University of Wyoming
Extension Sheep Program

SheepSense:
an applied research brief

Metabolic Disease and Diets Around Lambing in the Intermountain West

Understanding Metabolic Diseases

Late gestation is known for a rapid growth in fetal development, which increases the ewe's nutrient requirements drastically, like energy and calcium. Requirements in late gestation for twins are 125% higher for metabolizable energy (ME) and 151% higher for calcium (Ca) when compared to ewes gestating singles and even more for triplets! Little data is published showing current incidence of metabolic disorders around parturition. However, even a small percentage of metabolic disease can be costly to an operation, both in genetic progress and economically. Milk fever (hypocalcemia), and pregnancy toxemia (ketosis) are two diseases that occur around lambing and present with similar symptoms, therefore making it hard if not impossible to diagnose on farm.

Later progression of both diseases results in ewes that are unable to move, often in a recumbent state, commonly referred to as "downer-ewes." These "downer-ewes" are rightly named and most of the time when signs are noticeable, it's too late. Even if lambs are delivered, it is reported that the survival rate of the ewe is only 33%. Producers understand that reducing the risk for metabolic diseases and ensuring proper animal husbandry helps herd health and ultimately the sustainability of their operations.

Figure 1:

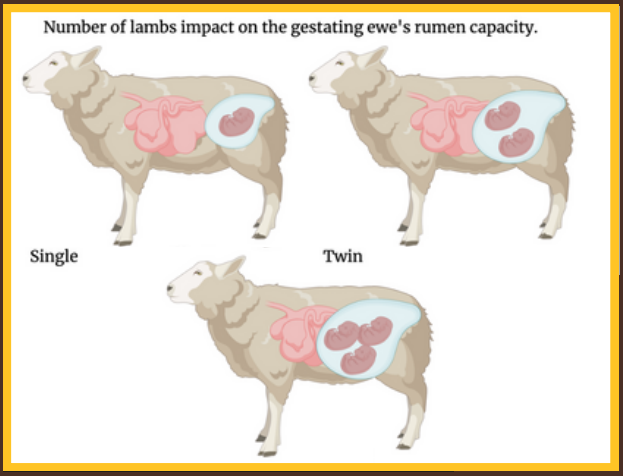
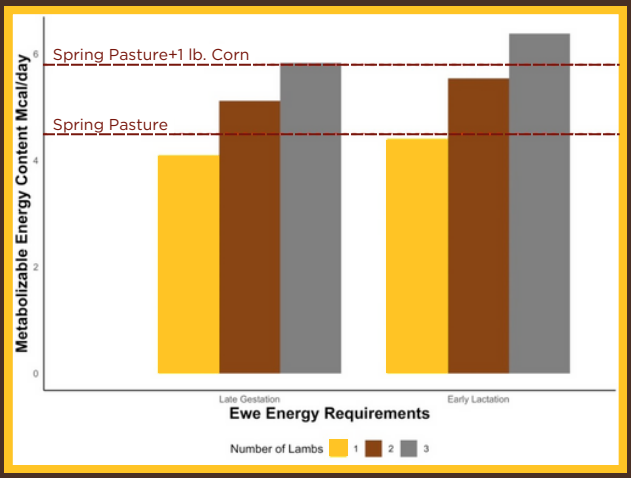


Figure 2:



Pregnancy Toxemia

Overview

Pregnancy toxemia, also known as hypoglycemia, twin-lambing disease, or ketosis, results from an energy deficiency in late gestation. Reduced feed intake due to fetal growth, combined with increased metabolic demands, leads to a negative energy balance. Ewes in poor (<2.0/5) or excessively fat (>4.5/5) body condition are at higher risk, especially under dietary changes or stress. This imbalance triggers ketone production, affecting vital organs and causing symptoms such as isolation, depression, and decreased feed intake, which can lead to death.

Clinical Signs

Early signs include isolation, staggering, labored breathing, and head pressing. If untreated, ewes become recumbent and eventually die. Diagnosis is confirmed by detecting ketones in urine or serum and low blood glucose, though on-farm identification can be done by noting a sweet smell in breath or urine.

Treatment

Treatment success is limited, with a mortality rate exceeding 66%. Increasing glucose levels via oral or intravenous administration is key. Oral propylene glycol (150–200 mL twice on day one, then 60 mL twice daily for up to six days) can help but may reduce appetite. Glucocorticoids like dexamethasone increase blood sugar but can induce premature labor if given before day 140 of gestation. Providing highly digestible feed (alfalfa hay, corn) and water is crucial.

Prevention

Prevention is the best strategy. Ensuring adequate nutrition, minimizing stress, and maintaining a consistent feeding routine—especially in the last six weeks of gestation—are essential. In the Intermountain West, feeding before winter storms and grouping ewes by fetal count for targeted nutrition can reduce risk.

