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.

In-Vitro Antimicrobial Activities of Grape Seed, Green Tea, and Rosemary Phenolic Extracts Against Liver Abscess Causing Bacterial Pathogens in Cattle (Salih et al., 2024): This study investigated the potential for plant-based phenolic extracts to help control liver abscesses in feedlot cattle. Within the US beef system, liver abscesses are quite prevalent and depending on carcass values and severity of abscess can be quite expensive. Liver abscesses are often linked to ruminal acidosis and bacterial infections, believed in part to be caused by *Fusobacterium necrophorum*, *Trueperella pyogenes*, and *Salmonella enterica*. The authors found that green tea phenolic extract, rich in flavanols such as epigallocatechin and epigallocatechin-3-gallate, demonstrated the strongest antibacterial activity in vitro, particularly at higher concentrations, effectively inhibiting the growth of *F. necrophorum* and *T. pyogenes*. ***This study highlights the ability of phenolic compounds to combat bacterial pathogens and raises the question of what polyphenol blends may provide a complementary or alternative strategy to traditional antibiotic usage.*** Further research is needed to explore the synergetic effects of various phenolic extracts and optimize their use in livestock nutrition and disease prevention.

Relative availability of 5 inorganic magnesium sources in nonpregnant nonlactating Holstein cows (Silvia-del-Rio et al., 2024): This recent paper in JDS compared several common types of Mg sources with a novel blended ingredient (Multesium) for both in vitro solubility and urine excretion. As illustrated in many previous papers, including an abstract by Ellison et al. (2018) highlighting Mg solubility of our own Calmin product, spikes in urinary excretion are a primary mechanism to demonstrate Mg solubility and absorption into the cow. In the current study, both the control and Mg carbonate product were out-performed by the novel blended Mg supplement, a previously screened high-solubility MgO, and Mg sulfate. The Mg hydroxide product appeared to provide the best overall Mg availability but there are likely some limitations to application in rations (cost and

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handling). A high correlation between the in vitro solubility and the urinary excretion support the use of in vitro solubility to estimate Mg availability in a more time- and cost-effective manner. Blending Mg products into a single supplement is one mechanism to limit the impact of large quality variation in Mg supplements on the market presently.

From the archives:

With the knowledge that a majority of Mg is absorbed through the rumen (Goff, 2018), many feed suppliers have prioritized Mg solubility to maximize absorption, either by in vitro or in vivo approaches. With the availability of high solubility Mg sources, one common question is on the effect towards rumen microbes themselves. You have to dig pretty far back to investigate rumen microbial responses to Mg where Hubbert et al. (1958) tested different mineral doses in vitro and quantified cellulose degradation. The conclusion was that cellulose degradation was favored between 60-80 ug/ml (approximately 10 g in a cow's rumen). The toxicity towards microbes ranged close to 4x that concentration which indicates that while cellulolytic microbes likely respond positively to available Mg, the risk for too much is pretty low. However, there is evidence that differences in Mg solubility (or the alkalinity imposed by the supplement) can influence the rumen microbial population towards different fiber degraders and more work needs to be done to investigate the Mg effect in a more controlled manner.

Other notes:

1. An alternative calcium product (aragonite structure) harvested from the ocean near the Bahamas was evaluated for buffering ability versus sodium bicarbonate or negative control diets (Martins et al., 2024). In this study, neither the bicarb nor the alternative product improved milk production or component yield. The authors state in the abstract that rumen buffering between both products was equal but this is a bit of a misdirect – there was no pH effect of any treatment (including sodium bicarbonate) leading to more questions than answers.
2. We hear about the CH_4-inihibition potential of the red algae, *Asparagopsis taxiformis*. However, toxicology concerns and DMI losses have limited its use to date. Another issue in the background is that

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treatment with this chemical inhibitor of methanogenesis tends to cause H_2 spikes (and loss) in the rumen that reflect inefficency from the interrupted CH_4 cycle. Romero et al. (2024) tried to use goats as a model to decrease CH_4 and capture the resulting H_2 in acetate with phlorglucinol degradation. The red seaweed decreased CH_4 by a modest 34% but spiked H_2 loss by nearly 3,500% (← yes, you read that right). Unfortunately, the treatment approach did not successfully capture all of the H_2 loss, mostly because losses were so large immediately post-feeding.

