

OCTOBER 2022

Sheep reproduction RD&A alert

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

The [Sheep Sustainability Framework](#) (SSF) was launched in 2021. The role of the SSF is to monitor, report, measure and report industry performance against sustainability priorities. The SSF recently released their [On-Farm Insights from the National Producer Survey](#) which reports SSF-relevant benchmark data. The survey found that pregnancy scanning was undertaken by fewer than half of producers (42%), with no significant difference between Merino and non-Merino producers. Of those producers who do scan 69% scanned for dry, single and multiple foetuses, but just 29% of these producers managed their twin-bearing ewes separately.

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

Feature project update

The impacts of long-term selection for reproductive performance in Merino sheep

A long-term selection experiment for reproductive performance in Merino sheep was commenced in 1986 in the south-western region of South Africa. Selection for (high line) or against (low line) the number of lambs weaned per ewe joined (NLW_{EJ}) has been undertaken for more than 35 years. Ewes were selected for the high line based on rearing all their lambs (including rearing twins at least once). For the low line, ewes that were either barren or lost all progeny born at least once were selected.

Professor Schalk Cloete (Stellenbosch University) presented an overview of this project at the 2022 SRSP Forum. Following 35 years of divergent selection the breeding values for NLW_{EJ} in the high line increased by 1% per annum compared with an annual decrease of 0.5% in the low line. Each of the component traits, conception, litter size and ewe rearing ability also diverged over time. The duration of lambing, post-lambing ewe behaviour, lamb survival, lamb response to cold stress (increasing channel index) and milk production also changed in favour of the high line.

Other correlated responses included heavier weaner and hogget liveweights and plainer bodies (fewer wrinkles and increased perineal bare area) of high line progeny together with a lower incidence of breech strike and lower stress levels. Long-term selection for NLW_{EJ} had no impact on clean fleece weight or fibre diameter, but a small negative impact on staple strength.

This experiment has shown that lamb survival can be improved by selection for NLW_{EJ} even though the number of multiple births also increases. Survival of high line twin lambs was significantly higher than that of low line twin lambs.

Key papers from the selection experiment

Cloete *et al.* (2004) Genetic and phenotypic trends and parameters in reproduction, greasy fleece weight and liveweight in Merino lines divergently selected for multiple rearing ability.

DOI <https://doi.org/10.1071/EA02225>

Cloete *et al.* (2011) Genetic and environmental parameters of milk production and milk composition in South African Merinos. *Proc. Assoc. Advmt. Anim. Breed. Genet.* 19:419-422

Cloete *et al.* (2020) Arena behaviour of Merino weaners is heritable and affected by divergent selection for number of lambs weaned per ewe mated.

DOI <https://doi.org/10.1016/j.applanim.2020.105152>

Cloete *et al.* (2021) The genetics of perinatal behaviour of Merinos in relation to lamb survival and lambs weaned per ewe mated.

DOI <https://doi.org/10.1016/j.applanim.2021.105217>

Hough *et al.* (2015) Relative contribution of P450c17 towards the acute cortisol response: Lessons from sheep and goats.

DOI <https://doi.org/10.1016/j.mce.2015.01.018>

Mpetile *et al.* (2015) Environmental and genetic factors affecting faecal worm egg counts in Merinos divergently selected for reproduction.

DOI <https://doi.org/10.4314/sajas.v45i5.8>

Nel *et al.* (2021) Long term genetic selection for reproductive success affects neonatal lamb vitality across cold stress conditions.

DOI <https://doi.org/10.1016/j.jtherbio.2021.102908>

Nel *et al.* (2021) Genetic parameters and trends for lamb survival following long-term divergent selection for number of lambs weaned in the Elsenburg Merino flock

DOI <https://doi.org/10.1071/AN21198>

Scholtz *et al.* (2010) Influence of divergent selection for reproduction on the occurrence of breech strike in mature Merino ewes.

DOI <https://doi.org/10.1071/AN09123>

Scholtz *et al.* (2011) Genetic parameters for breech strike indicator traits and yearling production traits in Merinos. *Proc. Assoc. Advmt. Anim. Breed. Genet.* 19:175-178

Scholtz *et al.* (2017) Genetic parameters for dag and cover scores of Merino ewes divergently selected for number of lambs weaned. *Proc. Assoc. Advmt. Anim. Breed. Genet.* 22:573-576

For more information on the long-term selection for reproductive performance in Merino sheep, contact Schalk Cloete (schalkc2@sun.ac.za).

