Sheep reproduction RD&A alert

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

The February 2021 issue of the Sheep reproduction RD&A alert features sheep reproduction research presented at the 33rd Biennial conference of the Australian Association of Animal Sciences. Full journal papers were published in a special issue of Animal Production Science (Volume 61, Number 3), with short communications published in Volume 33 of Animal Production in Australia.

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

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Review papers

Caffeine: A potential strategy to improve survival of neonatal pigs and sheep

Alyce Swinbourne (alyce.swinbourne@adelaide.edu.au), Karen Kind, Tom Flinn, David Kleemann and Willian van Wettere

Highlights

- high neonatal mortality is a persistent issue within the pig and sheep industries
- maternal caffeine supplementation can improve neonatal survival
- caffeine stimulates respiratory function and thermoregulation in neonates
- caffeine can reduce the number of stillbirths in pigs
- further research is required regarding appropriate supplementation level and duration.

Abstract

Caffeine is commonly used to treat pre-and postnatal injuries, including apnoea in premature infants, as well as neurological impairment caused by hypoxia or asphyxiation often associated with difficult birthing. As an adenosine antagonist, caffeine is metabolised rapidly and transported into many tissues. Caffeine stimulates the brain respiratory centre, improving respiratory function in immature infants or neonates, provides neuroprotection to the fetal brain, and initiates non-shivering thermoregulation increasing metabolic rates.

Recently, potential benefits of caffeine for animal production have been investigated. This has particularly occurred in pig production, where large litters are associated with relatively long parturition durations, and piglets born near the end of the parturition period have an increased risk of mortality due to asphyxia-related birthing injury. Similarly, in sheep, dystocia or prolonged parturition is a significant problem, where neonatal injury, dystocia and death *in utero* contributes to approximately 46 % of lamb mortalities. Within these two livestock production systems, large prevalence's of neonatal mortality is a persistent issue contributing to lost revenue, as well as being a significant animal welfare concern. Pre-partum maternal caffeine supplementation is a promising strategy to reduce neonatal mortality; however, there needs to be refinement of appropriate quantities administered, duration and administration pathway to provide producers with an efficient and cost-effective method to reduce mortality rates and increase production output. The information in this review details effects, benefits and important considerations regarding caffeine use in animal production, and identifies areas of limited knowledge where further research is needed.

Scientific papers

New genomically enhanced reproduction breeding value for Merino sheep allow targeted selection for conception rate, litter size and ewe rearing ability

Kim Bunter (kbunter2@une.edu.au), Andrew Swan, Phillip Gurman and Daniel Brown

Abstract

Context: Net reproduction rate defined as number of lambs weaned for joined ewes reflects conception, litter size and the ability of ewes to rear lambs to weaning age. These three attributes can be treated as separate traits for genetic evaluation, allowing breeders to focus selection for each appropriately.

Aims: The aim of the present paper was to present characteristics of the data, models and genetic parameters estimated from Merino data, along with results demonstrating the predictive capacity of breeding values, for conception, litter size, rearing ability, maternal behaviour and body condition score.

Methods: Industry data from MERINOSELECT were used to derive phenotypes for conception, litter size and rearing ability traits separately for yearling and adult ewes, along with maternal behaviour and body condition score. Indirect traits provided correlated information, including scrotal circumference, weight, scanned fat and eye muscle depths at up to three ages (post-weaning, yearling and hogget), along with pre-joining weight and condition score for ewes. Co-variances were estimated among the 19 traits included in the analysis. Breeding values were estimated using single step genomic methodology using consensus estimates of genetic parameters, with the predictive capacity of breeding values being estimated using forward-validation.

Key results: Heritabilities ranged from 0.04 to 0.06 for conception, litter size and rearing ability, and were moderate for maternal behaviour (0.13) and condition score (0.20). Component traits were genetically controlled by some common genes, but with genetic correlations less than 0.5, each component can be selected for independently. Weight, fat depth and muscle depth measures were moderately to highly

correlated with body condition score. These body development traits generally had low, favourable genetic correlations with ewe reproductive traits.

Conclusions: These procedures provide better use of data recorded by breeders subject to both data limitations and opportunities, and provide separate breeding values for conception, litter size, rearing ability, maternal behaviour and body condition score.