3. In New Zealand, Dalton et al. (2024) looked to see if feeding zeolites to bind Ca/P for the transition period would have any effect on animal behaviors. Interestingly, intake was decreased from 2 d prior to 2 d post-calving in the treated group. The authors were unsure as to the cause and more investigation is needed.
4. A common question in the field recently has been about the effect of fat feeding on methane production. Giagnoni et al. (2025) tested feeding two different oilseeds at different doses. The authors reported increasing fat levels in the diet reduced DMI, with palm kernel (high in C12 and C14) causing a more substantial decrease compared to rapeseed. The digestibility of organic matter and NDF was greatest at low fat levels and decreased with higher palm kernel concentrations. Methane emissions per lb of DMI decreased for both treatments, indicating that both fat sources could lower methane emissions. Previous studies showed similar results (e.g., Hollmann et al., 2013) where coconut oil (high in C12/C14) also decreased methanogenesis substantially but suppressed feed intake.
5. Ever wonder what the airports use to de-ice planes, or how this might impact the local environment? This paper (Exton et al., 2024) evaluates the ability of a fungus common to sewers to metabolize three common plane de-icers. The fungi most quickly utilized sodium acetate but the grew on all products tested.
6. Methanogens are persistent microbes in the rumen. Previous research on eliminating them by defaunation (killing all protozoa) focused on their ability to attach to protozoa. However, Wenner (2016) and others have shown that removal of protozoa often leads methanogens to locate in biofilm around feed particles instead, presumably for access to

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H_2. In fact, Leahy et al. (2010) documented (figure 5) attachment by methanogens onto rumen bacteria directly. To that end, Gupta and Seedorf (2024) characterized "adhesin-like proteins" used by common rumen methanogens to attach to polysaccharides, gaining closer access to metabolites such as H_2 to make CH_4 and grow. These proteins give methanogens unique survivability advantages and help them persist – something to consider when we develop anti-methanogen technologies.

7. Ortiz-Chura et al. (2024) highlighted how microbiome data can be skewed by the databases, animals/regions sampled, and accessibility to data for repeatable investigation. The study analyzed 47,628 microbiome sample metadata entries across ten ruminant species, revealing significant gaps in data representation by species, geography, and metadata quality. Previously,e Gloor et al. (2017) highlighted that most datasets deal in *relative* changes in microbial community. Taking both these issues into account is important to frame expectations regarding ruminal community shift predictions from feed additives.
8. In an effort to make anthelmintics more effective in small ruminants, Blinov et al. (2024) tried complexing chitosan and ricobendazole by mixing chitosan and ricobendazole (30:4). The resulting particles, ranging from 100 to 200 µm in size, demonstrated increased bioavailability and enhanced solubility compared to standard ricobendazole. Testing in sheep indicated that the chitosan-ricobendazole complex, administered at a dose of 4 mg/kg, showed an 89% therapeutic efficacy, comparable to the 92% efficacy of commercial ricazole at a higher dose (8 mg/kg). Liver histology showed a reduction in helminth eggs and inflammation; this chitosan-ricobendazole complex shows promise for treating liver fluke infections in animals.
9. Wandscheer et al. (2024) compared an essential oil blend (thyme, rosemary, orange) versus monensin (25 mg/kg feed) in Holstein steers for a 210-day trial. Results indicated that the EO treatment improved feed efficiency with a slight increase in weight gain compared to the monensin contorl. Treatment also enhanced antioxidant and anti-inflammatory responses, evidenced by lower levels of reactive oxygen species, protein carbonyls, and higher total thiols in both the blood and meat.

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