Scientific papers

Chitosan oligosaccharide supplementation affects immunity markers in ewes and lambs during gestation and lactation

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Animals, Volume 12(9), October 2022 **OPEN ACCESS**

DOI <https://doi.org/10.3390/ani12192609>

Simple Summary

Chitosan oligosaccharide (COS) is a hydrolyzate of the structural polysaccharide, chitin, extracted from crab and shrimp shells, which has significant health benefits for humans including boosting immunity. However,

there is limited information on the potential use of COS for sheep health and production. We supplemented COS via a loose lick to pregnant ewes maintained on pasture for 11 weeks with an estimated COS intake @100–600 mg/d/ewe from 5 weeks pre-lambing until lamb marking at ~4 weeks of age. We demonstrated that COS is readily incorporated into sheep supplementary feed without compromising palatability. Maternal COS supplementation did not influence the body weight of ewes or lambs, but it significantly increased serum interleukin 2 concentrations in both ewes and lambs at marking and weaning, while boosting the first line of immune defence of the lamb through an increase in serum immunoglobulin M at lamb marking. Other immune markers or cytokines were not affected by maternal COS supplementation in either ewes or lambs.

Abstract

Chitosan oligosaccharide (COS) is derived through deacetylation of chitin from crustacean shells. Previous studies reported the benefits of COS to gut microbiota, immunity and health of host species. In this study, 120 pregnant composite ewes were subdivided into treatment and control groups in duplicate. COS was supplemented via a loose lick to provide an estimated intake of COS @100–600 mg/d/ewe for five weeks pre-lambing until lamb marking. Body weight was recorded pre-treatment for ewes, and at lamb marking and weaning for both ewes and lambs. Serum immunity markers immunoglobulin G (IgG), immunoglobulin M (IgM), immunoglobulin A (IgA), secretory immunoglobulin A (sIgA), interleukin (IL)-2, IL10 and faecal sIgA were determined for ewes and lambs at lamb marking and weaning by enzyme-linked immunosorbent assay (ELISA). We found that COS can be incorporated in sheep feed without compromising palatability. Maternal COS supplementation did not influence the body weight of ewes or lambs. It did, however, significantly increase the concentrations of serum IL2 in ewes at marking and weaning ($p < 0.001$). In lambs, COS also significantly increased the IL2 concentration at marking ($p = 0.018$) and weaning ($p = 0.029$) and serum IgM at marking ($p < 0.001$). No significant effect was observed in the concentration of any other immune marker or cytokine in either ewes or lambs. In conclusion, maternal COS supplementation significantly modulated some immunity markers in both ewes and lambs. The short duration of maternal COS supplementation and optimal seasonal conditions during the trial may explain the lack of significant body weight in ewes and lambs from the COS supplementation.

Energy balance and hippo effector activity in endometrium and corpus luteum of early pregnant ewes

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Reproduction, Fertility and Development, Volume 34(16), October 2022

DOI <https://doi.org/10.1071/RD22081>

Abstract

Context: The establishment of pregnancy in cows requires uterine activity regulation of the main Hippo signalling effector yes-associated protein 1 (YAP). It remains unknown (1) how YAP activity at the corpus luteum (CL) correlates with early pregnancy-related events in ruminants; and (2) if YAP activity in the uterus and CL can be affected by metabolic disorders that may lead to pregnancy failure in ruminants.

Aims and methods: To determine the effect of early pregnancy on total and phospho-YAP expression and its transcriptional activity in the CL, we compared non-pregnant vs pregnant ewes. To understand the YAP activity dysregulation with disorders that may result in pregnancy loss, we induced negative energy balance in pregnant ewes.

Key results and conclusions: Our main results indicate that early pregnancy alters the expression and activity patterns of YAP in the ovine CL but not in the endometrium. In addition, while our NEB-induced model fails to alter YAP activity at the endometrium level, we found that fasting during the first but not second week of pregnancy affects YAP activity in the CL of pregnant ewes.

Implications: The data presented herein provide considerable insight into the activity of a signalling pathway that may be a key player in pregnancy recognition and establishment in ewes.

