

Research Brief

Gerald D. Mechor, DVM, Elanco Animal Health



Study demographics

79 dairy herds in the Northeast and Midwest

48 nutritional professionals from 28 organizations

Herd size range: 30 to 2,800 cows; median: 370

Herd milk fat range: 2.7 to 4.3 percent; median: 3.45 percent

All herds on Rumensin; dosage range: 150 to 410 mg/hd/day; median dosage: 250 mg/hd/day

Sampling

Initial questionnaire established demographics, cow and facility-related factors, ration ingredients

TMR sample from high-cow group

Milk samples from bulk tank

Corn silage samples

Sample analysis

TMR: nutrient content (DM, CP, ADF, NDF, starch, sugar, crude fat); fatty acid analysis; Penn State Particle Separator

Bulk tank: fatty acid profile analysis

Corn silage: DM, pH, VFAs, starch, 6-h in vitro starch digestibility

A field study to investigate risk factors for milk fat depression in commercial dairies feeding Rumensin[®].

Key Observations

Milk fatty acid (MFA) profile changes

Changes in bulk tank milk fatty acid profiles with changing herd milk fat percentage were consistent with controlled experiments and the biohydrogenation (BH) theory of milk fat depression.

- Reduction in content of *de novo* synthesized milk fatty acids was associated with a reduction in herd level milk fat percentage
- As trans-10 C18:1 content of milk fat increases, herd level milk fat decreases, suggesting an increased flow of polyunsaturated fatty acids (PUFAs) through an altered BH pathway resulting in an increased flow of milk fat depressing BH intermediates out of the rumen
- Relationship between MFA profiles and milk fat content in herds fed Rumensin was similar to that of research in herds not fed Rumensin

Total mixed ration (TMR) composition

In the analysis of the TMR nutrient content, including fatty acid content, the only significant factors remaining in the TMR multivariate model were TMR dry matter (DM) and the bottom pan of the three-box Penn State Particle Separator (PSPS).

In this data set:

- TMR DM \geq 50 percent was associated with a reduction in herd level milk fat percentage
- PSPS bottom pan \geq 54 percent was associated with a reduction in herd level milk fat percentage

Rumensin effects

- No association was found between Rumensin dose and milk fat percentage
- There was no association or interaction with Rumensin dose and any other common TMR variable or ration ingredient on milk fat percentage

Fatty acids analysis

In TMR fatty acids analysis, only total monounsaturated fatty acids, specifically C16:1 and C18:1 (g/day), were associated with a reduction in herd level milk fat percentage.

Ration ingredients

Inclusion of increased amounts of hay crop silage, total forage and total silage in the TMR was associated with an increase in herd level milk fat percentage.

Milk fat depression (MFD) is a multifactorial problem. No single TMR characteristic or ration component measured in this study accounted for more than 10 percent of the variation in herd level milk fat percentage.

The only FDA-approved feed ingredient for milk-production efficiency*

- Rumensin delivers more milk per pound of feed for just pennies per head per day
- Rumensin increases milk-production efficiency throughout lactation
- Rumensin meets the U.S. Food and Drug Administration's stringent standards for effectiveness, and animal, environmental and human-food safety
- On average, Rumensin provides at least a 5:1 return on investment

*Production of marketable solids-corrected milk per unit of feed intake

Rumensin dose recommendations for dairy cows

Total mixed rations (complete feed):

Feed continuously to dry and lactating dairy cows a total mixed ration (complete feed) containing 11 to 22 g/ton monensin on a 100% dry matter basis.

Component feeding systems (including top dress):

Feed continuously to dry and lactating dairy cows a Type C medicated feed containing 11 to 400 g/ton monensin. The Type C medicated feed must be fed in a minimum of 1 pound of feed per cow per day to provide 185 to 660 mg/hd/day monensin to lactating cows or 115 to 410 mg/hd/day monensin to dry cows.

The label contains complete use information, including cautions and warnings. Always read, understand and follow the label and use directions.

