Gut Inflammation: Fanning non-Specific Flames That Impact Health and Performance.

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Abstract: Inflammation emanating from the gastrointestinal tract (GIT) is a key component to suboptimal farm animal productivity. Gut inflammation encompasses more than just acidosis and is a widespread condition in high producing feedlot or dairy cows which is commonly associated with feeding high grain (starch) ration. Many of the direct causes of gastrointestinal inflammation are related to the microbial fermentation in the rumen and in the hindgut, both directly and indirectly. However, many of the impacts on production are “silent” from a health perspective, and are not limited to a single compartment of the gastrointestinal tract. Gastrointestinal inflammation is often linked with tight junction dysfunction which is accompanied by gross morphological changes that reduce intestinal barrier function, allowing for intestinal luminal contents and microbes to infiltrate into portal and systemic blood (leaky gut). Lipopolysaccharide (LPS) is an endotoxin found in gram negative bacteria which is a potent antigen, which can cause systemic responses including widespread inflammation. Leukocyte antigen recognition initiates a metabolic switch from oxidative phosphorylation to aerobic glycolysis and thus the immune system becomes an obligate glucose utilizer. The reprioritization in the hierarchy of glucose trafficking reduces glucose availability to support milk and muscle synthesis. GIT hyperpermeability and the ipso facto immune stimulation is accompanied by hypophagia and a unique endocrine footprint characterized by hyperinsulinemia and hyperglucagonemia. Preventing leaky gut should be the nutritionists primary objective and multiple strategies should be considered. The use of probiotics, organic acids, and phytochemicals offer potential alternatives to antimicrobials (ATA) that can alter the microbial population and reduce: 1) microbial activity that leads to the development of conditions leading to barrier dysfunction, 2) impacts of fermentation endproducts on epithelial tissues, and 3) immunostimulation due to LPS reaching the host.

Keywords: inflammation, leaky gut, mitigation

Why Should the Beef Industry be Concerned About gut Health?

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Abstract: The gastrointestinal tract (GIT) uses a disproportionate amount of energy relative to its weight to facilitate digestion and movement of dig, nutrient absorption, and barrier function. Through these roles, the GIT acts as the first barrier for the immune system. As such, it is clear that understanding factors that affect these functions, particular absorptive and barrier function, can help improve nutrient utilization and limit immune activation. Cattle fed highly fermentable diets provide a unique opportunity to explore functions of the GIT and improve our understanding of the connection between digestive and metabolic disorders, and infectious disease. Consistent feed intake is a major challenge facing epithelia lining the GIT as feed-deprivation: induces behavioral stress that may alter epithelial cell function increasing risk for inflammation; induces rapid reductions in absorptive surface area; reduces rates of short-chain fatty acid absorption, and results in a transient increase in GIT permeability. Upon re-feeding, cattle previously experiencing off-feed events are at high risk for ruminal acidosis. Reasons for depressed feed intake are numerous and the off-feed event imposed by many diseases may provide a theorized linkage between respiratory disease, ruminal acidosis, and liver abscesses. Recent research has highlighted that increased GIT permeability may decrease gain and alter carcass composition supportive of inflammatory-mediated responses. In addition, there is growing evidence that highly fermentable diets may alter the regional permeability; however, future research is needed to confirm these findings.

Keywords: absorption, gut health, permeability