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.

Increased dietary rumen degradable protein from soybean meal improved growth performance but increased liver abscess severity in finishing beef steers (Ross et al., 2024): This study examined the effects of replacing DDGS with soybean meal (SBM) on the growth performance and health of finishing beef steers. Conducted over 139 days with 189 steers, the study compared three dietary protein strategies: 100% DDGS control, 50% replaced with SBM (SBM50), and 100% replaced with SBM (SBM100). Steers fed SBM had improved ADG and feed efficiency, particularly in the early stages of the trial. Steers on the SBM100 diet had the largest increase in rib-eye area compared to those fed only DDGS. However, there were no significant differences in hot carcass weight or marbling scores across treatments. One downside to the SBM100 diet was a notable increase in liver abscess severity, with less steers scoring normal livers and more steers showing severe abscesses in the SBM100 compared with either the DDGS and SBM50 groups. Additionally, the study found that serum urea nitrogen levels increased in steers fed SBM, with the highest levels observed in the SBM100 group, especially at the end of the feeding period, which indicates inefficient nitrogen utilization. This study highlight the trade-off between performance and liver health when replacing DDGS with SBM, for reasons unknown at this time.

The E-volution in swine nutrition: Current perspectives on vitamin E (Shastak and Pelletier, 2024): This review provides a comprehensive exploration of the evolving role of vitamin E in swine nutrition, highlighting both traditional insights and contemporary research advances. Vitamin E, particularly in its active form, α-tocopherol, serves as a crucial antioxidant that protects cellular membranes from oxidative damage, a function especially important for swine given their rapid growth and high metabolic rates. The review examines vitamin E's absorption, metabolism, and excretion processes, noting that bioavailability is influenced by factors such as dietary fats and the form of vitamin E used. Beyond its antioxidant role, vitamin E

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significantly impacts immune function, reproductive health, and meat quality, with adequate supplementation linked to improved fertility, better immune responses, and enhanced pork shelf life. Emerging research has also uncovered vitamin E's involvement in epigenetic regulation, affecting gene expression through DNA methylation, histone modifications, and noncoding RNA interactions. These mechanisms influence critical physiological processes, including inflammation and oxidative stress responses. Despite extensive research, gaps remain in understanding the bioavailability and long-term impacts of different vitamin E isoforms and the potential benefits of supra-nutritional supplementation levels.

Meta-analysis of dietary supplementation with flavonoids in small ruminants: Growth performance, antioxidant status, nutrient digestibility, ruminal fermentation, and meat quality (Lucio-Ruiz et al., 2024): This meta-analysis analyzed data from 29 peer-reviewed sheep and goat research articles, revealing that flavonoid supplementation significantly improved DMI, ADG, and feed efficiency. Digestibility of dry matter, organic matter, crude protein, and fiber fractions was significantly improved, as was the ruminal concentration of total volatile fatty acids and acetate. Flavonoids also decreased ruminal ammonia and increased the activity of key antioxidant enzymes (SOD, CAT, and GSH-Px) and total antioxidant capacity in serum, while decreasing serum malondialdehyde levels, indicating reduced oxidative stress. Flavonoids enhanced carcass traits such as hot carcass weight and loin eye area while reducing cooking loss and improving measures of tenderness in meat, while decreasing lipid peroxidation. The study highlights flavonoids as an effective natural additive for enhancing production efficiency, rumen function, and meat quality in small ruminants. They may also enhance meat shelf stability in a product known for lipid oxidation.

Live Presentations:

PNANC and IDP Dairy Leaders Forum

Dr. Dale Woerner was an invited speaker at both the Pacific Northwest Animal Nutrition Conference and Indiana Dairy Leaders Forum this past month. His talk highlighted the performance advantages and challenges of beef × dairy crossbred cattle. Advances in genetics have led beef × dairy cattle

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to surpass conventional beef and dairy cattle in yield grades, carcass muscling, and USDA quality grades, including tenderness and flavor. However, beef × dairy cattle present challenges, particularly with higher incidences and severity of liver abscesses compared to native cattle that represent a loss of $2,000/minute in downtime for harvest (~$160/carcass total cost). He also discussed how the Texas Tech team is developing a new yield grade system based on CT-scans because the dairy influenced carcasses revealed flaws in the current yield grade calculations.

