

Below you'll find short summaries highlighting publications impacting ruminant and other species nutrition in the US. Please feel free to reach out with any questions or if seeking specific follow-up information.

[A preliminary investigation for the dietary inclusion of calcareous marine algae for grain-fed beef steers during a simulated heat wave \(Sammes et al., 2025\)](#): Feedworks Australia's Dr. Stephanie Sammes recently published the heat stress data she shared with us in West Virginia last summer. To jog your memory, she looked at Calmin (70 g/steer/d) as a dietary strategy to mitigate heat stress in grain-fed Angus steers housed in climate-controlled chambers. 12 steers were exposed to a 21-day heat-wave cycle (THI 65-87) and assigned to a control, increased-roughage "Heat-Load" (HL) diet, or Calmin supplementation (CMA). During the acute heat phase, all cattle reduced intake, but CMA animals maintained 4.8 lbs/day higher DMI than controls and fully recovered intake post-heat. CMA cattle also exhibited lower serum amyloid A and lipopolysaccharide-binding protein, indicating less systemic inflammation and improved gut integrity. Moreover, liver enzymes were lower than controls during recovery, suggesting reduced hepatic stress. Rumen pH stability and fecal consistency were better preserved in CMA steers despite elevated rumen temperature, and water intake rose appropriately to aid thermoregulation. Overall, Calmin supported feed intake, gastrointestinal health, and metabolic resilience during and after heat stress, highlighting its potential as a rumen-buffering and protective additive under periods of heat stress.

[Erythrocyte membrane coated biodegradable nanoparticles detoxify LPS-induced toxicity by producing non-mutagenic metabolites and downregulating pro-inflammatory cytokines and oxidative stress markers \(Aslam et al., 2025\)](#): This study investigated how chitosan-based nanoparticles (CNPs) can neutralize LPS-induced toxicity in rats. Chitosan, a cationic polysaccharide, binds negatively charged LPS molecules through electrostatic interactions, reducing their harmful effects. When rats were exposed to LPS from *E. coli* or *Salmonella*, they developed typical symptoms of endotoxemia such as fever, elevated white blood cell counts, oxidative stress, and increased pro-inflammatory cytokines. Treatment with CNPs, especially those coated with red blood cell membranes, lowered body temperature, normalized white blood cell counts, restored antioxidant enzyme activity, and reduced pro-inflammatory cytokines. Histological examination also showed reduced liver and kidney damage. Overall, CNPs, particularly when coated, effectively adsorbed LPS, downregulated inflammatory and oxidative stress responses, and mitigated organ damage, suggesting strong potential for detoxifying endotoxins in vivo.

[Effects of isoflavone supplementation, via red clover hay, on the growth and postgraze physiological recovery of beef steers grazing endophyte-infected tall fescue pastures \(Davis et al., 2025\)](#): This study from U Kentucky looked at whether supplementing beef steers grazing endophyte-infected (E+) tall fescue with isoflavones from red clover hay could improve growth and reduce post-graze recovery from fescue toxicosis. Over two grazing seasons, 36 steers per year were assigned to pastures and supplemented with either DDGS only (control), DDGS + 7.5% red clover hay daily, or DDGS + 7.5% red clover hay every other day. Steers receiving red clover hay gained more weight (0.77-0.83 vs. 0.55 kg/d) and had physiological advantages, including 2.5x larger caudal artery area and 2.5x higher serum prolactin levels compared with controls. These benefits were attributed to the phytoestrogenic activity of isoflavones, which mimic estradiol to

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restore vascular tone and stimulate prolactin production, both suppressed by ergot alkaloids. Metabolites like equol may also provide sustained vasoactivity, explaining why every-other-day supplementation was equally effective as daily feeding. During the 28-day recovery period on a non-toxic diet, red clover-supplemented steers never became vasoconstricted, whereas controls required 3 weeks to recover. Overall, isoflavone supplementation with red clover hay is a possible strategy to alleviate fescue toxicosis, improve steer growth, and accelerate recovery.

