

Cereals and Periparturient Ruminants

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Abstract

This editorial article critically discusses few selected ways to optimize cereal nutrition in periparturient ruminants. Despite some recent progress, research is much needed to explore dependent and independent effects of cereal type and processing in relation to dietary forage choice and its physical effectiveness on rumen ecology and ruminant metabolism during the periparturient phase. Health and immunity markers need to be monitored to enable pragmatic long-run policy-making.

Keywords: Periparturient; Ruminant; Cereal; Nutrition; Health

Philosophy and Discussion

Physiological shifts from a pregnant, non-lactating to a non-pregnant, lactating status involve metabolic challenges to periparturient ruminants [1-3]. The increased research on transition biology has quantified some facets of the challenge in animal, organ, cell and gene levels. However, due in part to on-farm difficulties of conducting large ruminant studies, transition biology continues to be a generous host to many unanswered or partly resolved questions. Sheep, for instance, as a docile, small, and inexpensive nutritional model works suitable for studying periparturient ruminant physiology and metabolism [4].

Effects of late pregnancy nutrition planes on periparturient sheep metabolism and production have long been acknowledged. However, global and regional guidelines especially on energy nutrition for optimal health and productivity are yet to be developed. Corn grain has lower effective rumen fermentability (40-70%) than wheat and barley grains (80-100%). The average wheat grain is to some extent more rapidly degradable than barley grain. Processing alters grain physical and chemical properties and rumen fermentation patterns. In addition, prepartal dietary starch source affects peripartal metabolism. Prepartal substitution of ground wheat grain for barley grain may improve energy and calcium status in periparturient cows and heifers [5,6].

Wheat and barley grains have long been fed to pregnant ewes. In situ ruminal and intestinal digestibility of differently processed cereal grains has also been under focused research. However, wheat, barley and corn grains have not been comparatively and conclusively studied in vivo in periparturient ruminants. Grazing pregnant ewes fed supplemental barley grain plus protein meals had better energy status and tissue gains [7,8]. In early lactation ewes on ad libitum swedes, supplemental soya beans increased daily intake of swedes and caused live-weight gain, whereas supplemental barley grain depressed live-weight [9]. Research is required to establish dependent and independent effects of cereal type and processing in relation to dietary forage and its physical effectiveness on rumen and ruminant metabolism during the periparturient phase.

Feeding more rapidly vs. more slowly degradable cereal grains (e.g., barley vs. corn) alters rumen fermentation patterns and effective fiber requirements for optimal health. Because of the positive wheat grain effects on transition energy and Ca status, and to reduce risks of too-rapid starch fermentation and subacute rumen acidosis, peripartally combined wheat and barley grains could be more desirable than feeding either grain alone. Pregnant ewes and not cows can effectively chew whole grains except for when diets contain silage. Post-weaning ewes can also produce greater milk fat when fed cereals as whole vs. pelleted or ground [10]. Research is needed to explore interactive effects of cereal and forage type on periparturient ruminant physiology.

Implication

Recent evolutions on commercial optimization of cereal nutrition for ruminants [11-14] must enable development of innovative strategies to improve starch efficiency in periparturient ruminants. This is of crucial importance since the efficiency of the periparturient period has significant impacts on health and performance of the entire lactation and cow longevity. Starch feeding optimization, especially during the periparturient period, is central to securing a lasting success in rumen and ruminant management in postmodern farming.

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