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.

**Dietary supplementation of scutellariae radix flavonoid extract improves lactation performance in dairy cows by regulating gastrointestinal microbes, antioxidant capacity and immune function (Dai et al., 2025):** This study investigated the effects of supplementing dairy cow diets with Scutellariae radix flavonoid extract (SFE; a strong antioxidant extract) on lactation performance and immune function. Supplementation with SFE significantly reduced oxidative stress in dairy cows, as evidenced by lower levels of malondialdehyde, a marker of lipid peroxidation, and in a decrease of SCC by half. In addition to improving milk yield and milk fat, SFE lowered inflammatory markers such as TNF-α and IL-1β, suggesting a reduction in systemic inflammation. The antioxidant properties of SFE also appeared to alter the gut microbiota, enhancing the presence of bacteria such as *Butryvibrio* spp., which may boost butyrate production and may contribute to improved health and immune function. These findings suggest SFE's antioxidant effects play a key role in enhancing dairy cow health by reducing oxidative stress, supporting immune function, and potentially improving lactation performance and milk quality.

**The effect of nano-chitosan in reducing the toxicity of aflatoxin B1 and fumonsin B1 in broilers (Khashan et al., 2025):** These authors investigated the impact of nano-chitosan supplementation (0.5 g/kg) in broilers fed diets contaminated with aflatoxin B1 (AFB1) and fumonisin B1 (FB1) – two mycotoxins known to impair poultry performance and health – or a combination of the two toxins. A total of 96 Ross-308 male broiler chicks were assigned to eight dietary groups (4 birds/pen; 3 pens/trt), including control, mycotoxin-contaminated, and nano-chitosan-supplemented treatments, and were monitored over 42 days. The presence of AFB1 and FB1 significantly reduced body weight (>30%), feed intake (~10%), and feed conversion efficiency while also negatively impacting carcass quality, blood parameters, immune response, and liver histology. Nano-chitosan supplementation demonstrated a partial protective effect, improving weight gain (mitigating

**For more information, reach out to this issue's contributors:**

**Becca Culbertson: becca.culbertson@feedworksusa.com**
**Dr. Benjamin Wenner: benjamin.wenner@feedworksusa.com**

>50% of toxin effect), feed efficiency, immune function, and mitigating liver damage. However, nano-chitosan also improved weight gain in birds when supplemented to the low-toxin negative control. These findings underscore that nano-chitosan may serve as a beneficial feed additive, especially to counteract the harmful effects of mycotoxin contamination in poultry diets.

**Association of liver abscess with demographic factors, gross pathology, and gastrointestinal histologic morphology in feedyard mortalities (Champagne et al., 2025):** This study surveyed 935 head of cattle across 6 feedyards. While arguably small in comparison to the scope of the U.S. beef industry, the cross-sectional case-control design included necropsies for all head. The study revealed that steers (rather than heifers), dairy-influenced cattle, and those with longer days on feed (100+ days) were much more likely to have LA. Additionally, peritoneal adhesions were strongly associated with the presence of liver abscesses (LA). Histological analysis showed that cattle with LA had significant changes in GI morphology, including wider rumen papillae, thinner keratin layers, and altered crypt and propria thickness in the small intestine. This suggests the pathogenesis of LA may involve complex GI changes, and while the rumen is important, other parts of the GI tract, including the small intestine, may play a role. These findings emphasize the need for further research to better understand the mechanisms behind LA formation and to develop targeted management strategies that include protecting the GIT against dietary- and environmentally-induced insults.

## Live Presentations:

Dr. Gail Carpenter's presentation at our Tri State Dairy Nutrition Conference Mini Symposium focused on nutritional approaches to decrease stress in calves. She noted that optimal calf performance starts with pairing strong management practices with targeted nutrition strategies. She reviewed various calf stressors including dystocia, transport, disbudding, and weaning, and explained how each can reduce health, performance, and profitability. Luckily, nutritional interventions can help to mitigate these stressors. For example, high-quality colostrum use has been shown to reduce transit stress in calves. Moreover, a high plane of nutrition can improve growth and immune resilience, though it may lower starter intake and cause a post-

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**Becca Culbertson: becca.culbertson@feedworksusa.com**
**Dr. Benjamin Wenner: benjamin.wenner@feedworksusa.com**

weaning slump. These issues can be mitigated with step-down weaning protocols. Additionally, adequate starter intake is essential for rumen development, with palatability, freshness, and placement near milk source all affecting consumption. Electrolyte supplementation was also emphasized as a supportive tool, especially to maintain hydration in stressed calves. She urged producers to avoid stacking stressors and to audit maternity management practices to better support calf welfare and future productivity. If you missed our mini-symposium, all presentations were recorded, and we are happy to provide you with a video if you'd like to watch - don't hesitate to reach out!