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Hypocalcemia (Milk Fever) in Ewes: Causes, Signs, Treatment, and Prevention

Overview

Hypocalcemia, or Milk Fever, occurs due to low blood calcium levels, typically in late gestation or early lactation. Rapid fetal bone growth in the last 30 days of gestation increases calcium demand, especially in ewes carrying twins or triplets. Unlike cattle, hypocalcemia in sheep is not tied to birth but can affect 5–30% of a flock due to nutrition or stress. Risk factors include transport stress, grazing on oxalate-rich plants (e.g., halogeton, pigweed, kochia), and consuming certain mixed feed ingredients.

Clinical Signs

Since calcium is crucial for muscle function, early signs include a stiff gait, muscle tremors, and isolation. As the condition worsens, ewes become recumbent, often lying with hind legs extended and head stretched forward. Reduced muscle contractions lead to bloat and death within 6–12 hours if untreated.

Treatment & Prevention

Hypocalcemia symptoms resemble pregnancy toxemia but improve rapidly with treatment. Intravenous calcium borogluconate works within five minutes, while subcutaneous injection is suitable for mild cases. IV administration (30–100 mL over 5–7 minutes) requires careful heart monitoring. Prevention includes supplementing inorganic calcium and managing the dietary cation-anion balance (DCAB).

Common Rations in the Intermountain West

A brief evaluation of three different diets based on operational type can be found on Table 1. In shrub dominated rangelands, shrubs are not only a large proportion of the diet, but also contain a large proportion of protein and minerals that plays a large role in the sheep diet, indicated by all requirements being met. The minerals contained in many species of shrub, contribute to a higher DCAB. DCAB is used in the dairy cattle industry and research has shown that a lower, or negative, DCAB works efficiently at preventing hypocalcemia. However, limited DCAB research has been conducted in sheep. Interestingly, the DCAB is generally lower for semi-extensive and farm-flock diets. Figure 1 shows an extensive operation diet and how just one pound of corn can help meet requirements for single and twin bearing ewes in late gestation and early lactation. Preliminary research at the University of Wyoming has shown very little incidence of clinical metabolic dysfunction on ewes consuming a diet indicative of semi-extensive operations, therefore emphasizing that meeting requirements can greatly reduce incidence.

Table 1
Evaluation of commonly fed diets during late gestation by operation type*

Item	Requirements	Feedstuffs and percent included in diet. Extensive: *Shrubs (45%), early vegetative grasses (45%), whole corn (10%)*	% of requirement met.	Semi-Extensive: *Meadow grass hay (83%), whole corn (17%)*	% of requirement met.	Farm-Flock: *Late-bloom alfalfa hay (64%), whole corn (36%)*	% of requirement met.
DM Intake, lbs.	4.4 - 5.6	4.5	100%	5.3	100%	4.9	100%
Macro-nutrient							
ME, Mcal/d	4.75	5.8	122%	5.8	122%	5.6	118%
CP, lb/d	0.48	0.67	140%	0.43	90%	0.56	117%
Ca, oz/d	0.37	0.61	166%	0.28	89%	0.70	189%
P, oz/d	0.26	0.62	238%	0.14	54%	0.20	78%
Ratio							
DCAB[1]		683		320		219	

*Assumptions: Mature Ewe, Late Gestation – Last 6 weeks, 180 lbs., Twins

[1]Generally, research in dairy cattle suggests that a lower value is more beneficial than a larger value, however no threshold is established in sheep

This brief was created by UWyo Sheep Task Force

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Find more resources here:
bit.ly/4brsdsC

Sources:

American Sheep Industry Association, Inc. 2015. Sheep Production Handbook. 8th ed. ADS Publishing, Fort Collins, CO.

Brozos, C., Mavrogianni, V.S. and Fthenakis, G.C., 2011. Treatment and control of peri-parturient metabolic diseases: pregnancy toxemia, hypocalcemia, hypomagnesemia. Vet. Clin. North. Am. Food. Anim. Pract. 27:1.DOI:https://doi.org/10.1016/j.cvfa.2010.10.004

Julian, A. A. M, J. D. Scasta, W. C. Stewart. Sheep winter diets parameterized with fecal DNA metabarcoding and forage sampling informs mineral nutrition management. Rangeland Ecology & Management. 94:168-177. https://doi.org/10.1016/j.rama.2024.03.003.

Mulligan F. J., L. O'Grady, D. A. Rice, M. L. Doherty. 2006. A herd approach to dairy cow nutrition and production diseases of the transition cow. Anim. Repro. Sci. 96:331-353. doi:10.1016/j.anireprosci.2006.08.011.

NRC. 2007. Nutrient requirements of small ruminants: sheep, goats, cervids, and new world camelids. Natl. Acad. Press, Washington, DC.

S
argison, N.D. 2007. Pregnancy toxaemia. In I.D. Aitken, editor, Diseases of sheep. 4h ed. Blackwell Publishing. Oxford, UK.

USDA-NRCS, MSU, and UW. 2020. Plants Poisonous to Livestock in Montana and Wyoming, Considerations for Reducing Production Losses. USDA-NRCS Plant Materials Technical Note MT-124 and University of Wyoming Extension Bulletin B-1359. USDA-NRCS, Bozeman State Office, Bozeman, MT. (Accessed 7 March 2024)