Embryo biotechnologies in sheep: Achievements and new improvements

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Reproduction in Domestic Animals, Volume 57 (55), October 2022 **OPEN ACCESS**

DOI <https://doi.org/10.1111/rda.14127>

Abstract

To date, large-scale use of multiple ovulation and embryo transfer (MOET) programmes in ovine species is limited due to unpredictable results and high costs of hormonal stimulation and treatment. Therefore, even if considered reliable, they are not fully applicable in large-scale systems. More recently, the new prospects offered by in vitro embryo production (IVEP) through collection of oocytes post-mortem or by repeated ovum pick-up from live females suggested an alternative to MOET programmes and may be more extensively used, moving from the exclusive research in the laboratory to field application. The possibility to perform oocytes recovery from juvenile lambs to obtain embryos (JIVET) offers the great advantage to significantly reduce the generation interval, speeding the rate of genetic improvement. Although in the past decades several studies implemented novel protocols to enhance embryo production in sheep, the conditions of every single stage of IVEP can significantly affect embryo yield and successful transfer into the recipients. Moreover, the recent progresses on embryo production and freezing technologies might allow wider propagation of valuable genes in small ruminants populations and may be used for constitution of flocks without risks of disease. In addition, they can give a substantial contribution in preserving endangered breeds. The new era of gene editing might offer innovative perspectives in sheep breeding, but the application of such novel techniques implies involvement of specialized operators and is limited by relatively high costs for embryo manipulation and molecular biology analysis.

Comparison of four strategies of ram management in a semen collection centre

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Reproduction in Domestic Animals, Volume 57 (55), October 2022 **OPEN ACCESS**

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Abstract

Thirty Merino rams were used to determine the effect of four management systems of rams on semen quality during the anoestrous season. Animals were divided into four groups: Artificial-Photoperiod group (AP; n = 8), which were isolated from females and exposed to artificial long days (16 hr/d) from 1 Feb to 15 Mar; Natural-Photoperiod (NP; n = 8), isolated from females and exposed to the natural photoperiod throughout the experiment; Oestrous-Ewe group (EE; n = 7), housed in a pen adjacent to another pen that housed three ewes in oestrus, and Anestruc-Ewe group (AE; n = 7), housed adjacent to another pen that housed three ovariectomized ewes. From 20 Mar to the end of May (10 weeks), semen samples were collected weekly, and blood samples were collected to determine plasma testosterone concentrations. Mean plasma testosterone concentrations, ejaculate volume and reaction time were not affected either by treatment or

week. There was a significant effect ($p < .01$) of ram treatment on sperm concentration, and both TM y PM, and their interaction, were significantly affected by group and week ($p < .001$). Rams exposed to ewes in oestrus presented the largest sperm concentration ($p < .05$) compared with the other three groups, although they had the lowest total and progressive motilities ($p < .01$). In conclusion, management strategy in spring affects semen quality of rams, with the presence of ewes in oestrus being the best plan to increase sperm concentration.

Responses of sperm mitochondria functionality in animals to thermal stress: The mitigating effects of dietary natural antioxidants

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Reproduction in Domestic Animals, Volume 57(10), October 2022

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Abstract

The reproductive consequences of global warming representing heat stress (HS) have been widely received more attention in the last decades. HS induced significant influence on the male reproductive cell, especially sperm functionally. Reduction in the sperm function induced by HS leads to failure of fertility potential. The main effects of HS on sperm are reducing sperm motility, increased abnormalities and changes in the fluidity of the membrane as well as cell morphology. Moreover, the destruction of mitochondrial function could be the result of adverse influences of HS. The protein contents and enzymes of mitochondria were lowered after the exposure of sperm to HS. Some natural antioxidants were used for improving sperm mitochondrial function under HS conditions. In this review, it was highlighted the potential influences of HS on sperm function through reduction in ATP Synthesis yield, mitochondrial activity, mitochondrial protein contents and mitochondrial enzymes, which involves the interference of mitochondrial remodelling in sperm of animals.

Seasonal changes in testis size, testosterone levels and sperm production quality in meat rams

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Abstract

The aim of the present study was to evaluate seasonal changes in testes size, serum testosterone (T) levels and sperm production characteristics of 24 adult (2–3 years old) rams of meat breeds: Charollais ($n = 6$), Ile de France ($n = 6$), Dorset (Polled) ($n = 5$) and Dorper (Dorper, $n = 7$). Semen was collected with artificial vagina using a female in spontaneous oestrus (September–November, breeding season, BS) or a female with induced oestrus (March–July, non-breeding season, NBS). A total of 672 ejaculates were examined. Jugular vein blood was collected to determine testosterone levels during BS and NBS, and serum was extracted. Results of the present study indicate that there was no significant change in parameters such as body weight (kg) and testes length, both right and left, during BS and NBS, irrespective of the breed. The remaining metrics of testes differ in varying degrees between breeds of rams (with the exception of the Dorper breed) between BS and NBS. No significant variation in these parameters was found in Dorper rams. For all breeds, season had a statistically significant effect on important parameters such as total sperm count and progressive sperm motility after thawing. There was also significant seasonal variation in ejaculate volume across the three breeds, excluding il-de-France rams. The most constant was the sperm concentration, which was unchanged

in BS and NBS in the three breeds, excluding Dorset rams, which showed a slightly significant decrease in this indicator in the non-breeding season. The serum content of the major male hormone testosterone (T) in rams of all breeds showed significant changes between BS and NBS, decreasing by a highly significant amount in the non-breeding season.

