

SEPTEMBER 2025

Sheep reproduction RD&A alert

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

Ewe mortality, shedder reproductive performance and increased weaning rates will be the focus of a SRSP webinar on **Tuesday 21 October 2025 at 12.30 pm (AEDST)**. This SRSP webinar will feature four early career researchers who are part of the research teams tackling some key sheep reproduction issues:

- Bea Kirk - Understanding the prevalence and causes of Merino ewe mortality;
- Bobbie Lewis-Baida – Quantifying the reproductive performance of shedding breeds
- Billie-Jaye Brougham and Megan Tscharke – new approaches to increase sheep weaning rates.

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Register for the SRSP webinar now via [MLA's events](#).

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.

Scientific papers

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

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Animal Production Science, Volume 65 Issue 11 July 2025

DOI <https://doi.org/10.1071/AN25008>

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, $T \leq 30^\circ\text{C}$), 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 lambs 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 adaptive 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.

Use of a lidocaine impregnated band improved behavioral and physiological indicators of pain during tail docking in lambs

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Journal of Animal Science, Volume 103 **OPEN ACCESS**

DOI <https://doi.org/10.1093/jas/skaf281>

Abstract

Tail docking improves hygiene, reduces flystrike, and enhances efficiency for routine husbandry practices such as shearing, serving as an important management practice that promotes sheep health. However, the procedure is known to cause acute stress and discomfort, raising animal welfare concerns. Thus, the objective of this study was to evaluate the effectiveness of a lidocaine-impregnated band at mitigating pain associated with tail docking newborn lambs. Thirty-two lambs were randomly assigned to receive a lidocaine-impregnated rubber O-ring band (LB; $n = 16$) or a non-medicated standard O-ring band (CON; $n = 16$). An elastrator was used to place CON and LB rings below the third caudal vertebrae for docking lambs at 3 d of life. At -1 h, 0 h, 2 h, 12 h, 24 h, 3 d, 7 d, 14 d, 21 d, and 28 d, behavioral observations, pressure algometry, infrared thermography, and blood collection were performed. From birth to 30 d of age, daily weights were

collected and used to determine growth and average daily gain (ADG). There was a band-by-time interaction for behavioral response at the time of banding (0 h), in which LB lambs exhibited fewer ($P < 0.05$) painful behaviors compared to CON. LB lambs had greater ($P < 0.05$) mechanical nociceptive thresholds below the site of docking compared to CON lambs, while thresholds above the banding site and at the control site did not differ. Thermal imaging revealed no temperature differences between LB and CON lambs at any timepoint or location. There was a treatment by time interaction where LB lambs had decreased ($P < 0.05$) haptoglobin levels 2 d post banding compared to CON lambs. The first 30 d performance did not differ between groups when evaluated as growth or ADG. The length of time until the tail fell off did not differ between treatments. These results indicate that lidocaine bands reduce initial pain response, tissue sensitivity, and help resolve the acute phase response faster than traditional bands, minimizing discomfort and stress while still achieving tail docking in the same amount of time. Thus, LBs may serve as a simple tool for livestock producers to incorporate into their standard management practices to enhance animal welfare.

Genetic parameters and response in conception, litter size and ewe rearing ability following 35 years of divergent selection for number of lambs weaned

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Animal Production Science, Volume 65, Issue 13 September 2025

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Abstract

Context. Selection for a composite trait, such as number of lambs weaned per ewe joined (NLWEJ), aims to simultaneously improve the underlying components, such as fertility (ELEJ), litter size (NLBEL) or ewe rearing ability (ERAEL). However, a concern with selection on NLWEJ is the higher risk of mortality as litter sizes increase.

Aim. This study estimated genetic parameters, (co)variance components and the long-term genetic changes in the component traits in the Elsenburg Merino flock that has been divergently selected in favour (H-Line) or against (L-Line) performance in NLWEJ.

Methods. The dataset included up to 6779 reproduction phenotypes recorded on 1836 ewes linked to a pedigree containing 10,903 identities. The data were analysed with a repeated measures linear mixed model using ASREML V4.2 software. Genetic trends were derived by regressing breeding values on year within each line.

