DECEMBER 2021

Sheep reproduction RD&A alert

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

If you missed the SRSP November webinar on **breeding ewe fitness and maternal ewe mortality**, recordings of both presentations (*Reducing maternal ewe mortality* by Mary McQuillan and *Ewe fitness to join, what have we learnt from case studies* by Andrew Whale both from Livestock Logic) are now available to view from the SRSP website.

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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Scientific papers

Productive and reproductive consequences of crossbreeding Dohne Merino with Corriedale in Uruguayan sheep production systems

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Abstract

Context: For extensive production systems, crossbreeding may be a tool that can be used to achieve production of quality wool and meat to suit market specifications.

Aims: To evaluate two levels of crossbreeding of Dohne Merino (DM) sires with Corriedale (C) ewes on productive and reproductive traits of the crossbreed progeny in comparison with purebred C progeny.

Methods: Two studies using three genotypes – 100% C (100C), 50% DM × 50% C (50DM) and 75% DM × 25% C (75DM) – were carried out. In Study 1, growth, wool production and nematode resistance were evaluated (n = 1652). In wethers, carcass weight, subcutaneous tissue thickness, weight of high value cuts, meat shear force and fresh meat colour were also evaluated. Before first mating, the presence and number of corpus luteum was recorded to evaluate puberty and ovulation rate, respectively, in 380 18-month-old hoggets. In Study 2, fertility, prolificacy and lambing percentages were measured in 382 ewes.

Key results: Increasing the percentage of DM was associated with heavier animals ($P < 0.01$). The heaviest fleece weight, broadest fibre diameter and longest staple length were recorded in 100C, and the lowest in 75DM ($P < 0.001$). Crossbred animals had heavier carcasses, boneless legs and French racks than 100C ($P < 0.001$). Subcutaneous tissue thickness GR adjusted for carcass weight was thicker in 100C, intermediate in 50DM and lowest in 75DM ($P < 0.001$). Meat quality and nematode resistance traits were not affected by crossbreeding. Genotype affected the proportion of hoggets cyclic at first mating ($P < 0.05$), being greater in 50DM than in C hoggets, although both proportions were similar to 75DM. Fertility was not affected (P >

0.05) by genotype, whereas prolificacy and lambing percentage were greater in the animals of the 50DM vs 100C and 75DM ($P < 0.05$).

Conclusions: Wool quality, animal growth, carcass weight and composition, and onset of puberty were improved by crossbreeding C ewes with DM sires. A reduction in wool production, and minor influences on prolificacy and lambing percentage were detected.

Maternal reactivity of ewes at lambing is genetically linked to their behavioural reactivity in an arena test.

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Abstract

In sheep, the bond between the dam and her lambs is established during the first hours of a lamb's life. Genetic variability for behavioural reactivity of ewes assessed in an arena test performed 24 hr after lambing has already been reported. However, there is no evidence that this reactivity represents the ewe's maternal reactivity at lambing in outdoor conditions. The objective of this study was to investigate whether or not the behavioural reactivity of ewes in the arena test is genetically related to their maternal reactivity measured at lambing. A total of 935 Romane ewes were studied. The maternal reactivity of ewes at the outdoor lambing site was recorded in response to a human approach and to the handling of the lambs. Their behavioural reactivity was also recorded 24 hr post-lambing in the arena test that involved a separation from the litter and a human presence. Flight distance, aggressive reaction, time to restore contact with the litter, maternal behaviour scores and vocalizations recorded at the lambing site were heritable (0.12–0.34). All of these behaviours were genetically correlated with the behavioural reactivity in the arena test. The highest genetic correlations (from 0.60 to 0.90) were found amongst maternal behavioural scores, flight distance and high-pitched bleats. In conclusion, behavioural reactivity in the arena test can be used to assess early maternal reactivity in standardized conditions. Phenotyping of ewes' behavioural reactivity with a simplified arena test can be performed for genetic improvement in maternal behaviour in sheep.

Seropositivity to *Coxiella burnetii* in primiparous and multiparous ewes from southern Australia: A cross-sectional study

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Highlights

- Study conducted on 28 farms over wide geographic region of southern Australia.
- Very low *C. burnetii* seropositivity in primiparous ewes with abortion or perinatal mortality.
- *C. burnetii* was not detected in aborted or stillborn lambs using qPCR.
- Very low *C. burnetii* seropositivity in randomly selected mature ewes.
- *C. burnetii* not a major contributor to abortion & lamb mortality for primiparous ewes.