Prolonging the time of semen deposition increases the pregnancy rates of ewes subjected to fixed time cervical insemination during the breeding season

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Abstract

The main limiting factor of artificial cervical insemination in ewes is the long and narrow fibrous cervical canal, which impedes the transport of spermatozoa and leads to lower pregnancy rates. The hypothesis that prolonging the time of semen deposition during ovine cervical insemination can increase pregnancy rates was investigated in this study. Estrus was synchronized in 150 multiparous Ujimqin ewes using a polyurethane intravaginal sponge impregnated with 45 mg of flurogestone acetate. The sponge was left in the vagina for 12 days followed by an injection of 330 IU of eCG at sponge removal. After the exclusion of two ewes due to sponge loss, the remaining 148 ewes were divided into the Treatment group (n = 75) and the Control group (n = 73). Each ewe was inseminated once between 56 and 60 h after the removal of sponges, using a new type of insemination device containing 0.25 ml of diluted semen. Semen was collected from eight Black Suffolk rams and all the ejaculates were pooled and diluted in ultra-high temperature-treated commercial skimmed milk. The time of semen deposition was prolonged to 60 s in the Treatment group, while ewes were given traditional insemination in the Control group. Pregnancy status was determined by transabdominal ultrasound examination 45 days after insemination. Lambing performance was calculated after all the ewes had been delivered. Significant differences were observed between the Treatment group and the Control group in terms of the pregnancy rate and the fecundity rate (73.3% and 93.3% vs 56.2% and 71.2%, $p < .05$ and $p < .01$, respectively). In conclusion, prolonging the time of semen deposition significantly increased pregnancy and fecundity rates in estrus-synchronized Ujimqin ewes subjected to fixed time cervical insemination.

Bio-economic modelling of sheep meat production systems with varying flock litter size using field data

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Highlights

- Litter size (lambs born/ewe) is a major profit factor for sheep meat producers.
- The proportion of lambs born as twins peaked at 67 % with flock litter size = 1.85.
- Marginal economic returns plateaued at flock litter size = 2.20.
- Ewes reared 2 lambs maximum, benefits of surplus lambs born in litters ≥ 3 were low.
- Results can inform industry priorities around litter size and lamb production.

Abstract

Sheep meat producers derive the majority of income from sales of weaned lambs, determined by flock conception rates, litter size, and lamb survival. Field data from commercial flocks can inform sensitivity analyses of the effect of litter size on flock productivity, feed demand, and gross margin. This study adapted an established bio-economic model of a flock of breeding ewes informed by statistical relationships (from linear models) between flock litter size (lambs born per ewe lambing) and production factors (such as flock barren rate, litter birth type and lamb birth weight) identified using 156 145 animal records from the Irish national sheep breeding database. Sensitivity analyses were undertaken to investigate the effects of flock litter size on flock production, feed demand, and gross margin. Results showed that as flock litter size increased, the proportion of lambs born as multiples increased, with 14 % of lambs born as singles when flock litter size was 2.2 lambs born per ewe lambing. Flock gross margin increased from €2 205 to €7 730 as litter size increased from 1.0 to 2.0 lambs born per ewe lambing. As litter size increased from 1.0 to 2.2 lambs born per ewe lambing, flock gross margin increased linearly by, on average, €52 per 0.01 increase in litter size. At a litter size of > 2.2 lambs born per ewe lambing, flock gross margin increased on average €12 per 0.01 increase in litter size. At a litter size of 2.2 lambs born per ewe lambing, flock efficiency (at 65.0 kg of lamb weaned per ewe presented for breeding), weaning rate (at 1.5 lambs weaned per ewe presented for breeding; not including excess lambs from large litters sold within a week after birth and thus not weaned on-farm), and gross margin (at €8 500) began to plateau. The results indicate lower marginal returns in gross margin at very high flock litter size, due to the lower value of additional lambs born as triplets and quadruplets compared with single- and twin-born lambs. However, the diminishing economic returns occurred at higher flock litter size than are currently biologically achieved in most flocks. Quantification from this analysis demonstrates how the value of increasing the number of lambs born changes at very high flock litter size, which can inform the priorities and performance benchmarking for international sheep meat production industries.