Dr. Angel Abuelo's presentation at the Tri State Dairy Nutrition Conference emphasized that neonatal calf health is a key driver of long-term productivity, yet preweaning morbidity and mortality remain stubbornly high. Calves are born with immature immune systems, so they rely heavily on passive transfer of immunity and early-life nutrition. Dr. Abuelo reviewed several nutritional interventions that can positively influence calf immunity, including utilizing transition milk, optimizing the plane of nutrition, and supporting antioxidant status. Oxidative stress was recognized as a significant barrier to robust immune responses in preweaned calves; they are at a similar risk level to oxidative stress as transition cows. Dr. Abuelo noted that milk replacers typically don't have adequate amounts of antioxidants. His team and others have shown that antioxidant supplementation can enhance immune function and response, although growth benefits have been inconsistent, likely due to differences in management conditions. Given that oxidative stress is a prevalent and under-addressed issue in young calves, supporting redox balance during this window may unlock new opportunities for improving immunity and resilience. E-life, a polyphenol-based antioxidant, offers one such option by enhancing antioxidant capacity in a cost-effective manner.

**From the archives:**

Not too far back for this one… Daddam et al. (2023) examined the effects of a blended plant polyphenol extract supplementation, containing green tea, capsicum, and fenugreek with electrolytes; the authors supplemented cows

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**Becca Culbertson: becca.culbertson@feedworksusa.com**
**Dr. Benjamin Wenner: benjamin.wenner@feedworksusa.com**

with two doses of the plant extract (100 g/d and 150 g/d). Results indicated supplementation with 100 g/d of the extract increased DMI and milk yield compared to control cows, while 150 g/d of the extract improved rumination. Both doses reduced the time cows spent with vaginal temperatures above 39°C, indicating better thermoregulation. Proteomic analysis of adipose tissue revealed the high dose enriched proteins related to oxidative stress responses, specifically those associated with the Nrf2-mediated oxidative stress pathway. These data suggest that at least this blend of plant polyphenols combined with electrolytes may enhance the ability of cows to cope with heat stress by modulating oxidative stress and inflammation in their tissues, ultimately improving their welfare and productivity.

Uncertainty around feed ingredients (%DM, %CP, %NDF, etc.) and how they change day to day on a farm or by load can greatly impact consistency in a TMR formulation – both compared to the formulation and among days mixed. This has been a topic of research conversation off and on for many years, and some of the best summarize work on sampling frequency and approaches have been presented by Drs. Weiss/St-Pierre at Extension conferences. For this issue, we went back to read some of the early papers by St-Pierre and Harvey (1986) and by Buckmaster and Muller (1994). The mathematical complexity around predict uncertainty or using it to manage daily feeding is likely beyond the interest of our readers here. However, a figure in Buckmaster and Muller (1994) says that adjusting scale precision below 5 kg (~10 lbs) does little to improve uncertainty per ton of feed (0.5% of the mix). The authors claim that the value of scale precision is limited by the other unknowns in daily feed mixes (DM or CP, for example of the silage pile) and the 0.5% serves as a benchmark for weighing accuracy in daily mixing reports. Forages or other feeds that can vary more **and** contribute greater volume to the ration require the most attention to sampling details. Forty years later, this is still true and deserves our attention.