Dr. Woerner discussed that liver abscess issues may originate from early-life factors like calf immunity and colostrum quality, rather than later management. He also spoke to the ability of the liver to heal from damage over time and the possible relationship between cattle treated more than once for BRD and those noted for liver abscesses at slaughter. Additional factors, such as rumen papillae damage from hair ingestion, could contribute to infections like fusobacterium-induced liver abscesses. Addressing liver abscesses is critical for improving efficiency but also for backstopping the , beef × dairy proportion of the beef feedlot marketplace. There are feed additives being tested that may show promise in mitigating the liver abscess issue, including some designed around buffering that will be a topic of future discussions. Resolving health challenges like liver abscesses is critical when it comes to maximizing their value and ensuring sustainability of crosses sold into beef production.

GA Dairy Conference / Balchem Webinar Series

Dr. Erin Horst's presentation at Georgia Dairy Conference focused on the critical role of inflammation during the transition period in dairy cows, while warning of its potential to cause harm if heightened or chronic. *Inflammation is a normal response to stressors such as pathogens or tissue trauma, but additional stressors like mycotoxins, overcrowding, and frequent pen changes can amplify it, leading to suppressed feed intake and reduced milk production.* Immune activation during inflammation is energetically expensive, diverting over 1 kg of glucose every 12 hours to immune cells, diverting energy away from milk synthesis. Acute phase proteins like haptoglobin serve as stable blood markers for inflammation, though the labor and cost of individual cow testing remains a challenge. To manage

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inflammation, Dr. Horst recommended addressing its source(s) by providing appropriate aid to the cow to strike a balance between insufficient and excessive inflammation. Insufficient inflammation can disrupt parturition and uterine involution, while excessive inflammation increases energy demands and the risk of disease. Anti-inflammatory feed additives show promise for mitigating inflammation, but further research is needed to develop practical tools to identify heightened inflammation. Inflammation management is key to improving transition cow health, performance, and overall herd outcomes.

In a similar vein, Dr. Lance Baumgard challenged the long-held belief that transition cows experience immune suppression during early lactation in his webinar titled "Rethinking Immunity in Transition Cows: Are They Truly Suppressed?" Instead, he argued that while these cows are at increased risk for health issues, the primary cause is heightened antigen exposure rather than compromised immune function. His research reveals that early lactation cows exhibit robust immune responses, including heightened neutrophil and cytokine activity. This immune strength plays a critical role in combating pathogens during this high-risk period, contrasting the traditional notion of systemic immune suppression. He highlighted the complex dynamics of inflammation in transition cows, noting that while pathogenic inflammation is harmful, sterile inflammation may serve an adaptive purpose, helping cows meet the physiological and metabolic demands of early lactation. This period also showcases a significant collision between immune and metabolic priorities, as cows prioritize milk production despite metabolic stress. Remarkably, their milk yields remain consistent, demonstrating the metabolic flexibility of early lactation cows. He concluded with the message that periparturient cows are not immune suppressed, but they are at much greater risk of antigen exposure, which explains the observed increased risk of morbidity.

Other notes:

1. A competing marine seaweed calcium product (Oceana's LithoNutri) was evaluated with monensin against a monensin control or an EO blend (Guerreiro et al., 2025). The Lithonutri decreased feed intake versus the monensin control without improving markers of efficiency. However, it is worth noting that the Ca:P in this ration reached 4 and it is

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likely that the high Ca may have had an influence on the intake and other results. It is also worth noting that the FI depression was specifically in the Nellore cattle and not in the crossbreds on trial. Still, it is worth exploring further if seaweed-derived calcium and monensin have any negative relationship as both serve roles in rumen functional stability.