Mass spectrometry-based lipidomics of brown adipose tissue and plasma of new-born lambs subjected to short-term cold exposure

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Simple Summary

This study evaluated the impact of short-term cold exposure (2-days) on new-born lamb brown adipose tissue (BAT) and plasma lipid composition, and identified potential biomarkers to predict BAT activity. Results from the present study propose that short-term cold exposure provokes profound changes in BAT and the plasma lipidome composition of new-born lambs. A significant increase in key lipid classes was observed, where they seem to cooperate as one in order to enhance lipid metabolism via BAT thermogenic activation and adipocyte survival during cold adaptation.

Abstract

During cold exposure, brown adipose tissue (BAT) holds the key mechanism in the generation of heat, thus inducing thermogenic adaptation in response to cooler environmental changes. This process can lead to a major lipidome remodelling in BAT, where the increase in abundance of many lipid classes plays a significant role in the thermogenic mechanisms for heat production. This study aimed to identify different types of lipids, through liquid chromatography–mass spectrometry (LC-MS), in BAT and plasma during a short-term cold challenge (2-days), or not, in new-born lambs. Fifteen new-born Romney lambs were selected randomly and divided into three groups: Group 1 (n = 3) with BAT and plasma obtained within 24 h after birth, as a control;

Group 2 (n = 6) kept indoors for two days at an ambient temperature (20–22 °C) and Group 3 (n = 6) kept indoors for two days at a cold temperature (4 °C). Significant differences in lipid composition of many lipid categories (such as glycerolipids, glycerophospholipids, sphingolipids and sterol lipids) were observed in BAT and plasma under cold conditions, compared with ambient conditions. Data obtained from the present study suggest that short-term cold exposure induces profound changes in BAT and plasma lipidome composition of new-born lambs, which may enhance lipid metabolism via BAT thermogenic activation and adipocyte survival during cold adaptation. Further analysis on the roles of these lipid changes, validation of potential biomarkers for BAT activity, such as LPC 18:1 and PC 35:6, should contribute to the improvement of new-born lamb survival. Collectively, these observations help broaden the knowledge on the variations of lipid composition during cold exposure.

Can genetic propensity for lambing difficulty be predicted by pelvic and body shape dimensions measured by X-ray computed tomography (CT) scanning of ram lambs?

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Highlights

- As potential lambing ease predictors, body/ pelvic measurements were taken by CT.
- CT lambing ease predictors measured in ram lambs are heritable.
- Preliminary genetic correlations suggest narrow hips and shoulders ease lamb birth.
- Also, wider, more vertical pelvises may result in easier lambing of ewes.
- Possible future potential to select for lambing ease via routine ram lamb CT scans.

Abstract

The ability of sheep to lamb unaided is important for both financial and welfare reasons. Current recording of lambing ease is subjective and unreliable for breeding purposes. The aim of this study was to investigate genetic control of measurements that could be taken from routine x-ray computed tomography (CT) scanning of ram lambs, within UK breeding programmes, to predict lambing difficulty of their progeny, or their daughters' progeny. Measurements of 6 CT-derived lambing ease predictor traits (hip width, shoulder width, pelvic area, pelvic height, pelvic width, pelvic angle) were taken from archived CT images from 437 Texel ram lambs from 58 flocks (average age ~20 weeks) scanned over 15 years, as part of the UK national terminal sire breeding programme. Heritabilities, after adjusting for live weight, ranged from 0.16 to 0.65, with the highest estimates for the pelvic traits. Lambing difficulty scores (17705 records over 16 years), recorded on a six-point scale of increasing severity, were available from lambs born within the same flocks. Lambing difficulty was lowly heritable when expressed either as a trait of the lamb ($h^2 = 0.05$) or the ewe ($h^2 = 0.02$) with large common litter effects, low maternal effects and low repeatability in the ewe. Genetic correlations gave some indication that wide hips and shoulders, at a fixed live weight, may be associated with increased lambing difficulty of the lamb ($r_g = 0.28$ and 0.47) and that lower pelvic width and angle (more horizontal) may be associated with increased lambing difficulty of the ewe ($r_g = -0.22$ and -0.39), although standard errors were high. Moderate genetic correlations between body width and pelvic measurements suggest scope to select for optimal combinations of these measurements. Further research in this area could lead to incorporation of robust breeding values for lambing ease into sheep breeding programmes to improve animal welfare.

Birth, colostrum, and vigour traits of lambs born from Corriedale ewes grazing native pastures supplemented during the peripartum period

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Highlights

- Short-term peripartum supplementation improved colostrum traits of ewes.
- Short-term peripartum supplementation improved blood glucose at lamb birth.
- Supplementation reduced dystocia/stillbirth/birth injury as cause of death in lambs.
- Supplementation did not affect duration or type of parturition in ewes or lamb vigour.

