Impacts of Forage Quality, Forage Type, Energy Supplementation on Dry Matter Digestibility, and Ruminal Nitrate Release.

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Nitrate toxicity is a problem that affects producers with ruminant livestock species every year. Ruminate Livestock species are at risk when plants that accumulate high concentrations of nitrates are consumed in large amounts over short, well defined, feeding periods. Toxicity risk can vary between livestock ruminant species, beef cattle are affected the most followed by dairy cattle, sheep, goats, and equine. In the rumen, nitrates will be converted to nitrite and then to ammonia. During toxicity events, nitrite will accumulate in rumen faster than converted to ammonia. The excess amount of nitrite in the rumen will enter the bloodstream and convert hemoglobin to methemoglobin, this will cause hemoglobin not able to carry oxygen throughout the body causing hypoxia.

Clinical signs of nitrate toxicity are difficult or shortness of breath, weakness, staggering gait, muscle tremors, cyanosis, abortion, and death. For clinical signs to start being observed 40%-60% of hemoglobin is converted to methemoglobin, and for death to occur 70%-90%.

Management strategies to prevent consumption of high nitrate feed is the best way to mitigate risk of nitrate toxicity. However, in scenarios where consumption of high nitrate feed occurs, and is not noticed quickly a veterinarian can administer methylene blue which can help reduce the effects of toxicity. But management strategies to reduce consumption of high-nitrate feeds is the best approach to reduce nitrate toxicity.

Nitrate toxicity research was initiated in the 1940s, and all other research has been based on those original findings. There has been a lack of continuity since the 1970's and most of the research has focused on harvest forage instead of grazing cattle. This has caused inconsistent feeding recommendations and confusing recommendations for producers who have high-nitrate feeds.

In this study we will be using cannulated cows to see how forage quality, forage type (non-dried vs. dried), and energy supplementation has on dry matter digestibility, and ruminal nitrate release. We hypothesize that dried forage will release nitrates at a faster rate in the rumen than wet succulent forage. In addition, energy supplementation will have more efficient ruminal microbes and, as a result, be more efficient at converting nitrite to ammonia resulting in lower ruminal nitrite levels.

Implications for this study could help update feeding recommendations and provide more precise management strategies for producers dealing with high nitrate feeds.

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