

Optimizing Diurnal Patterns of Nutrient Intake and Rumen Fermentation Based on Milking Management

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Rec date: June 08, 2015; Acc date: June 09, 2015; Pub date: June 17, 2015

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Abstract

This article develops an on-farm strategy to optimize eating and rumen fermentation patterns according to milking timing and frequency. Considering the post-milking crave for food, to avoid starch overtake and to minimize risks from subacute rumen acidosis, depressed rumen microbial production and jeopardized milk yield, selected forage choices or mixed rations with a minimal concentrate portion should be fed post-milking. High-starch portions can then be fed at other feeding occasions not shortly post-milking. Milking timing and frequency affect how to optimize diurnal patterns of feeding and rumen fermentation for superior efficiency.

Keywords: Milking timing; Intake; Rumen; Diurnal rhythm; Efficiency

Pragmatic Science Elaborations

Introduction

Milking is psychologically and endocrinologically followed by a great sense of hunger that is described as 'crave for fresh feed'. The crave characterizes an intake scenario during which ingestion rate and extent are dramatically high [1]. Increased eating rate could raise rumen fermentation rate and augment acids accumulation in the rumen, thereby causing prolonged subacute rumen acidosis (SARA) [2,3]. This metabolic disorder depresses daily feed intake later on and adversely affects overall cow health and milk production [4,5]. In a long term, cow longevity is severely reduced. Thus, identifying the occasions when such craves are developed is of importance in dairy farming to formulate feeding and management strategies that minimize risks from SARA and its unfavourable immune-related, health and economical consequences.

Innovations and discussion

The key objective of this research was, thus, to optimize diurnal patterns of feed intake and rumen fermentation based on milking times and frequencies. In today's modern dairy farms, milking is usually conducted between 2 to 6 times in a 24-h period. That means dairy cows usually experience multiple craves for fresh feed daily. Based on the main logic of the article, managing feeding strategies and systems without taking milking timing and frequency into account will not yield optimal results.

Depending on feeding systems practiced on different farms, diurnal patterns of feeding must be accordingly managed. For instance, where total mixed rations are prepared instead of component nutrition, high-starch portions would not be optimal choices for feeding just after milking, mainly because the post-milking crave for feed will result dramatically increased eating rate that will in turn increase rumen fermentation rate and extent within a short time. The resulting SARA

may be devastatingly elongated [6-8]. Occurring such a mismanagement multiple times a day means overly prolonged SARA and greatly depressed immunity. These events predispose lactating dairy cows to metabolic complexities that jeopardize cow health and farm economy. Therefore, a wise approach would be to avoid feeding high-starch feeds right after milking and instead attempt to improve rumen conditions through offering appropriate high nutritious forage choices, such as mixed silage and hay forages with minimal concentrate.

Starchy and energy-dense concentrates should be timed feeding mainly at other occasions than post-milking. Another option would be to reduce the concentrate portion of the diet offered post-milking at least once or twice daily. In farms where cows are milked only twice and thrice daily, practicing such a strategy is much easier and labour-friendly. In farms with 4-6 times milking a day, the strategy could at the very least be exercised for a half of milking occasions if not for all. Extensive commercial experience suggests that optimizing diurnal patterns of feeding based on milking management works well in reducing SARA and improving dairy herd health and farm economy, especially in a long-run. Rumen and intestines adaptation for such a rhythmic feeding management in relation to milking can effectively happen, which is highly worthwhile taking advantage of [9,10]. In light of the recent challenges towards total mixed ration feeding [11-13], modifying feeding patterns and dietary properties based on milking management offers pragmatic insights to improve TMR feeding management in many dairy farms. International education of such postmodern agrotechnologies must be a global obligation for innovative dairy science to be pragmatically realized [14].

Implications

Feeding strategies and systems in postmodern dairy farming should be optimized according to milking management. Based on milking timing and frequency, the nature of dairy diets and diurnal feeding management should be modified to minimize risks from starch overconsumption, multiple durable SARA's, depressed immunity, metabolic abnormalities, dropped milk production, cow longevity, and certainly farm economy.

Acknowledgments

Thanks to the Ministry of Science Research and Technology, National Elite Foundation and University of Zanjan for supporting the author's global initiative programs of optimizing science edification in the third millennium.

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