Abstract

To evaluate the effect of a short-term energy-protein supplementation during the peripartum on birth, colostrum, and vigour traits of lambs, 214 multiparous Corriedale pregnant ewes grazing native pastures were used. Ewes, according to body conditions score and body weight, were assigned to a 2 × 2 factorial design: type of birth (single or twin), and supplementation (yes or no). Single (n = 67) and twin bearing (n = 39) non-supplemented, and single (n = 67) and twin bearing supplemented ewes (n = 41) were observed during lambing in two similar sub-paddocks. There was no detected interaction between supplementation and type of birth for any of the experimental variables (P > 0.05), except in the time the lambs took to stand after birth. Length of gestation and type of parturition (normal vs. dystocia) were not affected by supplementation or type of birth (P > 0.05). The duration of parturition (phase II) was longer in supplemented than non-supplemented and in single than in twin bearing ewes (P < 0.05). Colostrum production was greater, heavier, and less viscous in supplemented than non-supplemented ewes, and in single than twin bearing ewes (P < 0.05). Colostrum nutritional values were greater in supplemented than non-supplemented ewes; there was more total lactose in single than twin bearing ewes (P < 0.05). Birth weight of lambs was not affected by supplementation (P > 0.05), but it was higher in single than twin lambs (P < 0.05). There were more lambs with blood glucose concentration greater than 20 mg/dl at birth from supplemented than non-supplemented, and from single than twin bearing ewes (P < 0.05). There was no effect of supplementation in the time taken by lambs to stand and suck their mothers (P > 0.05), however in non-supplemented ewes, single lambs stood and sucked faster than twin lambs (P < 0.05). No differences in lamb mortality to 72 h were observed due to supplementation or type of birth (P > 0.05) but lesions of dystocia/stillbirth/birth injury as cause of death was less frequent in supplemented than non-supplemented ewes (P < 0.05), without differences by type of birth (P > 0.05). In conclusion, a short-term energy-protein supplementation in ewes during peripartum period influenced positively the volume, viscosity and composition of colostrum and blood glucose of lambs at birth, reducing lesions of dystocia/stillbirth/birth injury as cause of death of lambs, but did not affect the length of gestation, duration, or type of parturition in ewes, birth weight, lamb vigour, or lamb mortality to 72 h.

Ovarian assessment for pre-selection of embryo donor ewes

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Highlights

- Transrectal ultrasound is a reliable method for assessing the dimensions of the ovary in ewes.

- Ultrasound evaluation of ovarian dimensions is not effective as a method for selecting embryo donor ewes.
- Ultrasound evaluation of the number of follicles ≥ 2 mm is a simple test to select embryo donor ewes.

Abstract

The present study aimed to evaluate whether two-dimensional ovarian measurements and the identification of antral follicle populations by ultrasound at different stages of the estrous cycle are related to the superovulatory response and embryo production in ewes. The estrous cycle of 57 Santa Inês ewes was synchronized by administering two doses of 75 μg of prostaglandin (PGF) 10 days apart. After 2.5 (proestrus/estrus), 4.5 (metestrus), and 9.5 (diestrus) days from the last PGF injection, ultrasound examinations were performed to quantify antral follicles ≥ 2 mm and ovarian measurements. Subsequently, the number of follicles and ovarian measurements were correlated with the superovulatory response and embryo production of each ewe. The mean follicle population (≥ 2 mm) and ovarian dimensions were similar in all phases of the estrous cycle ($P > 0.05$). Positive correlations were identified between the number of follicles and ovarian dimensions ($P < 0.05$) in different phases of the estrous cycle. Donor ewes with a high number of follicles (≥ 7) in the metestrus phase showed a significant increase in the number of ovulations, total structures, total embryos, and viable embryos ($P < 0.05$). In conclusion, ultrasonographic assessment of the number of follicles ≥ 2 mm, performed during metestrus (4.5 days after synchronization pre-treatment), is an easy-to-perform approach and can be used for pre-selection of embryo donor ewes.

Relationship between subclinical mastitis and reproduction in Lacaune sheep

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Highlights

- Long-term subclinical mastitis impairs follicular development in ewes.
- Coagulase-negative Staphylococcus is the main pathogen of subclinical mastitis.
- The chance of estrus is reduced by the presence of the lamb.