Postpartum macrominerals and trace elements dynamics in cows: A potential early indicator of endometritis? (Kuru et al., 2025):

This study examined how postpartum changes in calcium (Ca) and other minerals could help identify endometritis early in dairy cows. 40 Brown Swiss cows were monitored for 28 days post-calving, with serum levels of Ca, phosphorus, iron, zinc, and copper measured throughout. Cows diagnosed with endometritis consistently showed lower Ca concentrations than healthy controls, particularly between days 1-5 and again on day 21 postpartum. Ca plays a critical role in uterine involution and immune defense during the postpartum period. The authors note that inadequate Ca mobilization after calving can lead to hypocalcemia, which delays uterine recovery, increases the risk of retained placenta, and predisposes cows to uterine infections such as metritis and endometritis. Because Ca acts as a complement activator, low circulating levels may slow clearance of uterine bacteria and prolong inflammation. Their findings confirmed that cows with persistently low Ca were significantly more likely to develop endometritis.

Effect of broccoli extract supplement on carcass traits and lipid metabolism in Holstein steers (Chen et al., 2025):

This study evaluated the effects of broccoli extract supplementation on growth performance, carcass traits, rumen microbiota, blood metabolites, and gene expression in Holstein steers. Over a 45-day feeding period, cattle received either 0 g, 15 g, or 18 g of broccoli extract daily. Although growth performance was unchanged, supplemented steers showed higher feed intake, improved rumination behavior, and greater net meat percentage. These effects likely stem from bioactive compounds in broccoli extract including phenolics oligosaccharide-type fiber fractions that modulate rumen fermentation and systemic metabolism. While broccoli extract itself is unlikely to be a commercial cattle additive, the study reinforces a broader principle: plant-derived bioactives and functional oligosaccharides can meaningfully shift rumen ecology, inflammation, and nutrient partitioning. This adds to growing evidence that targeted phytochemicals can influence carcass fat deposition and overall metabolic health, even without changes in gain.

Calcium Metabolism, Immunity and Reproduction in Early Postpartum Dairy Cows (Kusza et al., 2025):

This study investigated how prepartum vitamin D₃ supplementation affects placental gene expression related to calcium metabolism, immunity, and reproduction in dairy cows during the early postpartum period. 16 cows were divided into 2 groups: 8 received a 10 mL vitamin D₃ injection (1 million IU cholecalciferol/mL) and 8 served as controls. They found that 5 genes were significantly downregulated in cows treated with vitamin D₃. These included a calcium-binding protein involved in placental calcium transport, receptors involved in follicle development and ovulation, and receptors associated with proinflammatory pathways. This suggests improved systemic calcium status, improved mineral balance and reproductive homeostasis, and beneficial anti-inflammatory effects. These findings support the broader concept that optimizing vitamin D

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and calcium dynamics may help improve postpartum health, though the dose used is much higher than we would typically see in a commercial setting.

The Impact of Bee Pollen as a Natural Growth Promoter on the Performance and Blood Characteristics of Growing Calves and Heifers (Negm et al., 2025): This study explored the effects of supplementing diets of growing calves and heifers with bee pollen (BP). 20 animals were divided into a control group (basal diet only) and a treatment group (basal diet plus 30 g fresh multifloral BP 3x/week for 3 months). Animals receiving BP had higher final BW, BW gain, and ADG compared to controls, with about a 27% improvement in growth performance. BP also improved DMI and FCR, indicating more efficient nutrient use. Blood analysis showed higher hemoglobin, total protein, albumin, globulin, and thyroid hormones in the BP group, suggesting enhanced metabolic activity and better health status. BP is a concentrated source of proteins, amino acids, vitamins, minerals, and especially phenolic compounds with antioxidant and antimicrobial properties. These components likely enhanced feed palatability and nutrient digestibility, boosted immune function, and supported better iron absorption, which improved hemoglobin and protein synthesis. The increase in thyroid hormones (T3 and T4) was interpreted as evidence that BP stimulates metabolism and energy utilization, thereby accelerating growth. They further suggest that the anti-anemic and antioxidant properties of BP contribute to improved blood parameters and overall health.