Implications: New breeding values with good predictive ability are now available for the component traits of reproduction. Direct recording data of the traits is required to achieve accuracy of breeding values. Australian Merino breeders are now able to select directly for components of reproduction and specific maternal characteristics.

Maternal melatonin implants improve twin Merino lamb survival

Tom Flinn, Jessica Gunn, Karen Kind, Alyce Swinbourne, Alice Weaver, Jennifer Kelly, Simon Walker, Kathryn Gatford, William van Wettere (william.vanwettere@adelaide.edu.au) and David Kleemann

Abstract

High preweaning mortality rates cost the Australian sheep industry an estimated $540 million annually in lost production, with losses significantly greater in twin (≥30%) compared with singleton lambs (≥10%). Previous intensive studies demonstrated that supplementing pregnant ewes with melatonin reduces adverse effects of fetal growth restriction and perinatal hypoxia on the neonatal brain via increased umbilical blood flow, placental efficiency, and antioxidant actions. The current study examined the effects of supplementing ewes with melatonin on the survival of twin Merino lambs under extensive grazing conditions. Pregnant mixed age ewes were implanted with 1 (M1, n = 50) or 2 (M2, n = 53) slow-release melatonin implants (18 mg, Regulin) at gestational days 70 to 90. Control ewes received no supplementation (CTL, n = 54). Ewes were monitored twice daily throughout the lambing period. Lamb survival, weight, and rectal temperature were recorded on the day of birth. Lamb blood samples were taken the following day for serum immunoglobulin G (IgG) analysis. Lamb survival and weight were recorded again at marking (30.6 ± 0.6 d postpartum) and weaning (70.7 ± 0.6 d postpartum). Lamb survival was increased in both melatonin treatments to 3 d postpartum (M1 = 98.0%; M2 = 95.3%; CTL = 83.3%; each P < 0.01), and this improvement was maintained to weaning (M1 = 94.0%; M2 = 92.5%; CTL = 79.6%; each P < 0.01). Melatonin did not affect lamb birthweight, rectal temperature, or growth rate. However, the rates of parturition-related death (dystocia, stillbirth, and birth injury) were greater in CTL lambs than M1 (P = 0.009) and M2 (P = 0.035). This suggests that improved survival is primarily due to melatonin-induced neuroprotection, although further studies are required to clarify the underlying mechanisms. These data provide evidence that supplementing pregnant twin-bearing Merino ewes with melatonin may be a practical strategy to reduce neonatal mortality and improve weaning rates in extensively managed sheep flocks. Although the present data are promising, this study is limited by small sample size and requires further replication.

Supplementing Merino ewes with melatonin during the last half of pregnancy improves tolerance of prolonged parturition and survival of second-born twin lambs

Tom Flinn, Niki McCarthy, Alyce Swinbourne, Kathryn Gatford, Alice Weaver, Hayley McGrice, Jennifer Kelly, Simon Walker, Karen Kind, David Kleemann and William van Wettere (william.vanwettere@adelaide.edu.au)