Abstract

The objective of this study was to determine how the occurrence and etiology of subclinical mastitis (SM) in the postpartum period was correlated with uterine involution (UI), return to estrus, and ovarian activity. Lacaune ewes ($n = 87$) were categorized based on the occurrence of one or more SM events diagnosed on days 5, 20, 35, and 50 after lambing. The animals diagnosed with SM (mastitis group, $n = 49$) were categorized according to the disease etiology into four groups (coagulase-negative Staphylococcus [CNS], Staphylococcus aureus, coliforms, and other gram-positive pathogens). The control group ($n = 38$) was ewes not diagnosed with SM at any of the evaluations. The group without pathogen isolation (WPI) consisted of SM-positive sheep according to the California Mastitis Test but without pathogen isolation by microbiological culture. Ultrasonographic examination of UI, characterized by uterine horn diameter ≤ 2 cm with no content in the uterine lumen, was evaluated on days 15, 30, and 45 after lambing. Ovarian activity was evaluated from the time of estrus detection every 12 h until ovulation. The number of corpora lutea and the total luteal area were determined 10 days after ovulation. Occurrence and etiology of SM were not correlated with ultrasonographic examination of UI, and at 45 days after lambing, all sheep had involuted uteri. Estrus detection began on the 20th day postpartum, and 57.47% (50/87) of the ewes exhibited estrus until the 60th

day postpartum. The diameter of the largest follicle was smaller in ewes diagnosed with SM on the 50th day after lambing than in the control group ($P < 0.05$). The WPI group had a smaller diameter of the largest follicle ($P < 0.001$) than the control group and the CNS group. The number of follicles, the number of corpora lutea, and the total luteal area were not influenced by SM occurrence or etiology. The chance of exhibiting estrus within 60 days was higher in the group affected by mastitis than in the control group. Furthermore, twin-bearing ewes and ewes with viable lambs were less likely to express estrus.

The time of eCG administration in progesterone injection-based estrus synchronization protocol could affect the time of estrus expression in ewes during non-breeding season

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Highlights

- The time of eCG administration after the last progesterone injection in ewes could alter the time of estrus expression.
- The time of eCG administration after the last progesterone injection in ewes does not affect fertility, prolificacy and fecundity.
- Three injections of progesterone, 72 h apart, could be used as a basis for estrus synchronization program in ewes.

Abstract

The objectives of this study were to investigate the suitable time of eCG administration following progesterone injections, and to propose the suitable time for AI in progesterone injection-based estrus synchronization protocol in ewes during non-breeding season. Healthy Shal ewes ($n = 140$) were used in this study. All ewes were exposed to rams for 10 h, after two months of isolation from males. Six days after ram exposure, all ewes were given progesterone (37.5 mg; SC; Day 0 of experiment) in association with GnRH analogue (7.5 μg Alarelin acetate; IM). Subsequently, the second (25 mg; SC) and the third (12.5 mg; SC) doses of progesterone were given, 3 days apart. Concurrent with the third dose of progesterone, all ewes received prostaglandin F₂ α analogue (250 μg Cloprostenol; IM). On Day 6, ewes were divided into four groups considering their age, BCS and parity. Ewes in groups 1, 2 and 3 received eCG (400 IU, IM), concurrent, 24 h, and 48 h following the last progesterone injection, respectively. Ewes in control group did not receive any further treatment. Estrus detection was carried out from the last progesterone injection for 6 days. Ewes that exhibited standing estrus were drafted and inseminated laparoscopically within 24 h after standing estrus. Data were analyzed using GLM and GENMOD procedures in SAS. The incidence of estrus was similar in all groups ($P > 0.05$). The time to estrus and AI after the last progesterone injection was longer in control than in other treatment groups ($P < 0.05$). Lambing rate in group 2 (66.7%) was higher than in control group (40%; $P < 0.05$). There was no significant difference in prolificacy among groups ($P > 0.05$). Fecundity in group 3 (83.3%) was higher than in control (43.3%; $P < 0.05$). The percentage of ewes that exhibited estrus within 24 h occurs earlier in eCG treated groups than in control ($P < 0.05$). In conclusion, although the time of eCG administration after the last progesterone injection could result in almost similar reproductive performance in ewe, it will shift the time of estrus expression and AI, affecting the proper time for AI.

Metabolic profiles and follicular dynamics of prepubertal and pubertal Santa Inês ewe lambs with dietary restriction and supplementation with roasted whole soybeans

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Highlights

- Lipid supplemented animals that ovulated had decreased dry matter intake.
- Animals that ovulated had greater serum HDL level than those did not ovulate.
- Roasted whole soybeans supplementation did not increase linoleic serum level.
- Moderate feed restriction reduced the number of follicular waves.
- Number, diameter and growth rate of follicles were not affected by feed restriction.