Live Presentations:

- ADSA's Discover Conference was focused on Beef x Dairy this year, so naturally there was a lot of talk around liver abscesses. This has been a costly and persistent challenge, estimated to cause more than \$600-680 million/year in losses. Economic impacts extend beyond liver condemnations, with abscesses reducing ADG, hot carcass weight and dressing percentage, increasing trimming losses, and removing high-value cuts. Dr. Ty Lawrence noted that the slowdown during packer processing time is an additional \$4,500 in lost productivity that we often don't factor in. From a nutritional and metabolic standpoint, Dr. Kendall Swanson estimated that abscessed liver tissue increases the animal's net energy for maintenance by ~4% due to the energetic burden of inflammation, immune activation, and tissue repair. This elevated maintenance cost diverts nutrients away from growth and efficiency. The speakers also highlighted the regional nutritional drivers of liver abscess prevalence. The Pacific Northwest shows the highest incidence, largely attributed to the use of highly fermentable co-products (e.g., potato waste, barley, fine-ground high moisture corn) that accelerate ruminal acid load and epithelial damage, leading to bacterial translocation to the liver. Luckily, the liver is highly responsive to changes in diet, which means that nutritional interventions may be able to provide a solution. Though the question remains: *Is the cure more expensive than the problem?*
- At Cornell Nutrition Conference, Dr. Barry Bradford's presentation, "*Does Extreme Weight Cycling Contribute to Poor Disease Resilience in Older Dairy Cows?*", explored how repeated cycles of body weight loss and regain across lactations may hinder immune balance and resilience. While mobilization of stored nutrients from adipose, muscle, and bone is a normal part of early lactation, chronic tissue mobilization seems to alter adipose tissue biology over time. Adipose is not just a fat depot, but a metabolically and immunologically active tissue composed of diverse cell types. During negative energy balance, lipolysis releases lipid mediators that attract immune cells, leading to

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inflammation. As adipocytes shrink or die, macrophages scavenge cellular debris and shift phenotype, perpetuating inflammatory loops that further drive lipolysis. This cycle contributes to systemic inflammation and diminished disease resilience. Evidence from transition cow studies supports this model: high body condition loss postpartum corresponds to greater inflammatory signaling in the tissue. He thinks that excessive weight cycling may train adipose to overreact to metabolic stressors later in life. To mitigate this, Barry highlighted strategies that minimize extreme lipid mobilization, including the use of anti-inflammatory interventions.

- Dr. Tom Overton focused on practical dietary strategies to optimize calcium metabolism and post-calving performance in dairy cows. He emphasized that subclinical hypocalcemia is not just a mineral imbalance but also underlies a cascade of issues like impaired health, reproduction, and milk production. Cows with persistent low calcium exhibited higher circulating inflammatory markers (serum amyloid A and haptoglobin), suggesting that inflammation is likely a consequence rather than a cause of chronic hypocalcemia. Cows experiencing persistent dyscalcemia (low Ca at day 4 post-calving) had lower DMI and poorer performance outcomes, reinforcing that calcium dynamics determine metabolic resilience and productivity. Prevention, he noted, is most effectively achieved through prepartum diet management. He recommends **feeding higher prepartum calcium (> 1.5%) with adequate magnesium to optimize transition** performance. One of our goals for 2026 is to increase our customers' awareness of how Calmin fits into this role of providing high bioavailability Ca and Mg in the transition period to prevent this persistent dyscalcemia.
- At the Penn State Dairy Nutrition Workshop, Dr. Bill Weiss noted that magnesium remains one of the most misunderstood macrominerals in dairy nutrition because it has real-world antagonists and the greatest variability in absorption. Although average Mg absorption is ~30%, the true range spans 15-45%, driven by rumen conditions and source-dependent solubility. For example, Mg absorption is decreased by dietary fat inclusion or K inclusion (especially under more marginal Mg feeding levels), while increased forage in the diet improves Mg absorption and monensin interacts with Mg source to either increase or decrease absorption. What we do know is that **magnesium must be soluble in the rumen** to be absorbed, but high solubility alone doesn't guarantee absorption. Solubility is where Mg sources vary widely due to factors like particle size, calcination, and contaminants. Dr. Weiss explained that the NASEM absorption coefficient for MgO (0.23) is likely an overestimate, because the university trials this number is based on typically use higher quality Mg than what is commonly in the field where some MgO source's absorption is practically zero. As such, solubility testing using rumen fluid, acid solutions, or a vinegar test is an important practice to adopt to screen your Mg products. To account for all this variability, Weiss recommends higher dietary concentrations: 0.35-0.40% Mg for lactating cows as opposed to NASEM's 0.18% but down from some of the $\geq 0.45\%$ Mg diets seen in the U.S. Overall, Bill's message was clear: choosing a Mg source with consistently high solubility validated across testing methods is essential for predictable absorption, reinforcing the value of including highly soluble Mg sources like Calmin in the ration.

