SP proteins and miRNAs play a role in direct communication with the female reproductive tract to alter uterine function and drive physiological changes that increase pregnancy success. Importantly, SP has been shown to be susceptible to paternal diet, indicating another method in which altered fetal programming may occur. Most work regarding the role of SP in pregnancy establishment as well as dietary contributions to SP composition has been conducted in mice and humans; however, the effects of diet on SP composition in livestock species warrants further investigation. Therefore, this study aims to investigate how paternal diet can alter the proteome and miRNA composition of SP from sheep to better understand their potential roles in male fertility and fetal programming. Here, we examined how a prepubertal methionine-enriched diet affected the miRNA and protein compositions of SP in Polypay rams. Comparative proteomics revealed that a total of 28 SP proteins were significantly increased, and 32 were decreased in abundance ($P < 0.05$, fold change > 1.5) in response to methionine supplementation. Additionally, 138 significant miRNAs were identified in the SP from treatment versus control rams, with 80 upregulated and 58 downregulated ($P < 0.05$, fold change > 2). Given that miRNAs are known regulators of mRNA expression, we performed a functional enrichment analysis of our differentially expressed miRNAs and found that 79 miRNAs target 37 proteins exhibiting differential abundance. Gene Ontology analysis revealed that targeted proteins were enriched in biological processes, including reproduction, fertilization, and embryo development. Overall, these results demonstrate that the SP composition of rams is susceptible to a methionine-enriched diet and may impact male fertility and offspring development.

Estimating the genetic parameters of resilience toward known and unknown disturbances in sheep using wool fibre diameter and body weight variability

Erin G. Smith (esmith76@myune.edu.au), Samuel F. Walkom, Dominic L. Waters and Sam A. Clark

Abstract

Background. General resilience in animals can be quantified by analysing the variability in longitudinal data. However, it is unclear whether resilience indicators derived from different longitudinal data series can predict resilience to known or unknown disturbances in sheep. This study aimed to use two sources of longitudinal data, wool fibre diameter and body weight, to develop potential indicators for resilience to the known stress of weaning and overall resilience to unknown disturbances. The genetic parameters of these traits were assessed, along with the genetic correlations between traits from different data series and different definitions of resilience. Additionally, correlations between resilience indicators, health and production traits were estimated to evaluate the suitability of including resilience indicators in breeding programs.

Results. Fibre diameter and body weight records from approximately 6500 yearling Merino sheep were used to estimate four resilience indicators of resilience towards unknown disturbances: log-transformed variance (Lnvar), lag-1 Auto (Auto), skewness (Skewness) and absolute difference in the deviations (ABS) from these curves. Three other traits, rate of change in the response and recovery (ROC_response and ROC_recovery) and area between curves (ABC) during a known disturbance of weaning, were also estimated. Resilience indicators were found to be lowly heritable (0.03 ± 0.01 to 0.18 ± 0.04). Genetic correlations between the general resilience indicator and the indicator of resilience to weaning stress were generally moderate, particularly in the wool fibre diameter data, suggesting these may represent similar traits. Genetic correlations between resilience indicators derived from wool fibre diameter and body weight data were typically weak to moderate, which indicates that they possibly capture different aspects of resilience. The genetic correlations between resilience indicators and health traits were mostly low, except for body condition score. Correlations between resilience and production traits were low to moderate and favourable.
Conclusions. Resilience indicators based on deviations in wool fibre diameter and body weight can be used to potentially select animals that are less affected by environmental disturbances. The genetic correlations between resilience indicators and health and production traits suggest that these traits could be included in breeding programs to improve resilience without adversely affecting production traits.

