

## Sustainable, Safe and Secure Human Food Production through Circadian Probiotic Optimization of Rumen Fermentation: A Farsighted Realm

Akbar Nikkhah\*

Department of Animal Sciences, Faculty of Agricultural Sciences, University of Zanjan, Iran

\*Corresponding author: Akbar Nikkhah, Chief Highly Distinguished Professor, Department of Animal Sciences, Faculty of Agricultural Sciences, University of Zanjan, Iran, Tel: +98-24-33052801; E-mail: [anikkha@yahoo.com](mailto:anikkha@yahoo.com)

Received date: May 03, 2015; Accepted date: May 05, 2015; Published date: May 12, 2015

Copyright: © 2015 Nikkhah A. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

This editorial innovatively establishes circadian timing of rumen fermentation properties as a natural probiotic and modulator of nutrient efficiency and microbial-host health in food-producing ruminants. Inspired by nature, circadian availability of differently nutritious plants is a major driving factor in maintaining near-to-optimal rumen conditions and microbial health and integrity. Taking the advantage of this major probiotic alongside external probiotics will be a postmodern art towards improved ruminant sustainability and human food safety and security.

**Keywords:** Probiotic; Rumen fermentation; Circadian timing; Pro-health

### Innovation and Elaboration

Ruminants have evolved to develop circadian rhythms of rumen fermentation [1]. This nature-driven rhythmicity involves microbial characteristics of nutrient assimilation [2]. Such circadian patterns greatly contribute to circadian responses in microbial and host metabolism to modern management strategies [3,4]. As such, before and while practicing any modern production approach in food-producing ruminant industry and human food sectors, such circadian rhythms of rumen fermentation must be taken into account. This is to ensure no or minimal interference with optimal microbial physiology and overall rumen and ruminant health.

Due to the highly diverse ruminal microbial population including bacteria, protozoa, fungi, archaea and viruses, and also the extensive rumen fermentation capacity, internal probiotics (relative to external probiotics) greatly determine rumen function and health. The internal probiotics include optimized natural patterns of feed presentation and subsequent eating behaviour and fermentation patterns. Managing ruminants in ways that never or minimally interferes with such nature-instigated patterns of microbial physiology, will determine the degree of success in manipulating rumen fermentation and utilizing external probiotics such as supportive fibrolytics.

Optimizing timing of feed presentation, notably, can improve microbial energetics and mass production, and thus, can increase production of adequately safe and secure human food (e.g., milk and meat) [5,6]. Appropriate use of external supplementary probiotics in line with optimal timing of rumen fermentation is more likely to significantly improve microbial production and health while reducing waste. Since ruminants have shown to possess greater digestive capacity of especially fibrolytic ability overnight vs. morning [5], linking such a natural and internal probiotic property of rumen

ecology to external probiotic strategies will be highly beneficial. The goal is indeed to maintain reasonable ruminant productivity without jeopardized or even compromised rumen microbial metabolism and health.

### Implication

This article innovatively established the scientific basis for an on-farm practice to augment prohealth and promass effects of probiotics on human food production from ruminants through taking increasing advantages of amalgamated internal natural probiotics with external prohealth supplements.

### Acknowledgments

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

### References

1. Nikkhah A (2012) Time of Feeding an Evolutionary Science. Lap Lambert Publishing, GmbH & Co. KG, Germany.
2. Nikkhah A (2011) Ruminant chronophysiological management: an emerging bioscience. Open Access Anim Physiol 3: 9-12.
3. Nikkhah A (2013) Chronophysiology of ruminant feeding behavior and metabolism: an evolutionary review. Biol Rhythm Res 44: 197-218.
4. Nikkhah A (2014) Review: Ruminant feed intake regulation evolution: Chronophysiological rhythms perspectives. Biol Rhythm Res 45: 563-577.
5. Nikkhah A (2014) Timing of feeding: a postmodern management strategy to modulate chronophysiological rhythms in rumen fermentation kinetics. Biol Rhythm Res 45: 533-540.
6. Nikkhah A (2013) Time of feeding orchestrates circadian post-Feeding intake rhythms in dairy cows. J Anim Poult Sci 2: 55-60.