Abstract

The role of infectious diseases including coxiellosis in causing poorer reproductive performance of primiparous ewes are not well studied. The aims of this study were to determine if natural exposure to *Coxiella burnetii* is widespread in breeding ewes and whether seropositivity is associated with poor reproductive performance of primiparous ewes. Seropositivity to *Coxiella burnetii* was 0.08% (CI95% 0.01, 0.36) in primiparous ewes and 0.36% (CI95% 0.07, 1.14) in mature ewes. *Coxiella burnetii* was not detected in aborted or stillborn lambs using qPCR. These findings suggest *C. burnetii* infection was unlikely to be an important contributor to abortion and perinatal mortalities observed for primiparous ewe flocks, and exposure to *C. burnetii* was not widespread in ewes on farms located over wide geographical region of southern Australia. Whilst ewes on these farms were not an important reservoir for *C. burnetii*, sporadic zoonotic transmission from sheep is reported and has public health implications.

Growth and Body Composition of Artificially-Reared Lambs Exposed to Three Different Rearing Regimens

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Simple Summary

Optimum lamb growth and cost-effective artificial lamb rearing are important to maximise farm profit. In addition to milk feeding, supplementation of a solid feed with balanced nutrients and an adequate level of fibre will aid rumen development, allowing for a smooth transition from a liquid to a solely solid diet. This study aimed to determine the effect of pellet fibre level, milk replacer composition and early milk weaning at 42 days of age, on the growth and body composition of lambs reared artificially to 57 days of age. Results demonstrate that lamb growth rate to 57 days of age was not affected by early weaning or pellet fibre level. Early milk weaning increased pellet intake and empty rumen weight. Early weaning resulted in leaner carcasses due to reduced fat deposition and lower total feed costs compared to lambs offered milk to 57 days of age. Overall, feeding lambs either low or high fibre pellets and weaning early (42 days of age) was shown to be beneficial, as growth was similar to unweaned lambs, but leaner carcasses and reduced feed costs were observed.

Abstract

This study was designed to investigate the influence of pellet fibre level, milk replacer composition and age at weaning on growth and body composition of lambs reared artificially. Romney ram lambs were randomly allocated to one of three rearing treatments; HFP57: commercial milk replacer to 57 days of age, and high fibre concentrate pellets; HFP42: commercial milk replacer with early weaning at 42 days of age, and high fibre concentrate pellets; LFP42: high protein milk replacer from 2–16 days of age followed by commercial milk replacer with early weaning at 42 days of age, and low fibre concentrate pellets. Lambs were slaughtered at 57 days of age. Overall average daily liveweight gain of lambs did not differ ($p > 0.05$) between treatments. Dressing out percentage, carcass weight, empty small intestine and omental fat were higher ($p < 0.05$) in HFP57 than in both HFP42 and LFP42 lambs. HFP42 and LFP42 lambs had heavier ($p < 0.05$) empty rumen weights. Whole body protein content was higher ($p < 0.05$) in HFP42 lambs compared to both HFP57 and LFP42 lambs. Fat content and daily fat deposition were greater ($p < 0.05$) in HFP57 lambs than HFP42 and LFP42 lambs. Weaning lambs at 42 days of age with provision of either low or high fibre concentrate pellets, resulted in similar growth rates, reduced whole body fat deposition and was a more cost-effective rearing regimen.

Rumen development of artificially-reared lambs exposed to three different rearing regimens

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Simple Summary

Young ruminants possess an undeveloped rumen when first born. Encouraging good rumen development in early life is vital for young ruminants as they transition to a solid feed diet, to ensure optimum growth post-weaning. This study aimed to investigate the effect of three different rearing regimens on rumen development in lambs reared artificially. Weaning of lambs at 42 d of age improved rumen fluid n-butyric content and also resulted in a thicker rumen dorsal wall. Feeding lambs pellets with low fibre and weaning them early increased rumen fluid n-valeric content. Papillae width, density, and rumen wall muscle thickness were affected by rearing treatment. Empty rumen weight, rumen volume, papillae development, and rumen fluid iso-butyric and iso-valeric content had positive associations with dry matter intake and nutrient intakes from solid feed. The majority of volatile fatty acids in the rumen fluid had a positive association with papillae height on the rumen dorsal wall. These results suggest that lamb diet and age at weaning influenced rumen function and physical development. Further studies examining how rumen microbial composition and rumen gene expression are influenced by rearing regimens are required.