Impacts of early weaning on lamb gut health and immune function: Short-term and long-term effects

Chong Li, Yunfei Xu, Jiale Jia, Xiuxiu Weng, Yang Zhang, Jialin Peng, Xueming An and Guoxiu Wang

Simple Summary

This study investigated how early weaning affects lamb health by examining stress, immunity, and gut function. Early-weaned lambs experienced short-term psychological stress, marked by increased stress hormones and inflammation, but these effects resolved within a week. However, long-term gut changes were observed, including compromised intestinal structure, increased cell damage caused by oxidation, and adaptive changes in intestinal cells. Gene analysis highlighted key molecules involved in immune function, fat metabolism, and energy regulation. The nitric oxide synthase 2 (NOS2) gene may play a key role in connecting cell stress to immune reactions. Overall, early weaning caused lasting gut issues due to changes in metabolism and nutrition, while psychological stress was temporary.

Abstract

Despite the known impacts of weaning on animal health, the underlying molecular mechanisms remain unclear, particularly how psychological and nutritional stress differentially affect gut health and immune function over time. This study hypothesized that early weaning exerts distinct short- and long-term effects on lamb stress physiology, immunity, and gut health, mediated by specific molecular pathways. Twelve pairs of full-sibling male Hu sheep lambs were assigned to control (CON) or early-weaned (EW) groups. Plasma stress/immune markers were dynamically monitored, and intestinal morphology, antioxidant capacity, apoptosis, and transcriptomic profiles were analyzed at 5 and 28 days post-weaning. Early weaning triggered transient psychological stress, elevating hypothalamic–pituitary–adrenal (HPA) axis hormones (cortisol, catecholamines) and inflammatory cytokines (TNF-α) within 1 day ($p < 0.05$); however, stress responses were transient and recovered by 7 days post-weaning. Sustained intestinal remodeling was observed in EW lambs, featuring reduced ileal villus height, increased crypt depth ($p < 0.05$), and oxidative damage (MDA levels doubled vs. CON; $p < 0.01$). Compensatory epithelial adaptation included increased crypt depth but paradoxically reduced villus tip apoptosis. The transcriptome analysis revealed significant changes in gene

expression related to immune function, fat digestion, and metabolism. Key DEGs included APOA4, linked to lipid transport adaptation; NOS2, associated with nitric oxide-mediated immune–metabolic crosstalk; and mitochondrial gene COX1, reflecting energy metabolism dysregulation. Protein–protein interaction analysis revealed NOS2 as a hub gene interacting with IDO1 and CXCL11, connecting oxidative stress to immune cell recruitment. Early weaning exerts minimal lasting psychological stress but drives persistent gut dysfunction through transcriptome-mediated changes in metabolic and immune pathways, highlighting key genes such as APOA4, NOS2, and COX1 as potential regulators of these effects.

Investigating the trend of blood progesterone concentration following an injection of slow-release progesterone in ewes out of the breeding season

Ali Kadivar (kadivar.ali@sku.ac.ir), Mohamad Mahdi Kaviani, Pegah Khosravian, Abdonnaser Mohebbi and Najmeh Davoodian

Abstract

Context. Progesterone has several applications in the reproductive management of domestic animals. Progesterone treatment in intravaginal devices is one of the most important and widely used methods for estrus synchronization in ruminants, especially in ewes and does. The use of intravaginal devices has disadvantages, including vaginitis and purulent discharge. An alternative solution to overcome these side effects is the use of slow-release progesterone injection.

Aims:

This study evaluated blood progesterone concentration after injecting three doses of slow-release progesterone (50, 75, and 100 mg) in ewes out of the breeding season.

Methods. A total of 18 cross-bred ewes were used in this trial. Ewes were randomly assigned to three groups (six ewes in each group) that received a single intramuscular injection of 50 (P50), 75 (P75), and 100 (P100) mg of slow-release progesterone. Blood samples were collected 10 times to evaluate progesterone concentration in all three groups.

Key results. Progesterone concentration decreased to <1 ng/mL in the P50 and P75 groups 24 h and 72 h after injection respectively, but stayed at >1 ng/mL in the P100 group for ~7 days after injection.

Conclusions. On the basis of these results, the 100 mg dose is probably better than lower doses, to use in estrus synchronization programs in ewes.

Implications. Achieving a minimum dose of slow-release progesterone that maintains high blood progesterone concentrations for an appropriate period of time with a single injection is an easy and economical way to induce and synchronize estrus in ewe.