Results. Heritability estimates were low, with the highest value observed for NLBEL (0.12 ± 0.02). All traits were affected by an animal permanent environmental effect from 0.05 for ERAEL to 0.12 for ELEJ. All traits diverged between the H- and L-Lines, with an upward rate of annual gain of nearly 1% for the composite trait NLWEJ, and positive but smaller gains of 0.3% for ELEJ, 0.45% for NLBEL and 0.15% for ERAEL. It was reassuring to see that the trend for ERAEL was stable despite the increase in NLBEL for H-Line ewes and the unfavourable genetic correlation ($rg = -0.57 \pm 0.14$) between these two traits.

Conclusions. In a well designed breeding program, the use of NLWEJ as selection criteria can be effective to breed ewes with a high output at weaning. Use of a composite trait might not deliver optimal genetic gains for the components ELEJ and ERAEL, however, and could favour NLBEL, which might not be desirable in all environments.

Implications. For commercial flocks, favourable results will depend on complete recording and correct processing of information from all ewes mated and lambs born. Otherwise, NLWEJ only reflects NLBEL, where the predicted response in ERAEL is unfavourable.

Protective role of curcumin in ram sperm cryopreservation: Evaluation of spermatological parameters and PRDX5 gene expression

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Reproduction in Domestic Animals Volume 50, Issue 8 September 2025

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Abstract

Cryopreservation of ram sperm is a cornerstone in reproductive biotechnology but is often accompanied by oxidative damage that compromises post-thaw sperm quality. Curcumin, a natural polyphenol with potent antioxidant properties, may offer protection against cryo-induced injuries. This study evaluated the effects of curcumin supplementation at two concentrations (10% and 20%) in semen extenders on the functional and molecular characteristics of ram spermatozoa. A total of 14 ejaculates were collected from healthy adult rams and randomly allocated into three groups: control (no curcumin), C1 (10% curcumin) and C2 (20% curcumin). Semen samples were cryopreserved using a Tris-based extender, and post-thaw evaluations included total motility, viability (eosin–nigrosin), morphology (head, midpiece, tail abnormalities), membrane integrity (HOST), chromatin integrity (toluidine blue) and PRDX5 gene expression via qPCR. Curcumin supplementation, particularly in the C2 group, significantly improved total motility and viability ($p < 0.01$), while reducing head and tail morphological abnormalities and chromatin damage ($p < 0.05$), compared to the control. No significant difference was observed in PRDX5 gene expression among groups ($p > 0.05$). These improvements are likely attributed to curcumin's antioxidant activity, including ROS scavenging and membrane stabilisation. Curcumin supplementation in semen extenders enhances post-thaw sperm quality in rams by improving functional parameters and maintaining chromatin integrity, without modulating PRDX5 gene expression. These findings support the potential of curcumin as a safe and effective cryoprotective additive in ovine artificial insemination and genetic conservation protocols. Further research combining transcriptomic and proteomic analyses (or approaches), along with validation of post-thaw sperm fertility, is needed to clarify curcumin's effects and its potential in livestock breeding.

N-Acetylcysteine promotes the maturation of sheep oocytes and embryo development in vitro

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Abstract

During the in vitro maturation process of oocytes, oxidative stress is commonly present, and excessive oxidative stress can affect oocyte maturation. Thus, adding antioxidants during maturation is an effective strategy for reducing oxidative stress. N-acetylcysteine (NAC), a derivative of cysteine, participates in glutathione (GSH) metabolism and stimulates glutathione synthesis. However, a clear understanding of the effect of NAC on sheep oocytes remains unknown. In this study, we investigated NAC's impact on the maturation of sheep oocytes, and the results revealed that the maturation rate, and subsequently the cleavage and blastocyst formation, were significantly enhanced by incubation with 1 mM NAC. The GSH and Ca^{2+} levels increased, and the cortical granules were significantly elevated, whereas the reactive oxygen species levels were significantly reduced in the 1 mM NAC-treated group. Additionally, the number of inner cell masses was significantly increased. The findings of this study support the hypothesis that NAC increases oocyte maturation rate by protecting them from oxidative stress damage. These discoveries provide a new approach for improving the efficiency of in vitro production of sheep embryos.