Other notes:

1. DSM published their [Mycotoxin Outlook](#) for the 2025 harvest, noting that despite the record corn yield projections, variable weather and disease pressures have raised the risk of

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mycotoxin contamination. Factors like late planting, delayed harvest, drought, and excess moisture can all increase susceptibility to aflatoxins, fumonisins, trichothecenes, and zearalenone. Since visual inspection is unreliable, proactive testing of feedstuffs is advised. Even so, mycotoxins aren't evenly distributed and sampling may be inadequate, leading to inconsistent results.

2. An [observational study](#) of 3,281 lactating Holsteins during an HPAI H5N1 outbreak found that pregnancy and parity were the strongest cow-level risk factors. Pregnant cows had nearly 5x higher odds of illness compared to non-pregnant cows, and multiparous cows had about double the risk compared to primiparous cows. Physiological and immune changes tied to pregnancy and advancing parity may increase susceptibility.
3. Jaramillo et al. (2025) evaluated the effects of microbial phytase and 25(OH)D₃ in growing pigs, finding that both supplements improved calcium and phosphorus digestibility and increased serum osteocalcin (a marker of bone formation). The 25(OH)D₃ also elevated plasma vitamin D metabolites, indicating enhanced vitamin D status. But their effects were not always additive; 25(OH)D₃ improved mineral digestibility only when phytase was absent, reinforcing the fact that benefits often depend on the basal diet composition.
4. In [Dr. Gail Carpenter's webinar](#) on nutritional approaches to decrease stress in calves, she reminded us that morbidity, mortality, and stress management begin with sound maternity, colostrum, and nutrition programs. Calf stressors can affect long-term productivity. A high plane of nutrition supports faster growth and earlier milk production but must be paired with a thoughtful step-down weaning program to encourage starter intake and rumen development. Best practices include ensuring colostrum quality, feeding adequate amounts of colostrum in 2-4 hours, cleaning equipment, and positioning starter feed near the milk source to boost intake. Additions like antioxidants, electrolytes, and probiotics can boost resilience, but you can never out-feed bad management.
5. Nutrition-driven gut health is a potential strategy to reduce antibiotic reliance in livestock. This [recent article in Feed & Additive](#) outlined factors to consider when selecting feed additives for gut health, including mode of action, stability, cost-effectiveness, and alignment with physiological stage. The author discussed the fact that mycotoxins compromise gut integrity and may even promote antimicrobial resistance, emphasizing the need for integrated control beyond binders with more holistic management and immune-boosting approaches to bolster animal resilience. Moreover, medium-chain fatty acids (e.g., lauric acid) were noted for their ability to repair gut lining, strengthen mucosal barriers, and reduce inflammation through antimicrobial and immunomodulatory effects.
6. Solubility of magnesium within the rumen is key to bioavailability and there are several dolomitic products vying for ration inclusion that are processed at different grind (particle) sizes. An Ohio mill recently ran a [newsletter article](#) highlighting differences between dolomitic products. These products were compared via vinegar test; however, the vinegar test drives pH down well below a potential rumen pH and that acidity artificially inflates digestion of the mineral source. The test is best suited for MgO samples only, as we demonstrated in our summer poster at ADSA (Wenner et al., 2025). Nevertheless, all dolomitic limestone samples in this newsletter indicated poor Mg availability and highlighted the importance of selecting rumen available Mg sources for ruminant diets. Because dolomitic limestone is commonly poorly reactive in the rumen, it should not be relied upon to provide a large percentage of the Mg requirements of the cow.

