

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.

ADSA Foundation Scholar Award: Shakin' off the rust – Oxidative stress and redox status as underlying factors of immune dysfunction in

periparturient cows and preweaned calves: This review article by Dr. Angel Abuelo ([2025](#)) presents an in-depth analysis of oxidative stress (OS) and redox imbalance as central contributors to immune dysfunction in both transition cows and preweaned calves. Many common diseases in cows (e.g., mastitis, ketosis) and calves (e.g., scours, pneumonia) share a common root in OS, the damage that occurs when there is an imbalance between pro-oxidants and antioxidants in the system. This imbalance impairs immune cell function, disrupts inflammatory resolution, and increases disease susceptibility. During transition, OS risk is heightened by increased mitochondrial reactive oxygen species (ROS) production due to the metabolic demands of lactation and remodeling uterine and mammary tissues, which are both major sources of pro-oxidants. Simultaneously, decreased DMI and reduced hepatic synthesis of carrier proteins contribute to a drop in antioxidant capacity, exacerbating the imbalance. In calves, several factors can affect OS during the preweaning phase, including maternal OS status, the oxidative impact of birth, the pro-oxidant load in colostrum, the low antioxidant content in milk replacers, and the metabolic demands of rapid growth. While antioxidant supplementation is a well-established strategy to support immune function, the review emphasizes that current NASEM guidelines are designed to *prevent deficiencies*, not supplementation to target responses in health or immune performance. Dr. Abuelo advocates for strategic, balanced antioxidant supplementation from sources like polyphenols or phytoextracts, and calls for the development of targeted nutritional interventions to mitigate OS and improve health outcomes during vulnerable periods.

Fusobacterium varium in cattle: prevalence and concentrations in healthy livers, liver abscesses, and ruminal and colonic epithelial tissues ([Deters et al., 2025](#)): This study investigated the prevalence and potential role of *Fusobacterium varium* in liver abscesses and GI tissues of feedlot cattle. The

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researchers conducted 3 studies involving beef-on-dairy heifers and feedlot steers: one examining the effects of in-feed tylosin or a yeast + zeolite product, one testing different starch concentrations and feeding regimens, and a third evaluating the impact of induced ruminal acidosis. Samples from healthy livers, liver abscesses, and ruminal and colonic epithelial tissues were analyzed. They found that *F. varium* was present in all sample types, but its highest prevalence and concentrations were observed in ruminal epithelial tissues. In contrast, *F. varium* was detected at low concentrations in liver abscesses and was below the qPCR detection limit in most cases. Feeding tylosin or yeast + zeolite lowered *F. varium* prevalence in healthy liver tissues but not in abscesses. Neither dietary starch level, feeding consistency, nor induced ruminal acidosis influenced *F. varium* prevalence or load in the liver or gut tissues. The authors concluded that although *F. varium* can reach the liver, its low abundance there suggests it is not a primary liver abscess pathogen. However, its consistent presence and high concentrations in the rumen and colon point to a possible role as a tissue invader that may contribute to rumenitis and colitis. These findings support a continued focus on *F. necrophorum* as the principal cause of liver abscesses, while highlighting the need to better understand the implications of *F. varium* for GI health. If *F. varium* isn't a primary driver of liver abscesses, attention may need to shift back earlier in the production system, potentially toward gut health or colonization patterns in young calves.

Late gestation heat stress induces inflammation and impacts nutrient transfer signature in the placenta of dairy cows ([Casarotto et al., 2025](#)):

This study evaluated the effects of late gestation heat stress on placental inflammation and nutrient transfer in dairy cows. Multiparous Holstein cows were dried off at ~232 days of gestation and assigned to either a cooled (CL; fans and water soakers) or heat-stressed (HT; shade only) environment throughout the dry period. Blood was collected on days -14, -7, and 0 relative to calving to measure cortisol, and cotyledonary placental tissues were collected from female calves for RNA sequencing. HT cows had lower plasma cortisol levels on days -14 and 0; the authors hypothesized this is due to acclimation to stress or increased uptake of cortisol. Placental tissue from HT cows showed upregulation of pro-inflammatory genes, suggesting acute inflammation. Gene pathways related to cortisol synthesis and hormone

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regulation were altered, and genes involved in amino acid biosynthesis were downregulated, indicating impaired nutrient transport. These changes suggest that heat stress during late gestation compromises placental function, potentially affecting fetal development and emphasizes the importance of managing maternal heat stress in dairy production systems for reasons beyond the bulk tank.