The effects of mitochondria-targeted (MitoQ and Mito-TEMPO) and untargeted (SOD and CoQ10) antioxidants on ram's sperm quality and fertility potential during the cooling storage

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Small Ruminant Research, Volume 251, October 2025

DOI <https://doi.org/10.1016/j.smallrumres.2025.107563>

Highlights

- We analyzed the effects of mitochondrial targeted and untargeted antioxidants on cooled ram sperm quality.
- Using MitoQ and/or Mito-TEMPO preserves the quality of chilled sperm during storage.
- Chilled sperm containing MitoQ and/or Mito-TEMPO presented higher fertility potential.

Abstract

High levels of polyunsaturated fatty acids (PUFAs) in ram sperm make it susceptible to the cold condition during the cooling process, which decreases the reproductive potential of chilled semen. Supplementation of chilled sperm medium with suitable antioxidants is a valuable method to protect sperm fertility rate during the cooling. The purpose of this study was to evaluate the effects of mitochondria-targeted (MitoQ and Mito-TEMPO) and untargeted (SOD and CoQ10) antioxidants on ram's sperm quality and fertility potential during the cooling process. Semen samples were collected and diluted in the extender and divided into eight groups. The first group was the control and the other groups were supplemented with 100 U/mL superoxide dismutase (SOD), 1 μ M CoQ10 (Q10), 50 and 100 nM MitoQ (MQ50 and MQ100), 50 and 100 μ M Mito-TEMPO (MT50 and MT100), 50 nM MitoQ+ 50 μ M Mito-TEMPO (MQ/MT), respectively. Then, the samples were cooled at 5 °C up to 50 h and sperm total motility (TM), progressive motility (PM), viability, membrane integrity, lipid peroxidation (LPO), and mitochondria active potential (MAP) were assessed during 0, 25, and 50 h of cooling storage. Moreover, artificial insemination was performed using 25h-chilled semen to evaluate sperm fertility potential. In the results, no significant differences ($P > 0.05$) were observed between groups at time 0. The highest ($P \leq 0.05$) TM, PM, viability, membrane integrity, MAP, as well as the lowest ($P \leq 0.05$) LPO were detected in the MQ/MT group compared to the other groups. The pregnancy rate, parturition rate, and lambing rate were higher ($P \leq 0.05$) in MQ100, MT100, and MQ/MT compared to the control group. In conclusion, supplementation of the ram sperm cooling extender with a combination of 50 nM MitoQ and 50 μ M Mito-TEMPO as the powerful mitochondria-targeted antioxidants is a useful strategy to preserve sperm quality during cooling storage.

Direct comparison of host resistance status and Barbervax vaccination to control parasitism in sheep subjected to a mixed parasite field challenge

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Veterinary Parasitology, Volume 339, October 2025 **OPEN ACCESS**

DOI <https://doi.org/10.1016/j.vetpar.2025.110552>

Highlights

- At least three Barbervax vaccinations were required for haemonchosis protection.
- Barbervax controlled haemonchosis in lambs not genetically resistant to *H. contortus* independent of flock genetics.
- Parasite resistance genetics protected unvaccinated lambs from all relevant parasites.

- Vaccinated, unselected and parasite-susceptible lambs needed drenching for scour worm protection.
- Resistance genetics and not Barbervax protected lambs from scour worm infection.