For additional product information or to report a suspected adverse event associated with the use of this product, call (800) 428-4441.

ELANCO

Rumensin

Rumensin® is a trademark of Elanco's brand of monensin sodium.

© 2008 Elanco Animal Health

Elanco Animal Health
A Division of Eli Lilly and Company
2001 West Main Street
Greenfield, Indiana 46140
(800) 428-4441
www.elanco.com

AI 10495

MFD and the biohydrogenation theory

Under certain conditions, rumen biohydrogenation results in unique fatty acids that are potent inhibitors of milk fat synthesis, e.g., *trans*-10, *cis*-12 conjugated linoleic acid (CLA) and possibly related intermediates from linoleic acid and other PUFAs.

1. Small quantities of specific BH intermediates produced in the rumen when taken up by the mammary gland are sufficient to induce substantial MFD.
2. A small amount such as 1.5 to 2.0 g/d of *trans*-10, *cis*-12 CLA or a related intermediate passing to the small intestine can cause a significant decrease in milk fat (3.8 to 3.2 percent).
3. Improving our understanding of the interaction and interrelationship between dietary supply of PUFA and rumen fermentation is key to developing approaches to troubleshoot MFD.

Nutrition and management decisions may contribute to increasing risk for milk fat depressing biohydrogenation intermediates passing out of the rumen by:

1. Increasing the supply of the substrate (PUFAs) for the formation of the CLAs noted to induce MFD.
2. Altering the rumen environment in a variety of ways impacting biohydrogenation.
3. Dietary components can influence the rates of biohydrogenation, which will drive an increase in the passage of biohydrogenation intermediates, some of which contribute to MFD. Rate of passage of feedstuffs through the rumen will also contribute to an increase in the likelihood of biohydrogenation intermediates passing through the rumen.

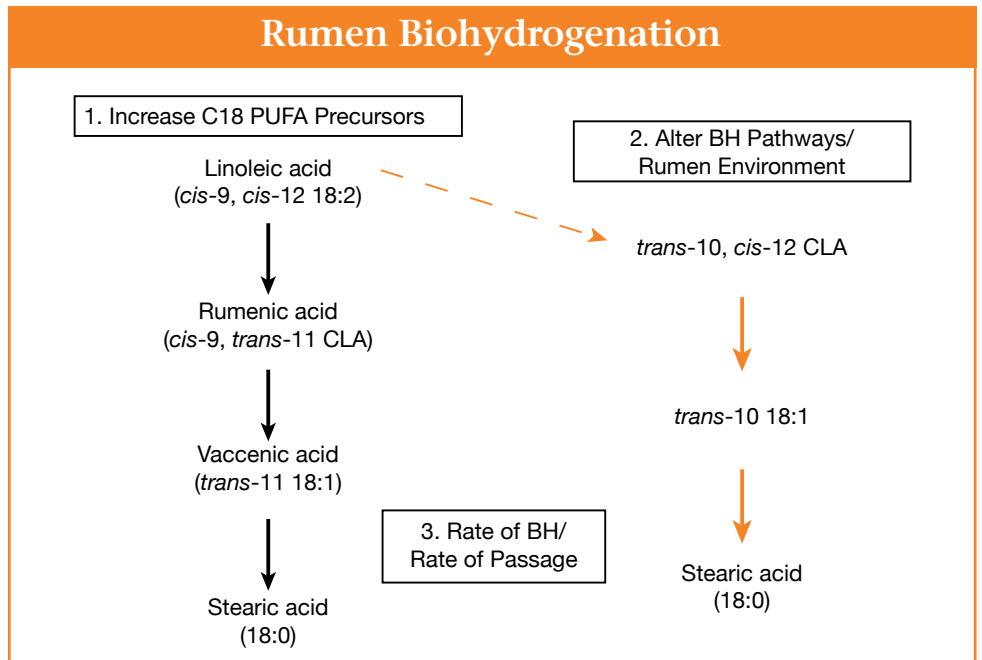


Chart courtesy of Dr. Adam Lock