Abstract

The objectives of this study were to evaluate moderate feed restriction and lipid supplementation on follicular dynamics, serum concentrations of fatty acids, and metabolic profile of prepubertal and pubertal ewe lambs. Thirty-five Santa Inês ewe lambs were randomly assigned according to body weight in an unbalanced block design with a 2 × 2 factorial arrangement, which consisted of level of intake (ad libitum - AL or restricted - FR), lipid supplementation (with or without whole roasted soybean). Ewe lambs in the FR group had 85% of the diet offered to those in the AL group. Ovulation was retrospectively defined by serum progesterone sample ≥ 1 ng/mL. The physiological status, ovulating (OV) and not ovulating (NOV), was considered as a two-level covariate. Dry matter and ether extract intake were greater in unsupplemented than supplemented AL ewe lambs that had ovulated (intake level x lipid supplementation x physiological status, $P < 0.05$). Plasma glucose and serum triglyceride concentrations were higher ($P < 0.05$) in supplemented animals, but no changes were observed in serum insulin concentrations ($P > 0.05$). In the unsupplemented animals, serum high-density lipoprotein (HDL) and cholesterol concentrations were higher in FR animals than in AL animals; serum HDL and cholesterol concentrations did not differ between lipid-supplemented groups (intake level x lipid supplementation, $P < 0.05$). Serum HDL was higher ($P < 0.05$) in animals that had ovulated than in animals that had not ovulated. In supplemented ewe lambs, serum stearic concentrations were greater in the AL group than in the FR group; conversely, in unsupplemented animals, stearic concentrations were lower in the AL group than in the FR group (intake level x lipid supplementation, $P < 0.05$). The linoleic serum concentrations were not affected ($P > 0.05$) by intake level, lipid supplementation, or physiological status. The number of follicular waves was greater ($P < 0.05$) in AL ewe lambs than in FR ewe lambs. There was no main effect of treatment or interaction effects ($P > 0.05$) on the number of follicles, follicular diameter, or growth rate of the largest follicle. In conclusion, lipid supplementation with roasted whole soybeans improved the metabolic profile of ewe lambs, with no concomitant effect on follicular dynamics or linoleic serum concentration. Except for a reduction in the number of follicular waves, the follicular dynamics were not altered by moderate FR. Despite the higher serum HDL concentrations in ewe lambs that had ovulated, the follicular development was not enhanced.

Female reproduction and the microbiota in mammals: Where are we?

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Highlights

- The presence of an extra-vaginal microbiota in the female reproductive tract is controversial.
- Knowledge about the microbiota beyond the gut and/or beyond the human species is limited.
- Limitations and gaps in our understanding about the microbiome and reproduction with a critical point of view is discussed.
- Microbiome in other bodily localizations (i.e.: gut, oral cavity) can affect reproductive events.

Abstract

While it is generally accepted that the mammalian vagina contains a site-specific microbiota that plays relevant roles in genital and reproductive health, the existence of an extra-vaginal microbiota in the female reproductive tract (i.e. follicular fluid, oviduct, endometrium, and placenta) is, at least, a matter of controversy. Many conclusions in this field have failed to consider the technical limitations, biases, and confounding factors inherent to next-generation sequencing (NGS) approaches. While this creates uncertainty in the field, there is no doubt this subject is set to be the focus of new research efforts because of its scientific and practical connotations in female reproductive health. The current art state, its limitations, and gaps in our knowledge about the female reproductive tract's microbiota and, particularly, about the microbes of the extra-vaginal environment are presented in this review. Also are discussed possible relationships between the gut and oral microbiota and reproductive events.

Upcoming events

Date	Event	Location
3 November 2022	Making the most of out of season joining – all you need to know SheepConnect NSW	Webinar
3 November 2022	Flood recovery: Feed budgeting webinar Agriculture Victoria	Webinar
10 November 2022	South Australian Livestock Adviser Update MLA	Hahndorf, SA
10 November 2022	Flood recovery: Animal health webinar Agriculture Victoria	Webinar
11 November 2022	Sheep Technology Expo 2022 Sheep Connect SA	Penola, SA
16 November 2022	WormBoss Sheep – Workshop pilot ParaBoss, MLA, AWI and Animal Health Australia	Canowindra, NSW
22 November 2022	BredWell FedWell Pilot – breeding and feeding to make more money MLA	Bordertown, SA
29 November 2022	Improving reproduction in extensive sheep flocks MLA, Productive Livestock Systems, MerinoLink,	Carrathool, NSW
8 December 2022	Are your bugs bogging you down? Sheep Connect NSW	Webinar

Funding calls

Program	Open	Close
Sheep Productivity Levy Priorities Meat & Livestock Australia	10 October 2022	18 November 2022