2. Rico et al. (2025) investigated the effects of feeding rumen-protected fish oil on the incorporation of very-long-chain omega-3 (VLC n-3) fatty acids into plasma and milk lipids. Six mid-lactation Holstein cows were fed either a triglyceride-encapsulated fish oil (TAG), a starch-encapsulated fish oil (STR), or no supplementation in a replicated Latin square. Both TAG and STR increased plasma concentrations of EPA and DHA (VLC n-3 fatty acids) over time compared to the control. Milk fatty acid composition also reflected increases in total omega-3 content in both supplemented groups. These findings suggest that rumen-protected fish oil supplements effectively deliver bioavailable omega-3 fatty acids post-ruminally.
3. The branched-chain VFA supplementation story continues to be a hot topic in advanced dairy nutrition. Another paper last fall (Redoy et al., 2024) does a nice job to summarize up how diet-specific the BCVFA response is in dairy cows. However, this study also demonstrates a clear distinction between low- and high-forage diets (17 vs 21% fNDF) in that BCVFA do appear to be more effective at bringing microbial protein (esp. valine and isoleucine) to the cow when there is more forage NDF to maximize the NDF digestibility effect of the products.
4. Last fall was a busy time with conferences and presentations, so Dr. Boerman's talk at CNC was saved for a later issue. Her proceedings outline a summary of how cows (and other ruminants, presumably) mobilize not just body fat during lactation but also body muscle. Her lab's data and others indicate that a cow starts to mobilize muscle tissue for AA to supply the growing fetus up to 6 weeks prior to parturition. And the cow will not begin accreting (building/storing) muscle tissue again until late in her lactation.
5. Zhou et al. (2024) studied the effect of feeding 3NOP (commonly called Bovaer) with malate as a pre-determined hydrogen acceptor to help limit the known loss of H_2 when methane production is inhibited. In this

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study, 3NOP decreased methane production by ~50%, much greater than commonly expected – perhaps related to unique experimental conditions. What is interesting in this study is that 3NOP decreased copies of DNA representing a loss in archaea (methanogen) numbers. But malate was largely ineffective in changing to outlook of 3NOP treatment overall.

6. Elanco's Dr. Kelly Mitchell presented at the Southwest Nutrition Conference and highlighted various mitigation strategies – differentiating them into three pools: finding alternate hydrogen sinks, decreasing hydrogen supply, or inhibiting methanogens or methanogenesis. When methanogenesis (option 3, a mechanism for 3NOP) is inhibited, hydrogen can build up in the rumen, which backs up redox reactions, ultimately affecting rumen function. This hydrogen must be channeled to an alternate sink to maintain productivity. Potential sinks include acetogens, sulfate reducers, and nitrate reducers, but their value may be limited by substrate availability or toxicity (e.g., hydrogen sulfide and nitrite). Shifting fermentation pathways toward more propionate production (e.g., using ionophores, lactylitics, or fumarate reducers) are another option to decrease methane by promoting more efficient fermentation. Ultimately, Dr. Mitchell emphasized the need for further research when it comes to combining strategies effectively for sustainable, optimized methane mitigation.
7. A research study in Canada contrasted Agolin and monensin for efficacy in methane mitigation in beef cattle (Terry and Beauchemin, 2025). The pen management of this study is a bit messy and Greenfeed visits are tricky – likely why it ended up in this journal – but it's important to consider all results to inform future research design. The cattle were on treatments for 84d in the background and 112d in the finishing phases. Besides monensin decreasing DMI and all treatments increased CH_4 (quite unexpectedly), there were no other significant results. Perhaps dosing or Greenfeed visit behavior influenced the results of this study.
8. Paz et al. (2024) looked at feeding Smartamine M in transition cows and inducing subclinical mastitis. Whereas we typically associated RPM feeding with decreased SCC, there was no effect here. However, RPM did decrease reactive oxygen species and inflammation, improving milk production.

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