

Preliminary Data on the Effects of Econase Supplementation on Milk Yield and Behavior of Transition Cows

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Introduction

The transition period of a dairy cow – from 3 weeks before calving to three weeks after – is considered one of the most important time periods relative to cow health, production, and profitability. Most infectious diseases and metabolic disorders occur during the transition period. This is due to a decrease in dry matter intake (DMI) observed in transition cows, coupled with an increase in nutrient requirements for milk production. This nutritional imbalance, alongside the stresses associated with calving, is largely responsible for the great numbers of health issues associated with transition cows, and results in decreases in milk production.¹

One solution to this issue is to attempt to increase nutrient availability of the feed, allowing for greater nutritional intake at the same level of DMI. Nutrient availability can be enhanced by improving the digestibility of feed, which can be achieved with the addition of enzymes such as Econase.

Econase is a non-starch polysaccharide (NSP) enzyme, also called a xylanase, produced by the company AB Vista. NSPs aid in the digestion of cellulose, a structural polysaccharide found in the cell walls of plants. Microbial populations found in the rumen of cattle naturally produce cellulases to digest cellulose in the diet, but the process is not 100% efficient. The addition of Econase to ruminant feed allows the animals to utilize a higher percentage of cellulose present, upping nutritional intake.²

It is hypothesized that the addition of Econase to transition cow diets will prevent the depression in milk production commonly observed in transition cows by increasing feed efficiency and the rate of passage of dry matter through the rumen.

However, there are concerns that Econase supplementation may change feeding behaviors, namely decreasing DMI as nutritional value of feed is increased. This could have negative effects on milk production. Thus feeding behaviors must be monitored to ensure the positive effects of enzyme supplementation.

Objectives

- To observe the impact of Econase supplementation on feeding behavior.
- To translate any behavioral changes into effects on cow production.

Procedure

Behavioral data was collected over two twenty-four hour periods, on September 28th and November 9th, 2013. Cows were observed every ten minutes, and their behavior was recorded. Behaviors were then assumed to extend over the ten minute observational period, and thus behavioral data collected was multiplied by a factor of ten to give cow behavior for the full twenty-four hours.

Behaviors measured were time spent lying down, time spent eating, and time spent ruminating.

