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Wheat Grain for Transition Dairy Cows: A Multifaceted Abet or an Intriguing Peril?

Akbar Nikkhah*

Chief Highly Distinguished Professor, Department of Animal Sciences, Faculty of Agricultural Sciences, University of Zanjan, Zanjan, Iran

***Corresponding author:** Akbar Nikkhah, Chief Highly Distinguished Professor, Department of Animal Sciences, Faculty of Agricultural Sciences, University of Zanjan, Zanjan 313-45195, Iran, Tel: +98-241-5152801; Fax: +98-241-5283202; E-mail: anikkha@yahoo.com

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Editorial

This editorial seeks to appraise metabolic feasibility of feeding wheat grain (WG) based rations to dairy cows, especially during transition period or few weeks around calving. A major commercial hypothesis is that WG in transition diets can help ease periparturient stresses by increasing rumen microbial protein synthesis, inducing mild acidosis and improving calcium dynamics, attenuating splanchnic metabolic pressures, and considerably overcoming immune challenges through stimulating dry matter intake [1-3].

Wheat grain has large amounts of easily fermentable starch and protein with a fortunate low cation–anion difference (5.3 mEq/100 g). Prepartal controlled feeding of WG with unique starch and protein fermentation rates and such a low cation-anion difference fueled with reasonable palatability has immense potential to reduce negative energy and calcium balance, increase periparturient blood glucose and calcium, and elevate milk fat and protein yields early postpartum. These events have already been proved in mature Holstein cows and heifers [2,4]. Recent discoveries suggest that inclusion of WG in transition diets, particularly prepartum, can alleviate commercial needs for feeding the expensive and impalatable anionic salts [1].

Wheat grain has successfully replaced barley grain in prepartum and midlactation dairy diets [4,5]. Wheat is usually more rapidly fermentable than barley grain, but its controlled feeding should enable an effective management of rumen conditions [6]. The prepartal provision of WG and related dietary changes in dairy heifers reduced urine pH at 7-day prepartum and elevated blood calcium and glucose at 7-day prepartum and 3-day postpartum [2]. Milk fat and protein yields were increased during the 21 days postpartum by prepartal WG provision. In addition, the WG based diet did not affect body condition score, calving difficulty, calf weight, placenta weight, and the time interval from calving to placenta expulsion. Therefore, prepartal provision of WG led to simultaneous improvements in energy and calcium states of first-calf heifers experiencing their most shocking metabolic stage of life without compromising mother and calf health.

However, feeding WG especially in ground forms requires caution to minimize risks from subacute rumen acidosis, compromised microbial health and weakened systemic immunity. These disturbances are a beginning to ending dairy cow economical longevity and production profitability [7,8]. On-farm data to date indicate that provision of WG based prepartal diets (at the expense of barley grain and wheat bran) to both dairy cows and heifers during 3-5 weeks prepartum offers simultaneous improvements in peripheral glucose and calcium supplies. The benefits have been obtained with no supplemental anionic salts, followed by relatively increased milk yield during 21-d postpartum.

Future research should enlighten the very mechanistic modes of WG action in microbial cells, rumen epithelia, release of endotoxins and LPS, portal and peripheral proinflammatory responses, and splanchnic representative gene expression profiles. Also, further larger fundamental studies are required on early- and mid-lactation cows for extendable observations on production and health criteria. Such data will more transparently tell apart how WG would become a multifaceted abet or an intriguing risk to dairy cow production and health and farm economics.

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