Invited review: Limitations to current mineral requirement systems for cattle and potential improvements ([Weiss and Hansen, 2024](#)): Balancing minerals (both macro- and microminerals) in the diets of dairy cattle is still more art than formula, despite many advancements in our knowledge of animal requirements and/or responses to mineral supplementation. Drs. Weiss and Hansen explain this well in their recent JDS review, illustrating both what leads to overformulation or “safety factors” as well as the research gaps preventing more refined feeding equations. This paper features many noteworthy comments, including Table 1’s referenced list of some mineral absorption antagonists and a discussion on the challenges in establishing absorption coefficients such as that of Mg. Our current models lend towards oversupplementation of Mg since our knowledge of absorption (and ability to measure it) are quite limited across sources and will likely vary based on dietary feedstuffs. The authors indicate a need for data linking in-vitro solubility estimates to in-vivo Mg status estimates, across a broader list of Mg sources. Lastly, while there is evidence that increased Mg decreases hypocalcemia in fresh cows, the authors illustrate limitations to that Lean et al. (2006) meta-analysis and what data are needed to strengthen that conclusion.

Blood total calcium concentrations in the fourth week postpartum of dairy cows continue to play a key role in uterine involution ([Tobolski et al., 2025](#)): This study explored the relationship between blood total Ca concentrations and uterine involution in clinically healthy dairy cows during the fourth week postpartum. Using ultrasound measurements and endometrial cytology, the researchers found a strong linear association between lower serum Ca levels and both larger uterine and cervical diameters, indicating delayed uterine involution. There was no significant relationship between Ca levels and the percentage of polymorphonuclear

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leukocytes (PMNs) in the endometrium, suggesting that Ca's role in uterine recovery is more linked to uterine contractility than to inflammation or subclinical endometritis. Other metabolic indicators (like β -hydroxybutyrate, triglycerides, cholesterol, and NEFAs) did not correlate with uterine size or PMN counts. These results indicate that maintaining adequate serum Ca levels into the late postpartum period is crucial for supporting proper uterine involution, even in the absence of clinical disease. It's likely that Ca metabolism impacts postpartum recovery beyond the immediate calving period/onset of lactation and can have long-term implications for reproductive efficiency.

From the archives:

In light of the current debate over use of an alkalizer (e.g., MgO) versus a buffer (e.g., bicarbonate) on managing rumen pH and feed intake, it seemed like a good time to bring back some classics. Kohn and Dunlap ([1993](#)) wrote a nice discussion of how the bicarbonate buffering system works in both respiration and the rumen. This work is complete with calculations demonstrating how pH responds to sodium bicarbonate addition and matched to in vitro work to demonstrate the accuracy of their equations. An estimated combined pKa of sodium bicarbonate is placed around 6.1 where the functional buffering range of bicarbonate would be 5.6 to 6.6 – an ideal pKa within the rumen (on average). However, the risk with sodium bicarbonate is that too much neutralization leads to CO₂ formation and escape from the rumen, losing the buffering ability of the feedstuff over time. Meanwhile, the use of high doses of alkalizer to manage rumen pH is certainly not new (e.g., inducing metabolic alkalosis in Ogilvie et al., 1983 or decreasing microbial activity in [Smith and Correa, 2008](#)) and comes with its own risks of shifting the rumen microbiome as demonstrated in Lobo et al. ([2023](#)) covered last month.