Abstract

Integrated parasite management strategies including paddock rotations, pasture management, vaccination and parasite resistance genetics, may be used to control sheep parasitism whilst minimising anthelmintic treatment. However, the efficacy of host parasite resistance traits and/or vaccination to reduce reliance on anthelmintics to control haemonchosis from a mixed parasite field trial remains unknown. Animals from three flocks with different genetic backgrounds received a standard Barbervax vaccination schedule (5 vaccinations) and were grazed as a single mob, ensuring each cohort received the same parasite exposure during the field trial. Lambs received rescue treatments if their haemoglobin concentration was less than 85 g/dL and/or had worm egg count above 15,000 eggs/g. After three vaccinations, lambs from all lines produced significant H-gal-GP antibody titres which, for parasite-susceptible and parasite-unselected lines provided protection against haemonchosis (reduced anaemia and low *Haemonchus contortus* egg counts) compared to unvaccinated lambs. Barbervax also reduced the need to rescue treat lambs in the parasite-unselected and parasite-susceptible flocks by 73 % and 93 %, respectively, compared to unvaccinated lambs from the same lines. After three Barbervax vaccinations lambs from a parasite-unselected flock were protected from haemonchosis but not from scouring caused by *Trichostrongylus* spp., whereas parasite-resistant line lambs were protected from haemonchosis and scouring, did not require rescue drenching and did not substantially benefit from Barbervax vaccination.

Sexual attractivity and receptivity in tailed and docked ewes

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Applied Animal Behaviour Science, Volume 291, October 2025

DOI <https://doi.org/10.1016/j.applanim.2025.106733>

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.

Platelet-rich plasma strategy against freezing damage in ram spermatozoa: its effect on miRNA, ion channels, growth factors, lipids and oxidative stress

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Reproduction, Fertility and Development, Volume 37, Issue 15

DOI <https://doi.org/10.1071/RD25064>

Abstract

Context. Platelet-rich plasma (PRP) is a plasma component containing high concentrations of platelets, growth factors, antioxidants and proliferative properties.

Aim. To mitigate the negative effects of cryopreservation on ram semen by utilising PRP.

Methods. Semen was collected from six rams twice a week for 3 weeks during the breeding season. Pooling was performed by dilution with tris + egg yolk diluent. Pooling was divided into three equal parts and re-diluted with diluents containing control (0% PRP), 5% PRP and 10% PRP. Sperms were frozen in an automatic freezing device and stored in liquid nitrogen. After thawing, spermatological, flow-cytometric, oxidative stress, cholesterol, fatty acid, ELISA, quantitative real-time polymerase chain reaction (qRT-PCR) and western blot analyses were performed.

Key results. Compared with the control group, the 5% PRP group exhibited a significant increase in progressive motility, viability and cholesterol ratios, glutathione-peroxidase activity, CATSPER1 (Cation Channel of Sperm), CATSPER3, vascular endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF) levels and KCNJ11 (Potassium Channel, Inwardly Rectifying, Subfamily J, Member 11), HSA-MIR-181A, HSA-MIR-150 and HSA-MIR-374 transcripts. Apoptotic protein, malondialdehyde and HSA-MIR-410, OAR-MIR-10B, BTA-MIR-22-3P and RNO-MIR-494 transcripts were decreased in 5% PRP group compared with control. PRP supplementation at 10% increased dead sperm and heptadecenoic acid ratios, VEGF and PDGF levels and HSA-MIR-410, PPY-MIR-16, CFA-MIR-199, HSA-MIR-181A, HSA-MIR-150, OAR-MIR-127, HSA-LET-7A and HSA-MIR-374 transcripts as well as CATSPER3, HSD3 β 2, PDGFB and VEGFA proteins compared with the control. PRP supplementation at 10% significantly decreased plasma membrane integrity, insulin-like growth factor 1 (IGF1) level and CATSPER3 and KCNJ11 transcripts compared with the control.

Conclusions. The addition of 5% PRP before cryopreservation has beneficial effects on the functional and molecular properties of frozen-thawed ram spermatozoa, whereas the addition of 10% PRP has negative effects.

Implications. Five per cent PRP should be added to ram semen diluents.

The impact of heat stress on growth and resilience phenotypes of sheep raised in a semi-arid environment of sub-Saharan Africa

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Livestock Science, Volume 301, November 2025 **OPEN ACCESS**

DOI <https://doi.org/10.1016/j.livsci.2025.105794>

Highlights

- The Red Maasai breed had a higher heat tolerance for growth.
- The F1 had the lowest growth decline per unit increase in Temperature and Humidity.
- Pre-weaning live weight gain was significantly affected by heat stress.
- Heritability estimates for resilience traits were moderate.