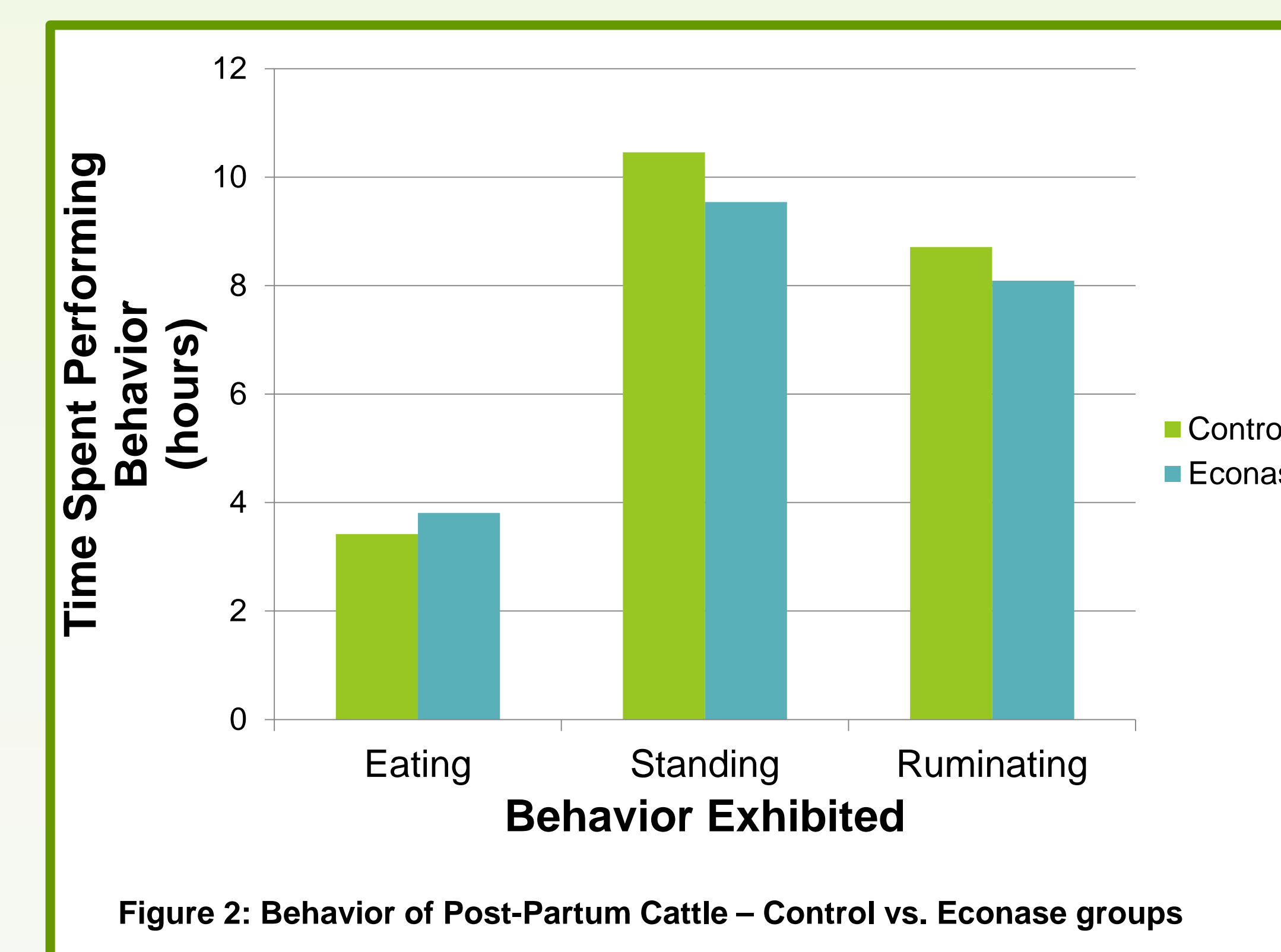
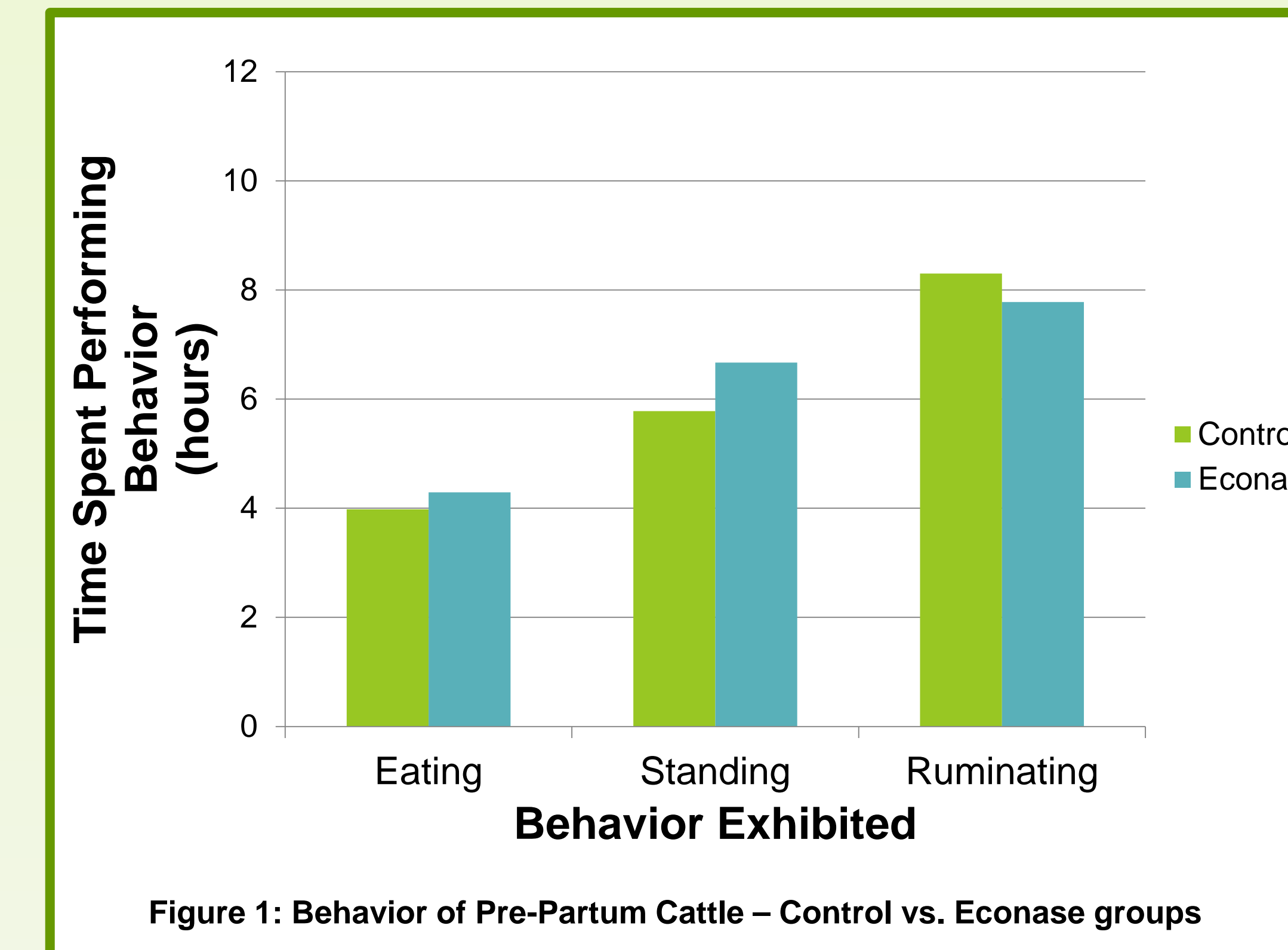
Time spent lying down has been found to negatively correlate with milk yield^{3,4}. It is theorized that this is due to higher producing cows having higher energy requirements, and thus needing to feed and ruminate more often. Optimistically, Econase would improve energy intake while maintaining or increasing lying time, and subsequently decreasing standing time. Increases in standing time are not desirable.