Productive, hematological and physiological responses of Barbarine ewe lambs subjected to nutritional challenge under hot conditions

Yathreb Yagoubi (yagoubiyathreb@hotmail.fr), Massara Nasraoui, Mokhtar Mahouachi, Samir Smeti, Samia Ben Saïd Ahlem Bartkiz, Kahena Bouzid and Naziha Atti

Abstract

Context. Climatic changes considerably affect feed availability; consequently, animals face undernutrition.

Aims. This study aimed to evaluate the productive, reproductive and metabolic responses of Barbarine ewe lambs to feed restriction under hot conditions (30–50°C).

Methods. Forty-eight 6-month-old ewe-lambs (BW 24.4 kg) were assigned to high (H; 500 g straw, 600 g concentrate) or low (L; 400 g straw, 200 g concentrate) feeding groups for 120 days where the temperature exceeded 40°C (restriction phase). During refeeding (50 days, T ≤30°C), both groups received 500 g of straw and 600 g of concentrate (H). During this phase, both groups were renamed based on their previous nutritional status: HH (previously high-fed animals) and LH (previously low-fed animals). BW, body condition score, rectal temperature, respiratory rate and heart rate were measured, and blood samples were collected every 2 weeks. At the end of this phase, rams were introduced to ewe ambs to assess their reproductive aptitudes.

Key results. During feed restriction, under heat stress, H ewe lambs gained 5.1 kg, whereas the L group maintained a constant weight without health issues (P = 0.0001). During refeeding, the LH group's BW increased by 6%, but remained lower than that of HH with no compensatory growth. During restriction, under hot conditions, the respiratory rate and heart rate were higher in H than L (P < 0.05), whereas the rectal temperature remained stable (P > 0.05). During refeeding, no significant changes were observed in all physiological parameters. Compared with H, glucose and urea decreased for the L group, and creatinine increased, whereas the rest of the metabolites remained constant in both groups. In terms of reproduction, only 50% and 25% of ewe lambs showed estrus behavior for HH and LH, respectively. Consequently, only 33 (HH) and 12% (LH) of total ewes lambed.

Conclusion. Feed restriction combined with heat stress significantly impairs growth and may affect the long-term reproductive performance of Barbarine ewe lambs. Monitoring their progress should provide important information on the adaptive capacities of this breed to different environmental challenges.

Implications. Insights into adaptative responses help develop sustainable feeding and management strategies to enhance the resilience of Barbarine ewe lambs to environmental challenges while maintaining productivity in arid and semi-arid regions.

Evaluating somatic cell count, the California mastitis test, and infrared thermography for subclinical mastitis detection in meat ewes

Gretchen L. Peckler and Sarah J.J. Adcock (sarah.adcock@wisc.edu)

Highlights

- SCC was the strongest predictor of subclinical mastitis among methods tested.
- CMT showed moderate value and may serve as a first-line screening tool.
- Infrared thermography was unreliable due to ambient temperature influence.
- Infection raised SCC earlier in lactation but not late lactation.

Abstract

Mastitis is a major concern in sheep farming. Detecting subclinical mastitis, which manifests without apparent signs, is particularly challenging. While somatic cell count (SCC) and the California Mastitis Test (CMT) are widely used in dairy animals, and infrared thermography has shown some promise, their diagnostic performance in meat sheep remains under-evaluated. This study aimed to 1) characterize SCC and udder skin surface temperature across lactation in subclinically infected and uninfected udder halves; 2) determine diagnostic cutoffs for SCC, CMT, and thermography; and 3) compare diagnostic performance using receiver operating characteristic curves. Milk and thermal data were collected weekly from 37 clinically healthy nursing ewes over the first 8 weeks postpartum. Infection was defined by ≥100 CFU/mL of a bacterial species.