**Other notes:**

1. Pupo et al. (2025) evaluated the economic impacts of incorporating 3-NOP into dairy cow diets. The analysis, which included 412 lactating cows from 16 experiments, found that while 3-NOP supplementation

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**Becca Culbertson: becca.culbertson@feedworksusa.com**
**Dr. Benjamin Wenner: benjamin.wenner@feedworksusa.com**

decreased methane emissions by about 28%, it also slightly decreased DMI and milk yield. The financial impact of 3-NOP feeding was negative, with a mean income over feed cost decrease of $0.35 per cow per day. Dairy farmers need to be compensated for GHG reductions through carbon credit programs or other incentives. In this case, the annual compensation required for a farm with 1,000 cows was estimated at $128,320.

2. Another 3-NOP study examined the effect of supplementing Bovaer in dairy cow diets consisting primarily of grass-clover silage (Johansen et al., 2025). Holstein cows (n=48) were assigned within a 4 × 4 Latin square design with varying silage sources and Bovaer inclusion levels (0 or 60 mg of 3-NOP per kg of dry matter). Results showed that while Bovaer supplementation significantly reduced methane production by 33%, it also led to a 5% decrease in DMI and a 2.2% reduction in ECM yield. These negative effects on milk production were more pronounced in early lactation compared to mid-late lactation but should be couched with two important caveats: the study fed high-silage diets in a PMR and the experimental periods were only 21 days (pretty short for rumen adaptation).
3. A bit further back is this study from the Netherlands (Dieho et al., 2016) looking at rumen papillae adjustment with dietary transition. The authors increased fermentable organic matter in the diet by either a gradual or more aggressive step-up and demonstrated rapid adaptation increased rumen papillae in size/surface area compared to gradual adaptation. The rumen papillae response to increased fermentable carbohydrate is impressively quick – a reminder of how adaptable the rumen can be with proper support.
4. Dr. Adam Lock's presentation at the 2025 Western Dairy Management Conference reviewed his perspective on the intricate relationship between dietary fatty acids and milk fat synthesis, with a particular focus on how targeted feeding strategies can optimize milk fat yield. Adam discussed some dietary approaches to boost milk fat yield, including supplementation of palmitic acid, stearic acid, oleic acid, and oilseeds. He also referenced a meta-analysis he published supporting palmitic acid increases mixed FA yield. More recent research in his lab demonstrated that sodium acetate supplementation raises both de

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**Becca Culbertson: becca.culbertson@feedworksusa.com**
**Dr. Benjamin Wenner: benjamin.wenner@feedworksusa.com**

novo and mixed FA yields. This work highlights the broader opportunity to improve milk fat yield by supporting the rumen's capacity to generate precursors for milk fat production.

5. Pigweed (g. *Amaranthus*) is an invasive plant species prevalent in the SE U.S. and spreading northward. Researchers at the University of Kentucky (Cuervo et al., 2025) wanted to see if there was any value to feeding pigweed (or portions of the plant) as a byproduct feed additive. While there was some in vitro decreases for methanogenesis, increasing doses of pigweed also shifted VFA and digestibility negatively. There may be potential for small doses to increase propionate yield (and decrease $CH_4$) – more work is needed to explore this abundant opportunity.
6. Zhang et al. (2025) published some thought-provoking data supporting a gut-mammary access where rumen fermentation (and microbes within) are heavily correlated to both milk components and SCC. Cows classed as high SCC (H-SCC) had lower milk fat, protein, and lactose content, and increased serum inflammatory markers. The researchers also identified significant microbial shifts between the high and low (L-SCC) groups, including an increase in Bacteroidetes and Firmicutes in H-SCC, and a decrease in Prevotella. Metagenomic analysis revealed that pathways related to glutathione metabolism, thyroid hormone synthesis, and inflammatory responses were enriched in the H-SCC group. These findings suggest that dysbiosis in the rumen microbiota, along with alterations in metabolic pathways, may influence mastitis and milk quality.
7. Teng et al. (2025) evaluated grape pomace (high in polyphenols and also poly-unsaturated fatty acids) as a byproduct feed for beef cattle up to 20% inclusion rate. There were minimal effects in this small study (5 cattle/treatment) but there is optimism that grape pomace could be a safe alternative feed in beef cattle. Grape pomace did not significantly affect rumen microbial diversity, though it did alter the abundance of certain fungi, such as Aspergillus, which may influence rumen fermentation.

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**Dr. Benjamin Wenner: benjamin.wenner@feedworksusa.com**