Abstract

High preweaning mortality rates continue to limit sheep production globally, constituting a major economic and welfare concern. Greater losses in twin lambs (≥30%) compared with singletons (≥10%) are attributed primarily to lower birth weight and increased risk of intrapartum hypoxia, leading to impairment of thermoregulation, neuromotor activity, and maternal bonding behavior. Previous intensive studies demonstrated that supplementing pregnant ewes with melatonin reduced the adverse effects of fetal growth restriction and perinatal hypoxia on the neonatal brain via increased umbilical blood flow, placental efficiency, and antioxidant actions. The current study examined the effects of supplementing pregnant ewes with melatonin on lamb survival, birth weight, and behavior under intensive conditions. From gestational day (gD) 80 until parturition, pregnant singleton and twin-bearing ewes were supplemented with melatonin via a 2-mg capsule fed daily (Mel-FED, n = 61) or 18 mg subcutaneous implant (Regulin), with one implant administered at gD80 and another at gD125 (Mel-IMP, n = 60). Control ewes received no supplementation (CTL, n = 60). Ewes and lambs were monitored via video throughout parturition. Postpartum measures were taken from lambs at 4 and 24 h (live weight [LW], rectal temperature, serum immunoglobulin G, and latency to stand and suck after birth) and LW at 72 h, 7 d, marking (49.7 ± 0.2 d), and weaning (124.2 ± 0.8 d). Chi-square analysis was used to compare lamb survival between treatment groups. There were no treatment effects on singleton lamb survival. Melatonin supplementation tended to increase the proportion of twin lambs surviving from birth to weaning (Mel-FED = 85.5%; Mel-IMP = 85.9%; CTL = 72.9%; each P < 0.1). Survival of first-born twins did not differ between treatment (each ~90%, P = 0.745) but within second-born twins, survival of Mel-FED was greater than CTL (81.6 vs. 57.1%, P = 0.023), and Mel-IMP (78.1%) tended to be greater than CTL (P = 0.068). Similarly, in second-born twins exposed to prolonged parturition (≥ 90 min), survival of lambs from Mel-FED ewes was greater than CTL (86.7% vs. 42.9%, P = 0.032), while Mel-IMP was intermediate (66.7%). These data suggest that the neuroprotective actions of melatonin may improve twin lamb survival by increasing tolerance of prolonged parturition and provide a sound basis for continued testing in extensively managed sheep flocks.

AAAS Short Communications

The following AAAS Short Communications were published in Volume 33 of Animal Production in Australia which can be accessed from CSIRO Publishing Animal Production Science Volume 61 Number 3 (scroll to the bottom of the page to access the pdf).

Clover disease across southern Australia: what we know now

Kevin Foster (kevin.foster@uwa.edu.au), Dominic Blache, Tim Watts, M. Kontoolas, Graeme Martin, Phil Vercoe, Zoey Durmic, D. Kidd, C. Wyrwoll, J. Smith and M. Ryan

Financial implications of confinement feeding pregnant ewes during early winter to improve pasture and sheep management, a case study using myFARMSMART

Lucy Anderton (lucy@laoneconsulting.com) and Tanya Kilminster

Animal Production in Australia Volume 33, cxlvi- January 2021

Morphological changes in the reproductive tract of ewes after long-term feeding with subterranean clover (*Trifollium subterraneaum* L.)

F. Chazal, M. Kontoolas, Tim Watts, K. Foster, M Ryan and Dominique Blache (dominique.blache@uwa.edu.au)

Animal Production in Australia Volume 33, cxlvii- January 2021

Is there genetic variation in foetal loss after pregnancy scanning in sheep?

Daniel Brown (dbrown2@une.edu.au), Kim Bunter and Andrew Swan

Animal Production in Australia Volume 33, cxlviii- January 2021

Breeding to produce high clean fleece weight decreases fat reserves in pregnant and lactating Merino ewes and is likely to reduce their reproductive success

Taya Clarke (taya.clarke@westpork.com.au), Johan Greeff and Ian Williams

Animal Production in Australia Volume 33, cliii- January 2021

Are abortigenic parasites an important contributor to reproductive wastage in maiden ewes?

Tom Clune (t.clune@murdoch.edu.au), Amy Lockwood, Serina Hancock, Susan Beetson, Andrew Thompson, Colin Trengove, R. O'Handley and Caroline Jacobson

Animal Production in Australia Volume 33, cliv

Investigating the magnitude and timing of reproductive wastage in ewe lambs

Tom Clune (t.clune@murdoch.edu.au), Amy Lockwood, Serina Hancock, Susan Beetson, Andrew Thompson and Caroline Jacobson

Animal Production in Australia Volume 33, clv

Early weaning of twin-reared lambs at eight weeks of age onto lucerne

Lydia Cranston (l.cranston@massey.ac.nz), Rene Corner-Thomas, Paul Kenyon and Scott. Morris

Animal Production in Australia Volume 33, clix

Supplementing pregnant Merino ewes with melatonin may improve twin lamb survival

Tom Flinn (tom.flinn@adelaide.edu.au), Alyce Swinbourne, Niki McCarthy, Jessica Gunn, Jennifer Kelly, Alice Weaver, Simon Walker, Kathryn Gatford, Karen Kind, David Kleemann and William van Wettere

Animal Production in Australia Volume 33 clxi

Impacts of a heavier live weight at breeding on the morphology of mammary glands of non-dairy ewe lambs

Emmanuelle Haslin (e.haslin@massey.ac.nz), Rene Corner-Thomas, Paul Kenyon, Scott Morris and Hugh Blair

Animal Production in Australia Volume 33 clxv

Lamb mortality: do producers really know?