Infected udder halves had higher log SCCs than uninfected halves in weeks 1–4 and 6 postpartum. Infection status did not predict udder skin temperature, which was more influenced by ambient temperature. SCC had the highest diagnostic performance (AUC = 0.78), with an optimal cutoff of 148,500 cells/mL (sensitivity = 0.77; specificity = 0.66). The CMT yielded an AUC of 0.70 with an optimal cutoff score above negative (i.e., trace or positive reaction; sensitivity = 0.77; specificity = 0.51). Udder skin temperature had the lowest AUC (0.56). SCC is the most effective of the three tools for detecting subclinical mastitis, although CMT may serve as a useful on-farm screening tool. Infrared thermography did not detect subclinical infection, highlighting the need for further research into non-invasive diagnostics.

Sexual attractivity and receptivity in tailed and docked ewes

Jocelyn M. Woods (jwoods5@wisc.edu) and Sarah J.J. Adcock (sarah.adcock@wisc.edu)

Highlights
- Rams tended to mount undocked ewes before docked ewes.
- When mounted, undocked ewes tended to accept more mounts compared to docked ewes.
- Tail docking did not impact the ewe's distance traveled or distance to the ram.
- Tail docking ewe lambs soon after birth can have lasting effects on mating behavior.

Abstract

Removing a portion of the tail, also known as tail docking, is commonly performed in sheep. However, there is evidence that females of small ruminant species use their tails to communicate in sexual contexts. The objective of this study was to test whether a ewe's tail status affected the mating behavior of ewes and rams. Within 18 Polypay female twin pairs, one lamb was docked between 24 and 36 h of age by placing a constrictive rubber ring on the tail while her sister's tail was left undocked (n = 18 lambs/treatment). The estrous cycles of the ewes were synchronized when they reached 7–8 months of age, and 9 groups of 4 ewes (2 twin pairs/group) were each exposed to a single unfamiliar virgin ram (n = 9; 7–8 months of age) for 48 h. Behavioral interactions were video recorded over the first 2 h and analyzed to determine the ram's latency to investigate each ewe's perineal region and to mount her, the duration of perineal investigation, the number of headbutts and mounting attempts towards the ewe, and the proportion of mounts that the ewe accepted out of the total attempted mounts. We used real-time location sensors to record the x, y location of ewes and rams every second, from which we determined each ewe's total distance traveled and average distance to the ram. Undocked ewes tended to be mounted sooner by the ram and, when mounted, tended to accept more mounts compared to docked ewes. No differences were observed between docked and undocked ewes in any of the other behaviors. These findings suggest that tail docking neonatal ewe lambs may reduce sexual attractivity and receptivity later in life, with potential implications for reproductive success.

Impaired calcium oscillations and PLCζ dysfunction as key contributors to the low efficiency of ICSI and artificial activation in sheep

Luca Palazzese, Domenico Iuso, Aurora Scudieri, Margherita Moncada, Martina Lo Sterzo, Francesca Boffa, Pasqualino Loi (ploi@unite.it) and Marta Czernik

Abstract

Intracytoplasmic sperm injection (ICSI) is less effective in ovine oocytes than in vitro fertilization (IVF), but the reasons remain unclear. Calcium oscillations, driven by phospholipase C zeta 1 (PLCζ1), are critical for fertilization success. This study evaluated Ca^{2+} wave dynamics in ovine oocytes matured in vitro and fertilized via IVF or ICSI. Metaphase II oocytes were fertilized by IVF (n = 140) or ICSI (n = 105) using frozen-thawed ram spermatozoa. Calcium oscillations were monitored by time-lapse microscopy with Fluo-4 pentapotassium salt, and PLCζ1 expression/localization was analysed via immunofluorescence. IVF-fertilized oocytes exhibited prolonged Ca^{2+} oscillations lasting up to 16 h, with peaks persisting during pronuclear formation. ICSI-fertilized oocytes showed restricted Ca^{2+} responses, with peaks limited to the first 4 h. In frozen-thawed sperm, PLCζ1 was mainly in the acrosomal region but relocated to the subequatorial region after ionomycin-induced acrosome reaction, mimicking IVF conditions. In contrast, in PVP-treated sperm used for ICSI, PLCζ1 mislocalized or was depleted, likely due to premature acrosome loss. These findings indicate that abnormal Ca^{2+} responses underlie ICSI's poor performance in ovine oocytes. Our preliminary results suggest that PLCζ1 mislocalization in sperm during ICSI could impair Ca^{2+} signalling. This study, the first to describe Ca^{2+} patterns in sheep oocytes fertilized via IVF, highlights key fertilization failure mechanisms in ICSI and underscores the need to optimize reproductive biotechnologies in farm animals.

