

Multisource Starch for Optimal Rumen and Ruminant Integrity

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Abstract

This pragmatic article founds grounds to establish a farm policy to include multiple sources of starch in commercial ruminant diets to improve rumen and ruminant health. Rumen environment has a dramatically fluctuating nature that requires versatile species of microbes to inhabit. As such, multiple sources of differently fermentable starch (varying degradation extent and rate) are required to maintain ruminal microbial versatility and integrity. For its considerable dietary inclusion rate, starch from multiple grain and forage sources better meets energy requirements of a variety of microbial groups and helps minimize risks from metabolic complexities such as subacute rumen acidosis and immune deficiency.

Keywords: Starch; Multisource; Cereal grain; Ruminant; Health

Innovations and Discussion

Rumen environment

Rumen possesses highly varying biophysical and biochemical conditions that require fitting microbial versatility and feeding management [1-3]. Starch as a major dietary portion (e.g., up to 25-30% of diet dry matter) for commercial ruminants has highly significant impacts on rumen and ruminant health [4,5]. Differential rumen microbial groups have specialized requirements for nutrients with particular rate and extent of fermentation for optimal growth and longevity. As a result, feeds with fitting extents and rates of degradation must be provided towards securing such microbial growth and efficiency. This match-feeding of rumen microbes, also, helps minimize energy loss and risks from metabolic problems such as SARA, bloat, endotoxemia, immune deficiency, and hepatic malfunction [6,7].

Starch properties

A variety of cereal grains are planted worldwide and fed to ruminants mainly based on their availability and costs. Nonetheless, another reason for using particular grains in ruminant diets is merely the local tradition that may be followed just as a conventional experience regardless of costs and benefits. Soft grains including wheat, barley and oats have rather high rumen degradation rate as opposed to hard grains such as corn and sorghum with much lower fermentation rate [7-10]. However, within each cereal grain either soft or hard, there could be some varieties with unique degradation behaviour that may essentially not follow the average grain properties [7].

Starch match-feeding

Based on the above science, feeding wheat, oats and barley is more likely to induce subacute rumen acidosis and trigger proinflammatory responses than feeding corn and sorghum grains [11-13]. On the other hand, feeding solely soft or hard grains in diet would most probably

reduce microbial growth, efficiency and yield. This is because given microbial groups' requirements for particular fermentation behaviour may not be optimally met when only specific types of starch are fed.

Farm pragmatism

This article innovatively establishes and expands a philosophy that involves dietary inclusion of multisource starch for nearly optimal rumen microbial integrity and health and, thus, for superior ruminant efficiency and longevity. Starch from barley, wheat, corn, sorghum, and indeed ensiled forages should effectively meet dynamic microbial requirements for varying and complementary rumen fermentation properties. Research is required to extensively study and discover optimal combinations of different sources at varying physiological stages. Education will be an ultimate frontier in profound realization and implementation of the pragmatic philosophy [14].

Implications

A farm philosophy was discussed to incorporate multisource starch from grains and forages in commercial dairy diets. This was to more accurately meet nutrient requirements for differential groups of rumen microbes and to improve rumen and ruminant efficiency and health. Should this philosophy be a basis for commercial farm practice, availability and cost issues could be rectified when and where necessary?

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