Kayla Kopp (kkopp@csu.edu.au), Marta Hernandez-Jover, Susan Robertson, Angel Abuelo and Michael Friend

Animal Production in Australia Volume 33 clxx

Maize and methionine supplementation alter milk production of ewes

Kayla Kopp (kkopp@csu.edu.au), Susan Robertson, Angel Abuelo and Michael Friend

Animal Production in Australia Volume 33 clxxi

Factors influencing the optimum mob size of ewes at lambing and the economic benefit of lambing ewes in smaller mobs to increase lamb survival across southern Australia

Amy Lockwood (a.lockwood@murdoch.edu.au), Serina Hancock, Lyndon Kubeil, Andrew Thompson, Jason Trompf and John Young

Animal Production in Australia Volume 33 clxxii

The resurgence of clover disease in sheep: implications for industry and research directions

Graeme Martin (graeme.martin@uwa.edu.au), Kevin Foster and M. H. Ryan

Animal Production in Australia Volume 33 clxxiii

Improving twin lamb survival in Merino lambs by maternal melatonin supplementation in the second half of pregnancy

Niki McCarthy (niki.mccarthy@adelaide.edu.au), Tom Flinn, Alyce Swinbourne, Jennifer Kelly, Kathryn Gatford, Karen Kind, Hayley McGrice, Simon Walker, David Kleemann and William van Wettere

Animal Production in Australia Volume 33 clxxv

Exogenous melatonin extends the ram breeding season and increases testicular function in seasonal and non-seasonal sheep breeds

Kelsey Pool (kelsey.pool@uwa.edu.au), Jessica Rickard, T. Pini and Simon de Graaf

Animal Production in Australia Volume 33 clxxviii

Grazing lucerne pasture at joining may not alter the sex ratio of lambs

Susan Robertson (surobertson@csu.edu.au) and Michael Friend

Animal Production in Australia Volume 33 clxxxi

Observations of Merino ewe parturition behaviour and lamb survival

Alyce Swinbourne (alyce.swinbourne@adelaide.edu.au), Tom Flinn, N. L. McCarthy, Bianca Agenbag, B. Lewis Baida, Bilie-Jaye Brougham, P. Riddel, N. Murdock, Alice Weaver, Jennifer Kelly, David Kleemann and William van Wettere

Animal Production in Australia Volume 33 clxxxv

Validation of hand-held refractometers for assessing Merino ewe colostrum and colostrum intake in lambs

Alyce Swinbourne (alyce.swinbourne@adelaide.edu.au), N. Blagojevic, N. Murdock, H. Mills, Tom Flinn, Niki McCarthy, Jennifer Kelly, David Kleemann and William van Wettere

Animal Production in Australia Volume 33 clxxxvi

Profitability of mating maternal composite and Merino ewe lambs

John Young (john@farmingsystems.com.au) and Andrew Thompson

Animal Production in Australia Volume 33 clxxxviii

Upcoming events

Date	Event	Location
5 March 2021	MeatUp Forum Meat & Livestock Australia	Gawler, SA
11 March 2021	Joining your flock this Autumn? Sheep Connect NSW	Webinar
18 March 2021	Are your ewes lambing this Autumn? Sheep Connect NSW	Webinar
23 March 2021	MeatUp Forum Meat & Livestock Australia	Cobar, NSW
25 March 2021	MeatUp Forum Meat & Livestock Australia	Charleville, Qld
March 2021	Growing Ewe Masterclass Nextgen AGRI	On-line

Funding calls

Program	Open	Close
Postgraduate Study Awards 2021 Meat & Livestock Australia	Now	14 March 2021
Producer Demonstration Sites Meat & Livestock Australia	1 April 2021	12 May 2021