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7. Dr. Lund's [group at Aarhus University](#) found that supplementing 3NOP in corn silage-rich diets consistently reduced methane production metrics, but it also lowered DMI 13.3% and decreased ECM by 3.4%. These effects were uniform across parity and lactation stages.
8. [Heat stress in calves](#) was shown to disrupt intestinal integrity, increasing crypt depth in the jejunum and flattening villi. It also promoted a state of inflammation, elevating neutrophil counts and altering lymphocyte concentrations. These results highlight the immune system's central role in heat stress-related gut dysfunction and suggest that modulating inflammation may alleviate the pathophysiology of heat stress in dairy cattle.
9. Roskopf et al. ([2025](#)) evaluated the effects of supplementing early-lactation Holstein cows with rumen-protected omega-3 FAs. Multiparous cows were randomly assigned to either a control group (CON) fed ground corn, or an omega-3 group (O3) fed calcium salts of linseed and fish oil origin from 21 days prepartum to 105 days postpartum. While total energy intake was comparable, O3 cows showed improved feed efficiency, likely due to a shift in milk FA profile, with more preformed long-chain FA and fewer de novo FA, suggesting greater energy utilization by the mammary gland. Cholesterol and progesterone levels were also greater in O3 cows, and more cows in this group were pregnant by 130 days in milk (76.5% vs. 56.3% for CON). This study reinforces the potential of omega-3 FAs to enhance lactation and reproductive efficiency.
10. A recent feature by [Dr. Ellen Hambrecht](#) provides a nice overview of phytogetic use in animal nutrition. Rather than being positioned only as antibiotic replacements, plant-derived compounds are now recognized for their ability to modulate immunity, strengthen gut integrity, and support metabolic balance. Their effects depend on precise, low-level dosing, or "whispering, not shouting", to trigger beneficial responses. Used preventively, this host-focused approach could help livestock build resilience in a complex production environment.
11. Fescue toxicosis, caused by endophyte-infected tall fescue, is a major economic challenge, costing the US livestock industry an estimated **\$3-3.5 billion/year** due to reduced growth, reproduction, and productivity. Alfaro et al. ([2025](#)) analyzed fecal samples from pregnant Angus × Simmental cows before and after 30 days of consuming toxic fescue seeds and found reductions in microbial diversity and shifts in composition. Ruminococcaceae bacterium P7 increased over 16-fold, highlighting its strong potential as a fecal biomarker for early detection and management of this costly condition.
12. Dr. Chris Chase was featured on [The Dairy Nutrition Blackbelt Podcast](#) in June, and it was a great conversation on gut health and immunity. He explained that the gut is the largest immune organ in the body, constantly interacting with the microbiome. Factors like intake, heat stress, and diet strongly influence this relationship and overall health. He noted that gut movement depends on signals from macrophages, demonstrating the tight link between immunity and gut function. If you haven't given the Dairy Podcast Show by Wisenetix a listen, there are many hours of good content for the road.
13. A recent study ([Xu et al., 2025](#)) found that supplementing sow diets with 25-OH-D3 during gestation improved milk composition, increased blood calcium in newborn piglets, enhanced tibia and femur weight at weaning, and promoted intestinal development. The supplementation also altered gut microbiota in both sows and piglets, suggesting benefits for bone growth and gut health beyond traditional levels of vitamin D₃ feeding.
14. Beck et al. ([2025](#)) analyzed roughly 4500 total cattle records from multiple experiments to describe correlations between treatments and cattle performance in beef stocking and

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finishing systems. They describe negative effects of bringing bulls onto feedlots (esp. on BRD treatment and mortality) but also provide data evidence to support the assumption that as the number of BRD cases during the stocker period increase, ADG decreases for a given group of cattle and they perform poorer throughout the feeding period. Cattle treated twice for BRD had nearly a quarter pound poorer gain/day over their lifetime. These data serve as a reminder of the economic importance in maintaining healthy animals, in this case specifically those intended for beef feeding operations.

15. Authors in Sweden fed a [factorialized study](#) of two different starch sources, with two different protein sources, with or without 3NOP (marketed as Bovaer in the U.S.). A downfall of the study is that washout periods (changing over dietary treatments) are a bit shorter than ideal and give less time for microbial adaptation. However, increasing energy or oil in the diet generally tended to decrease methane emissions and intensity, and feeding 3NOP dramatically decreased methane emissions and intensity (slightly >30%). However, 3NOP also decreased ECM by roughly 2.5 lbs/hd/d and points to ongoing concerns about cow productivity loss when mitigating methane with 3NOP.
16. On the Dairy Podcast Show, Dr. Corwin Nelson (former University of Florida faculty) spoke on the [role of calcium and inflammation](#) in transition. It's a great listen that includes discussion on the application of P-binders and some expounding on the focus towards "dyscalcemia" rather than a clinical concept of hypocalcemia in our transition cows.
17. Torres et al. ([2025](#)) recently published data where they "mined" proteomic data from genetic databases for archaea (such as methanogens or those that live in underwater thermal vents) and found 233 sequences that their machine learning model predicted would have antibiotic-like activity. They recreated 80 of them and 93% were antimicrobial at some level, with one specific "archeasin" having strong antibiotic activity. This study highlights the frontlines of new antimicrobial science for human and animal medicine.

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