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Abstract

Two Holstein cows were fed Rumensin for 12 weeks, beginning approximately 90 days postpartum. Milk production increased 7%, whereas percentage fat in milk decreased 10.3%. Percentage protein in milk increased 9.6% in the early stages and decreased 10.2% in the late stages of the study. Daily fat yield did not change, whereas protein yield increased in the early stages, but did not change in later stages. Fat corrected milk (FCM) did not change with treatment, but dry matter intake (DMI) tended to increase when Rumensin was fed. Acetate concentration did not change whereas propionate concentration increased, causing a significant decrease in ruminal acetate:propionate ratio. Rumen pH showed a nonsignificant numerical increase.; Dairy Day, 1987, Kansas State University, Manhattan, KS, 1987;

Keywords

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RUMENSIN FOR THE LACTATING DAIRY COW[1]

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Summary

Two Holstein cows were fed Rumensin for 12 weeks, beginning approximately 90 days postpartum. Milk production increased 7%, whereas percentage fat in milk decreased 10.3%. Percentage protein in milk increased 9.6% in the early stages and decreased 10.2% in the late stages of the study. Daily fat yield did not change, whereas protein yield increased in the early stages, but did not change in later stages. Fat corrected milk (FCM) did not change with treatment, but dry matter intake (DMI) tended to increase when Rumensin was fed. Acetate concentration did not change whereas propionate concentration increased, causing a significant decrease in ruminal acetate:propionate ratio. Rumen pH showed a nonsignificant numerical increase.

Introduction

Rumensin, an ionophore, is used in the beef industry to increase efficiency of gain. Rumensin affects the microflora in ruminant animals by shifting the population to a higher proportion of propionate-producing bacteria. Normally, this is not desirable in lactating cows because of the negative effect that high rumen propionate concentration has on fat content in the milk. This was a preliminary study to determine the proper dose of Rumensin prior to examining the effect of a combination of Rumensin and bovine somatotropin on milk production when treatments will begin shortly after peak lactation.

Procedure

Two third-lactation Holstein cows were ruminally fistulated and housed in tie stalls. At approximately 90 days in milk, Rumensin was added to the diet in an increasing and then decreasing step-wise fashion as follows:

Early	Late
Week 1 = 0 Rumensin	Week 9 = 450 mg/day
Week 2 = 150 mg/day	Week 10 = 300 mg/day
Week 3 = 300 mg/day	Week 11 = 150 mg/day
Week 4 = 450 mg/day	Week 12 = 0 mg/day

Week 5-8 = maintained on high (450-600 mg/day) level of Rumensin. Ruminal samples were collected three times per week during weeks 1-4 and weeks 9-12.

Results and Discussion

Milk production data are presented in Table 1 and ruminal traits and DMI are summarized in Table 2.

[1] Rumensin® is an experimental product not approved by the U.S. Food and Drug Administration (FDA) for use in lactating dairy cows.

Table 1. Effect of level of Rumensin on various milk traits

Trait	Stage	Level of Rumensin (mg/day) 0	150	300	450
Milk yield (lb/day)		41.6[a]	44.0[b]	44.5[b]	44.1[b]
Fat (%)		3.88[a]	3.48[b]	3.59[b]	3.57[b]
Fat (lb/day)		1.59	1.52	1.57	1.55
F.C.M. (lb/day)		40.4	40.4	41.1	40.8
Protein (%)*	Early	2.80[a]	3.0[b]	3.04[b]	3.07[b]
	Late	3.24[a]	3.04[b]	3.00[b]	2.91[b]
Protein (lbs/day)*	Early	1.22[a]	1.41[b]	1.43[b]	1.40[b]
	Late	1.22	1.22	1.23	1.25

[a,b]Values in same row with different superscripts are different (P<.01).
*Stage by treatment interactions. Listed by stage.

Table 2. Effect of level of Rumensin on various rumen traits

Traits	Level of Rumensin 0	150	300	450
Rumen pH	5.42	5.96	6.32	6.27
Acetate (mmole)	69.6[a]	68.9	72.1	70.1[b]
Propionate (mmole)	21.2[a]	23.5	23.7	27.0[b]
Acetate:Propionate	3.33[a]	3.00	3.06	2.68[b]
DMI	30.2	33.2	39.8	38.5

[a,b]Values in same row with different superscripts are different (P<.01).

Milk production traits (yield, % fat, % protein, lb protein) changed significantly at the initial (150 mg) level of Rumensin but did not change thereafter. Propionate concentration increased and acetate:propionate ratio decreased as the level of Rumensin increased. Plausible explanations for these results include: 1) The increase in propionate concentration in the rumen resulted in an increase in the rate of milk and milk protein synthesis, while fat synthesis did not change. This would explain why fat percent decreased while daily milk fat yield did not change. 2) Rumensin is noted to have a protein-sparing effect that may have caused an increase in protein synthesis in the mammary gland during earlier lactation. In the later stages, glucogenic (glucose-like) nutrients were in adequate supply, removing the benefits of rumensin and causing no change in protein yield. 3) These changes may be from the benefit of Rumensin as a coccidiostat. The initial level of Rumensin may have eliminated subclinical coccidiosis, allowing the cows to produce more milk.