Other notes:

1. Avian influenza (HPAI) continues to add stress to the poultry and dairy industries. This recent [article in Feedstuffs](#) helps highlight the losses and stressors being placed on the poultry industry and some of the tension to dairies where both overlap in the same space. The authors urge the

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- government to approve a vaccine for use in birds but until then with the shortage in chickens, layer efficiency and longevity become very important. A highly available calcium source is key to their longevity.
2. Wolfe et al. ([2025](#)) looked at calf weaning timing and found that abruptly weaned calves had a more intensive negative energy balance than those weaned gradually over 14 d. However, the more gradual weaning promoted more pro-inflammatory oxylipids than abrupt weaning whereas specific linoleic-based anti-inflammatory oxylipids were increased in abrupt weaning. We need more data on inflammatory status in calves to determine the “best” strategy relative to oxylipid status.
 3. Dairy Herd Management published an [article online](#) with Dr. Renaud highlighting many key considerations in transporting calves to ensure better welfare and health. Many of these were highlighted previously at our Tri-State Dairy Nutrition Conference mini-symposium but bear repeating: longer trips are harder on calves; calves that are older than a week at transport have better outcomes; calves fed before transport have lower indicators of fat mobilization (negative energy balance); colostrum and clean trailers are still critical.
 4. A recent feature by Cortyl ([2025](#)) highlights that heat stress may cost the U.S. swine industry up to \$900 million/year through reduced feed intake, reproductive loss, and mortality. In hotter climates, field reports estimate losses as high as \$60/pig/year. The article outlines five core strategies to mitigate heat-related losses: 1) oral hydration and electrolyte supplementation, 2) environmental cooling systems, 3) genetic selection for thermotolerance, 4) nutritional interventions (e.g., fat-rich diets, antioxidant supplementation, betaine supplementation), and 5) management practices like lower stocking density and timed feeding. Especially when used in combination, these tools can help preserve animal performance and build a more resilient herd.
 5. Similarly, EW Nutrition’s tech team wrote a [nice piece on the role of oxidative stress](#) in poultry exposed to chronic or acute heat. Heat stress increases cellular energy demand, generating excess ROS that overwhelm the bird’s antioxidant defenses. This oxidative stress damages intestinal cells, disrupts tight junctions, and promotes leaky gut, dysbiosis, and reduced feed efficiency. The authors note that

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- antioxidant support is critical under these conditions. In particular, phytomolecules such as carvacrol, cinnamaldehyde, capsaicin, silibinin, and other polyphenols can scavenge ROS, stimulate natural antioxidant enzymes, and support gut integrity. These compounds help mitigate oxidative damage and improve resilience under heat stress conditions.
6. Manoni et al. ([2024](#)) evaluated two different hydrolyzable tannins (smaller density) on their ability to target methanogens and decrease methane production in a style of continuous culture fermenter: RUSITEC. The gallic acid showed more promise as it decreased methane production without cost in VFA. However, more work is needed to investigate realistic doses that could be applied to feeding situations.
 7. Plastic packaging is widely used to transport feed ingredients but it's non-biodegradable and poses environmental threats. Da Silva et al. ([2025](#)) evaluated whether edible Kraft paper packaging could be incorporated into lamb diets as a sustainable alternative to plastic without negatively affecting animal performance or product quality. Crossbred male lambs (n=20) were assigned to either a diet with no packaging (CTL) or a diet including 0.43% Kraft paper packaging used for 40 kg grain bags (PACK). After 50 days of feeding, DMI and nutrient digestibility did not differ between the groups, indicating that the paper packaging was well accepted and digested. Similarly, nitrogen metabolism was unaffected by the inclusion of packaging. Growth performance variables were not different between the groups either. The findings support the idea that paper-based packaging could replace plastic for feed transport and be included in the ration, supporting a move toward circular systems.
 8. Barry and Hall ([2025](#)) took a small sample of forages (n=12) and ran them using in-vitro digestibility assays at two separate commercial forage laboratories. They used the residual NDF to fit either a 2-pool or 3-pool model based on previous publications that indicate a 3-pool model is a more accurate prediction of NDF digestibility. While this may be true, the current smaller dataset (fit without a lag phase in low rate curves) demonstrated minimal differences between the 2- and 3-pool models. Simpler models are often better in implementation and the authors suggest that updating to the 3-pool approach in ration formation may not be necessary.

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