Forecasting the performance of alternative sheep production systems grazing perennial pastures

Christine E. Storer (cstorer@csu.edu.au), Sosheel S. Godfrey, Susan M. Robertson, Michael A. Friend and Karl Behrendt

Highlights

- Six sheep production system enterprise mixes were different in dynamic modelling.
- Higher economic returns were associated with higher risks of variable returns.
- Earlier mated and terminal systems had lower economic returns but also lower risks.
- More lucerne and later mating produced greater returns that were more variable.

Abstract

Context: Grazing enterprises employ a range of management strategies in rain-fed Australian sheep production systems, which alters both production potential and profitability. This research used a stochastic whole-farm simulation modelling methodology to assess the impact of six different management regimes on the long-term profitability of a model farm simulated from August 1971 to July 2018.

Objective: We aimed to 1) compare the whole farm productivity and economics of the different sheep production systems, 2) identify the factors that were driving the differences between systems, and 3) determine if the profitability and ranking of systems changed in response to different market and environmental conditions.

Method: Stochastic simulation whole-farm modelling, combined AusFarm® biophysical simulation data, with forecasted @Risk modelling price time series data. The economic and financial performance of different sheep management systems were assessed using gross margins, cash flows, net present values (NPV), coefficient of variation (CoV) and cash flow modified internal rates of return (MIRR).

Results and conclusions: Decisions on the management of sheep system mating times, breed of ram, type of pasture grazed and retention of ewe lambs affected supplementary feeding costs as well as production of wool and meat. Production differences along with variation in prices received explained why the six sheep systems had significantly different economic gross margins and NPVs. The systems also had different risks in achieving economic returns. Higher economic returns were associated with higher risks of variable returns

and lower returns with lower risk of variation. The earlier mated (February) and terminal systems did not perform economically as well as the later mated (April) systems, but were more reliable with lower risk. The winter lambing Merino system had the lowest gross margins and NPV, but also the lowest risk CoV and MIRR. Investment in additional lucerne pasture for early summer feed paid off with greater gross margins and NPV, but with highest risk CoV and MIRR that these economic returns may vary.

Significance: Modelling incorporating historical long-term price and production risk clarified the complex effects of sheep system management decisions on production and economic returns. The more basic gross margin analysis gave the same ranking of the different sheep production systems as the more complex NPV and MIRR. Potential economic effects and risks of variable returns can be understood by examining past variability in production and prices received (revenues) on gross margins then assessing expected risk of future variability.

Upcoming events

Date	Event	Location
14 August 2025	Making Maidens Weight PDS Field Day QDAF, Leading Sheep , Connect Ag, NSW DPI & MLA	Isisford, Qld
19 August 2025	Unpacking wool performance – measuring your flock's productivity AWI Extension NSW	Webinar
21 August 2025	Choose right, breed right. Sheep classing & ram selection workshop Leading Sheep Qld	Bungunya, Qld
26 August 2025	Productive sheep achieving success in every season NSW Local Land Services	Walgett, NSW
29 August 2025	BredWell FedWell (Sheep) Meat & Livestock Australia	Coolac, NSW
29 August 2025	Making sense of ASBVs & Selection indexes AWI Extension WA	Webinar
11 September 2025	eID for productivity and profitability AWI Extension SA, SA Sheep industry Fun, PIRSA	Coonalpyn, SA
12 September 2025	eID for productivity and profitability AWI Extension SA, SA Sheep industry Fun, PIRSA	Kapunda, SA
17 September 2025	RAMping up Repro AWI Extension WA	Moora, WA

Funding calls

Program	Open	Close
MLA Quarter 1, Sustainability R&D Priorities EOI		30 September 2025