Abstract

Sheep production in Arid and Semi-Arid lands face immense heat stress with the changing climate. This study assessed the effect of heat stress on growth and developed resilience phenotypes of sheep raised in a semi-arid environment. Heat stress was measured by Temperature-Humidity Index (THI). Live body weight records of 4078 animals, belonging to pure Red Maasai (RRRR), pure Dorper (DDDD), and their crosses: 50%Dorper-50%RedMaasai (DDRR) and 75%Dorper-25%Red Maasai (DDDR) collected between 2003 and 2024 were analysed. Random regression models fitted with reaction norm functions were used to develop two resilience phenotypes: Response and Stability, at THI 70 and THI 85 representing varying heat stress. Animal mixed models were used to estimate genetic parameters. The THI breakpoints were 78.75, 78.71, 78.42 and 77.93 with a decline rate of 0.06 Kgs, 0.09 Kgs, 0.05 Kgs and 0.15 in live weight gain per unit change in THI for RRRR, DDDD, DDRR and DDDR respectively. The breed, sex, type of birth, dams' parity and season of birth significantly ($P < 0.05$) affected the stability of growth at low and high heat stress. The heritability estimates of resilience traits ranged from 0.12 to 0.16. Genetic correlations of resilience phenotypes at THI 85 with pre-weaning live weight gain were antagonistic and significant ($P < 0.05$). With the changing climate, resilience phenotypes should be included in selection programs for sheep in the Arid and Semi-Arid lands for robust growth.

Evaluating amino acid profiles and blood gas concentrations between single and twin Merino newborn lambs

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Animal Science Journal, Volume 96, Issue 1, January/December 2025 **OPEN ACCESS**

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Abstract

As sheep production standards progress, and animals are bred for high production in terms of the number and weight of lambs weaned per ewe, research has identified a difference in the physiology of single lambs compared to multiple born lambs. The current study aimed to report the baseline amino acid (AA) profiles and blood gas concentrations in newborn, Merino single and twin lambs. From 120 days of gestation, 50 single-bearing and 50 twin-bearing, naturally mated Merino ewes were monitored for signs of approaching parturition. At birth, blood samples of the progeny were collected, and birth weight, rectal temperature, and meconium score were recorded. Blood plasma samples were analysed for AA profiles and blood gas concentrations were determined using an i-Stat Alinity. Single-born lambs had a higher birth weight (5.05 kg) compared to twins (4.24 kg; $p < 0.05$). Birth rank also affected rectal temperature and AAs aspartic acid, isoleucine, leucine, and phenylalanine, all being lower in twins compared to singles ($p < 0.05$). These baseline data provide insight into the physiological differences between single and twin lambs at birth from dams where there has been no treatment or intervention imposed.

Upcoming events

Date	Event	Location
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13 Oct 2025	Integrated worm management for sheep Agriculture Victoria & MLA PDS	Gelantipy, Vic
13 Oct 2025	Integrated worm management for sheep Agriculture Victoria & MLA PDS	Swifts Creek, Vic
13 Oct 2025	RAMping up Repro Repro AWI Extension WA	Wandering. WA
14 Oct 2025	Integrated worm management for sheep Agriculture Victoria & MLA PDS	Bengworden, Vic
15 Oct 2025	BredWell FedWell MLA	Hamilton, Vic
15 Oct 2025	RAMping up Repro AWI Extension NSW	Grenfell, NSW
21 Oct 2025	Ewe mortality, shedder reproductive performance and increased weaning rates MLA SRSP	Webinar
23 Oct 2025	Yardstick 2025 Sire Evaluation Field Day DPIRD, WA Federation of Performance Sheep Breeders, AWI & AMSEA	Katanning, WA
6 Nov 2025	AWI Repro Masterclass AWI Extension NSW	Boooroban, NSW