Rumination time has been found to be positively correlated with milk yield⁴. This is thought to be due to increased rumination of feedstuffs yielding greater levels of nutrients. Ideally, Econase will maintain rumination time while increasing nutritional output of said rumination. Decreases in rumination time are not desirable.

Eating time has not been found to correlate to milk yield, but increasing or maintaining eating times is still desirable. Since transition cows tend to have decreased DMI, it is not desirable to have eating times decrease, despite lack of direct correlation to milk yield.

Results

The preliminary results of the study are displayed below. Separate results were obtained for pre- and post- partum cows, to avoid confounding Econase results with the behavioral changes associated with calving.



P-values were not significant for any behaviors, in either the pre- or post- partum groups.

Discussion

Pre-partum and post-partum cows expressed behaviors at different rates, as was expected. Post partum cows spent significantly more time standing and less time lying than their pre-partum counterparts, as well as having less noticeable differences in eating behavior. Thus the two groups were analyzed separately, to avoid confounding variables.

Eating time was increased for the Econase groups for both pre- and post- partum cows. Ruminating time was decreased for the Econase groups for both pre- and post- partum cows. Standing time was increased for the pre-partum Econase group and decreased for the post-partum Econase group. However, none of these trends were statistically significant, and thus the null hypothesis could not be rejected.

Conclusion

It can be concluded from the preliminary data that supplementation of the diet with Econase does not alter behavior in pre- or post- partum cows. Thus it is unlikely that any differences in milk yield observed between the Econase group and the control group are the result of behavioral changes. More research is needed to examine the extent of the effects of Econase supplementation on cows.

References

1. Drackley, J. K. (1999). **Biology of Dairy Cows During the Transition Period: the Final Frontier?** *Journal of Dairy Science*. 82(11): 2259-2273. doi: 10.3168/jds.S0022-0302(99)75474-3.
2. AB Vista. (2012). **Econase from AB Vista**. Retrieved from <http://www.abvista.com/products/enzymes/xylanase/econase>.
3. Vasseur, E.; Rushen, J.; Haley, D.B.; and de Passillé, A.M. (2012). **Sampling cows to assess lying time for on-farm animal welfare assessment**. *Journal of Dairy Science*. 95(9): 4968–4977. Retrieved from <http://dx.doi.org/10.3168/jds.2011-5176>.
4. Norring, M.; Valros, A.; and Munksgaard, L. (2012). **Milk yield affects time budget of dairy cows in tie-stalls**. *Journal of Dairy Science*. 95(1): 102–108. Retrieved from <http://dx.doi.org/10.3168/jds.2010-3458>.

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