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Guest Editorial

Sugar Beet Pulp as a Substitute for Cereal Grains and Forage in Dairy Diets: Towards More Sustainable Animal Agriculture and More Secure Human Food Supply

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Abstract

Cereal grains are consumed by humans as viable foods. Livestock compete with humans in consuming cereal grains. Thus, alternative energizer feeds need to be supplied and included in dairy cow rations for cereal grains to become more available for human use. Sugar beet pulp (SBP) is unique in possessing highly digestible fibers that would promote both microbial fermentation and milk production in high-producing and low-producing dairy cows. In addition, sugar beet pulp is rich in pectin and arabinose that are rapidly degraded in the rumen to support microbial protein synthesis. As a result, SBP can replace major portions of dietary cereal grains for lactating dairy cows. On the other hand, because of its rich and highly digestible NDF content, SBP is an optimal and partial substitution for forages of varying quality. Experimental dietary levels of up to 24% (DM based) SBP have successfully been fed to lactating cows. However, this finding should not lead to unwise overfeeding of SBP because it can disturb rumen conditions and depress milk fat and cow health.

Keywords: *Sugar Beet Pulp; Cereal Grain; Dairy Cow; Sustainable Industry*

Philosophy

Sugar beet pulp (SBP) is a by-product of sugar industry and is generated after extracting sugar from beets [1]. Sugar beet pulp is exclusive in containing cell wall fibers that are extensively degradable in the rumen [2-4]. As a result, SBP can be fed in significant amounts to dairy cows of varying physiological states and milk production levels to, at least partially, replace both concentrate and forage portions.

In the current feed market in Iran and many other countries, cereal grains are more expensive and less available than were they before. In addition, humans need to be able to access and consume considerable levels of cereal grains as viable foods. Consequently, less cereal grains are made available for livestock use. Therefore, sustainable alternatives for cereal grains are required to be supplied and fed to livestock and especially to dairy cows [5]. Sugar beet pulp is a unique by-product that, if particularly inexpensive, can be considered as an optimal forage and concentrate source for both higher-producing and lower-producing dairy cows. Although, the SBP's NDF is not as highly physically effective in stimulating chewing and ruminating as are forages like alfalfa hay and silage, it can still be considered a semi-forage component because of its high NDF content. The rapid degradability of SBP's fibers may be because of its high arabinose vs. xylose content of hemicellulose [6]. Xylose is characteristically the main hemicellulose sugar found in mature forages that are less digestible than SBP. Moreover, SBP has low lignin content that could be another reason for its reasonably high digestion extent and rate [6]. Overall, SBP

is a rich fiber source that promotes healthy rumen conditions, ample microbial growth, improved milk production, and feed efficiency if included wisely and optimally in dairy rations.

Care should be taken to not overfeed SBP, as it can disturb healthy rumen environment and depress milk fat [4]. Nonetheless, experimental levels of up to 24% of diet DM have successfully been fed to lactating dairy cows without negative impacts on milk and fat production while improving feed efficiency [1,2]. Adequate care, however, should be taken in feeding right amount of SBP to dairy cows at various stages of lactation.

Future research using large sample sizes and preferably under commercial settings are required to determine lactating and non-lactating dairy cattle responses to different dietary levels of SBP replacing both concentrate and forage portions. Monitoring continuous rumen conditions in such studies will be a major plus.

Conclusion

Sugar beet pulp contains extensively rumen degradable cell wall fibers that can both meet guest microbial fermentation requirements and support host animal's milk production. As such, SBP is commercially viewed as both concentrate and forage. For more secure human food supply, considerable portions of dairy cow dietary cereal grains could be replaced by SBP towards more sustainable animal agriculture and more secure human food supply. This trend should allow human-animal-agriculture sectors to cooperate more efficiently towards improved dairy production economics and human food supply and health.

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