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Perspective

The Need for Rumen Microbial Protein Synthesis for Milk Output in Huge Dairy Farms

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DESCRIPTION

Ruminant milk is a classic raw material used in the creation of a variety of dairy products with distinct compositions. Many of them are regarded as functional foods in various geographical and socioeconomic areas. However, in order to ensure consumer safety, European Union laws require farmers to acquire milk exclusively from healthy animals, which may limit milk output and consumption.

A variety of factors impact ruminant health in huge dairy farms. Both single components and their combination generate the circumstances for pathogen virulence, particularly bacterial virulence, to compromise the host's immunity. Various organ illnesses can be caused by factors such as poor housing hygiene, poor nutrition, and abuse, and when many animals are sick, they are referred to be "production diseases." Despite improved zootechnical control and milk production hygiene, mastitis remains the most dangerous and demanding infection of dairy cows, with major economic consequences. Clinical or subclinical mastitis has a negative economic impact since it reduces milk production and lowers the price of milk with high SCC (Somatic Cell Count), increases the incidence of culling, and raises the cost of veterinary treatment, which can reach 185 EUR/cow. According to a report, 23 percent of cows that leave herds too soon are culled due to udder health conditions.

Increasing WSC (water-soluble carbohydrates) concentration might improve rumen microbial protein synthesis, ruminal ammonia and dietary Nitrogen utilization for milk production, and have the added environmental advantage of lowering nitrous oxide emissions and nitrate leaching. Furthermore, increasing the fraction of glucogenic volatile fatty acids (i.e., propionate) in the rumen may enhance milk protein concentration. Greater WSC content of a perennial ryegrass (PRG) can be accomplished by agronomic management, such as lowering the frequency of defoliation depending on leaf regrowth stage or decreasing the Nitrogen fertilization rate, or through genetic selection for higher sugar levels in grass. However, the manifestation of high-sugar characteristics cannot be anticipated to occur under all situations, highlighting the impact of a genotype-environment interaction.

Several studies have been conducted to determine the effect of High-Sugar Grass (HSG) on dairy cow Dry Matter Intake (DMI) and milk production, with the majority of them being conducted under stall-feeding. Several researchers observed that HSG improved digestible DMI in early-lactation dairy cows without affecting milk output. On the other hand, found higher milk production from late-lactation dairy cows when the WSC content of the diet was raised by the use of HSG forage without affecting DMI significantly. In both investigations, the changes in WSC content across treatments were varied by collecting the forage at different times of day or applying different Nitrogen fertilization rates. In another indoor feeding research, higher WSC concentration in grass had no effect on grazing behaviour and DMI, or on milk output and composition in mid-lactation dairy cows.

Recent study evaluated the influence of forage WSC and Crude Protein (CP) contents on the behaviour of dairy cows in grazing situations and discovered that cows preferred to consume and spend more time grazing on swards with higher CP contents rather than higher WSC. This was accomplished by increased fertilization rates (equal to 250 kg N/ha per year) and more frequent defoliation, demonstrating a preference for nutrient-rich swards. Understanding how the nutritional content of HSG effects grazing behaviour and hence herbage intake is critical for determining its potential for feeding in pasture-based dairy systems.

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