Abstract

The objective of this study was to examine the effect of three different rearing regimens on rumen development in lambs reared artificially. Romney ram lambs were randomly allocated to one of three treatments: commercial milk replacer fed to 57 d of age and high fibre concentrate pellets (HFP57); commercial milk replacer, high fibre concentrate pellets, and early weaning from milk replacer at 42 d of age (HFP42); high protein milk replacer from 2–16 d of age followed by commercial milk replacer, low fibre concentrate pellets, and early weaning from milk replacer at 42 d of age (LFP42). Lambs were slaughtered at 57 d of age. Volatile fatty acid content in rumen fluid at slaughter was analysed and rumen tissue samples were collected for histological examination. The rumen n-butyric content was greater ($p < 0.05$) in both LFP42 and HFP42 treatment lambs compared to HFP57 lambs. The n-valeric content was greater ($p < 0.05$) in LFP42 lambs compared to both HFP57 and HFP42 treatment lambs. Thickness of the rumen dorsal wall determined by ultrasound scanning at 49 d was greater ($p < 0.05$) in both HFP42 and LFP42 lambs compared to HFP57 lambs. There was an interaction ($p < 0.05$) between treatment and site of rumen tissue sampling on papillae width, density, and rumen muscular layer thickness. Collectively, early weaning and the provision of a low fibre pellet leads to improved rumen function and physical development.

Three studies evaluating the potential for lidocaine, bupivacaine or procaine to reduce pain-related behaviors following ring castration and/or tail docking in lambs

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Simple Summary

Lambs are routinely castrated and/or tail docked. Local anesthesia could improve lamb welfare, but data on the duration of effect of local anesthetics are not available. This study evaluated the efficacy of lidocaine, procaine, or bupivacaine in terms of the behavioral response to castration and/or tail docking. The benefits of local anesthetics were modest. The effects of procaine appear to last longer than lidocaine, while bupivacaine is slower to take effect but may provide longer-lasting pain relief. The duration of action of local

anesthetics is limited in sheep, and detailed behavioral evaluations are required in the first hour post-procedure to observe efficacy.

Abstract

The use of local anesthesia at the time of ring castration and tail docking can improve lamb welfare. However, few local anesthetics are registered for sheep, and data on their duration of effect is limited. Three studies were conducted to evaluate the efficacy of procaine (P), lidocaine (L), and bupivacaine (B) in terms of observed alleviation of behavioral responses to castration and/or tail docking in 10-min blocks in the first 60 min post-treatment. In each study, comparisons were made between two groups of lambs castrated and/or tail docked with rubber rings and either receiving the agent using the NUMNUTS® instrument (N) or receiving no anesthetic agent (RR). Acute pain behavior was lower in NL ($n = 28$) than RRL ($n = 15$) males in the first 10 min post-procedure ($p < 0.05$); lower in NB ($n = 16$) than RRB ($n = 16$) males in periods 10–20 min ($0.05 < p < 0.01$), 20–30 min ($p < 0.05$) and 40–50 min ($0.05 < p < 0.01$); lower in NB ($n = 16$) than RRB ($n = 16$) females between 20 and 40 min post-procedure ($0.05 < p < 0.01$); lower in NP ($n = 8$) than RRP ($n = 7$) males in period 10–20 min ($0.05 < p < 0.01$), and lower in NP ($n = 9$) than RRP ($n = 9$) females in periods 0–10 min ($0.05 < p < 0.01$), and 10–40 min ($p < 0.05$). Benefits were modest, and the effects of procaine appear to last longer than lidocaine, while bupivacaine is slower to take effect than either procaine or lidocaine but may provide longer-lasting pain relief. The duration of action of local anesthetics is short in sheep, and detailed behavioral evaluations are required in the first hour post-procedure to establish efficacy.