

Rumination Collars: What Can They Tell Us

Doron Bar¹ and Ran Solomon²

¹ SCR Engineers, ² Min. of Agric., Extension Service, Israel

Introduction

The HR neck collar (SCR, Israel) is a rumination monitoring system combined with a unique motion sensor. The basic principle of using sounds picked up by a microphone that is in tight contact to the cow's neck to measure rumination time (RT), has been developed by A. Bar-Shalom (Vocal Tag, Israel). This system, after technological upgrade, is integrated in commercial activity tags (Hi-Tag) and is named HR-Tag (or QWES-HR Tag if they are part of Lely's Astronaut A3 milking robot system). The rumination data is downloaded to and stored in the herd computer after each milking or any time a cow passes under a tag reader, and is available as individual or group reports, produced by the herd management software (DataFlow, SCR, Israel). Rumination is recognized by analyzing the chewing sounds, and excluding the sounds related to eating. Data is stored in "2 hours cells", in 2 minutes resolution. The RT parameter may be applicable in 2 areas: I – nutrition management, and II - health and cow's welfare sensor. It is well accepted in the scientific literature that on the average a dairy cow ruminates about 35-40% of the day. Where ration supplies adequate physical properties, and still significant decrease in rumination has occurred, this may suggest that stress factors, such as health, management, climatic condition (heat stress) or animal welfare disturbance are involved. The objective of this study was to track changes in RT during some physiological, health, nutrition, and management and climatic events, on a commercial dairy farm.

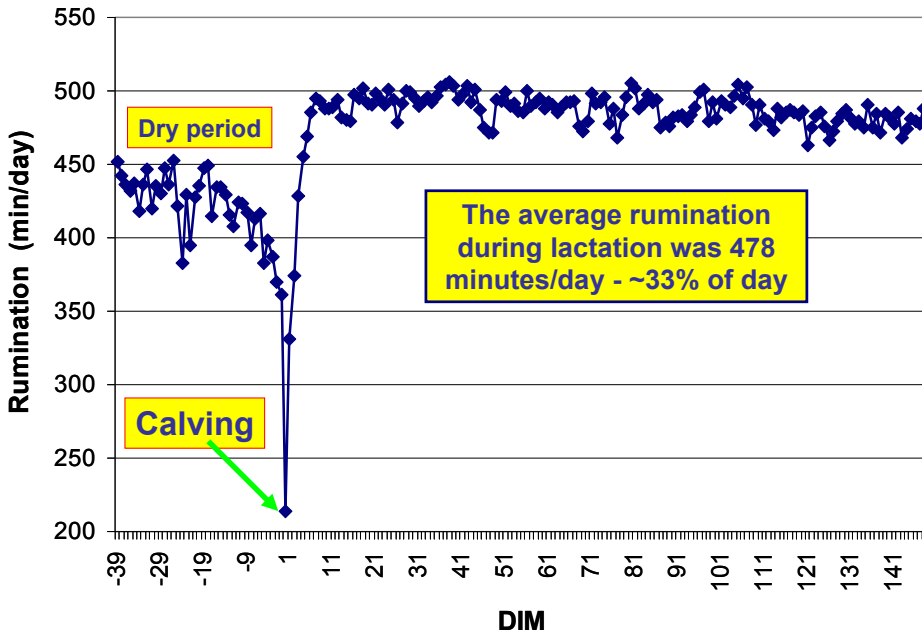
Materials and Methods

75 Holstein cows that were dried off between 10/2006 – 7/2007 were followed until 150 days in the next lactation on a commercial dairy farm (150 milking cows) in Be'erotaim, Israel. In this farm all dairy cows are equipped with HR neck collars. All rumination data and health, reproductive and management events were readily available through the herd management software. The effect of various events on daily rumination time was estimated in a mixed linear model ("Proc mixed", SAS, USA) where independent fixed effects were the type of the event on a calendar date, and independent random effect was the cow.

Results and Discussion

The average daily rumination time along the relative time line is presented in the next figure. Note the gradual decrease in rumination time in the last two weeks before calving, the sudden drop at calving, and the rapid increase in rumination in the days following the calving date. After about a week, the cow reaches usually her maximal daily rumination time and stays relatively stable on this level afterwards.

This information is used in farms equipped with these rumination (and motion) monitoring neck collars to track the smooth transition from the dry period into the next lactation. Any deviation from this norm can indicate the start of one of the common calving diseases (e.g. milk fever, retained placenta, metritis, or ketosis), and can be promptly diagnosed and treated.



Comparing the average daily rumination time of milking cows on days without any event to days with either nutritional changes (in the dry period), clinical mastitis event, calving, or estrus, a clear and significant decrease is evident on these days (next table). This result indicates the usefulness of reports based on rumination decrease from previous norm, to track potential individual cow health problems or disturbance to her normal behavior (Lindgren, 2009), and to alert on whole herd problems (e.g. inadequate cooling at hot days) or to track intentional or accidental nutritional changes (Adin et al., 2006)

	Dry ration	Closeup ration	Calving	Estrus	Trim date	Hot day	Clinical Mastitis
Events/cows	75	72	75	199	98	671	45
Estimate*	-43	-66	-255	-75	-39	-20	-63
SE	1.9	2.5	10.4	6.2	8.8	3.4	12.9

* vs. milking cow (482 min/d); all effects $p < 0.0001$

References

Adin, G., R. Solomon, M. Nikbachat, A. Zenou, E. Yosef, A. Brosh, A. Shabtay, S. J. Mabweesh, I. Halachmi, and J. Miron. 2009. Effect of feeding cows in early lactation with diets differing in roughage-neutral detergent fiber content on intake behavior, rumination, and milk production. *J. Dairy Sci.* 92:3364.

Lindgren, E. 2009. Validation of rumination measurement equipment and the role of rumination in dairy cow time budgets. Master Thesis, Swedish University of Agricultural Sciences, Department of Animal Nutrition and Management, Uppsala, Sweden.