Rumen Stability of Two Rumen-Protected Choline Products

Jennifer Ann Lynch

Supervisor: Dr. Maurice Eastridge
Advisor: Dr. Keith Irvin

ABSTRACT

The goals of the modern dairy producer are much higher than those of past producers. Therefore, emphasis on vitamins and dietary supplements is required to ensure that dairy cows are healthy and are able to meet the high production demands placed upon them. This project is very much a part of this ultimate goal as it examines the effects two rumen-protected choline products have on the dry matter (DM) and nitrogen (N) disappearance in rumen digesta. In this experiment, 2 rumen-protected choline products, [ProCholine™ 50 (P-50), Probiotech, Inc., St-Eustache, QC, Canada; and Reashure®, Balchem Encapsulates, New Hampton, NY] were incubated in situ in 2 rumen cannulated cows. Dacron bags containing the product samples were placed into the rumen of each cow. Two bags per product (~ 2.5 g of product) per cow were removed at the same time intervals: 0, 2, 4, 6, 12, 24, and 48 hours. The material remaining in the bags after incubation were analyzed for DM (105oC oven overnight), N (Kjeldahl, strong acid method). DM analysis showed that Reashure® is a much more rumen-stable product, as its rate of disappearance was 1.15% per hour with a rumen degradation of 2.62% over 48 hours. ProCholine™ 50, however, had a 27.50% per hour disappearance and degraded 38.70% over 48 hours. Nitrogen analysis reaffirmed this trend: Reashure® had a 1.75%per hour rate of disappearance and a 12.54% degradation over 48 hours. Pro-Choline ™ 50 had a 16.85% rate of disappearance and a 57.30% degradation over 48 hours.

INTRODUCTION

There is currently a vast amount of research in the areas of genetics, reproduction, nutrition, and management, all of which are aimed at meeting the needs of the higher-producing dairy cow. While all of these areas of study are important and relevant, emphasis on vitamins and dietary supplements is also required to ensure that dairy cows are able to meet the high production demands placed upon them. This project concerning supplemental rumen-protected choline is therefore very much a part of this ultimate goal. A dairy farmer may be able to improve the overall health of his herd, as well as maximize pounds of milk, simply by adding a supplement to the daily total mixed ration (TMR). However, with the expense of this product (~$2.60/lb; $0.35/cow/day), its effectiveness must be proven before producers will be willing to use it. Also, it is known that choline chloride is degraded in the rumen and that a viable choline supplement must be protected from ruminal degradation for it to reach the small intestine for absorption (Deuchler et al., 1996). Therefore, research concerning this supplement is needed in order to make it a valuable asset to the dairy industry.

OBJECTIVES

The use of supplemental rumen-protected choline in lactating dairy cows arouses several questions concerning bovine health and milk yield but this study will focus on the following question: Which choline product is the most effective in terms of resistance to ruminal degradation?

MATERIALS AND METHODS

Experimental Design:

- 2 dry rumen-cannulated Holstein cows
- 12 dacron bags containing about 5 g of each product were placed into each cow (24 total bags/cow)
- 2 bags/sample were removed from each cow at 2, 4, 6, 12, 24, and 48 hours
- 2 bags for each product were washed in warm water to measure washout (A pool)

Laboratory Analyses:

- DM analysis
- N analysis

RESULTS

The results of this trial were very clear as to which product would be of greater benefit in the dairy industry. DM analysis showed that Reashure® is a much more rumen-stable product, as its rate of disappearance was 1.15% per hour with a rumen degradation of 2.62% over 48 hours. ProCholine™ 50, however, had a 27.50% per hour disappearance and degraded 38.70% over 48 hours. Nitrogen analysis reaffirmed this trend: Reashure® had a 1.75%per hour rate of disappearance and a 12.54% degradation over 48 hours. Pro-Choline ™ 50 had a 16.85% rate of disappearance and a 57.30% degradation over 48 hours.

Table 1. Rate of disappearance of two choline products

Product	Item	A pool (%)	B pool (%)	C pool (%)	Kd (/h)	Rumen Degrad (%)
Reashure	DM	1.45	6.28c	92.27a	0.0115	2.62a
P-50	DM	19.15	24.37d	56.48b	0.2750	38.70b
Reashure	N	7.23c	27.83	64.94c	0.0175	12.54a
P-50	N	37.02d	32.35	30.63d	0.1685	57.30b

Ab Means in the same column within variable with different superscripts differ ($P < 0.05$)
cd Means in the same column within variable with different superscripts differ ($P < 0.10$)

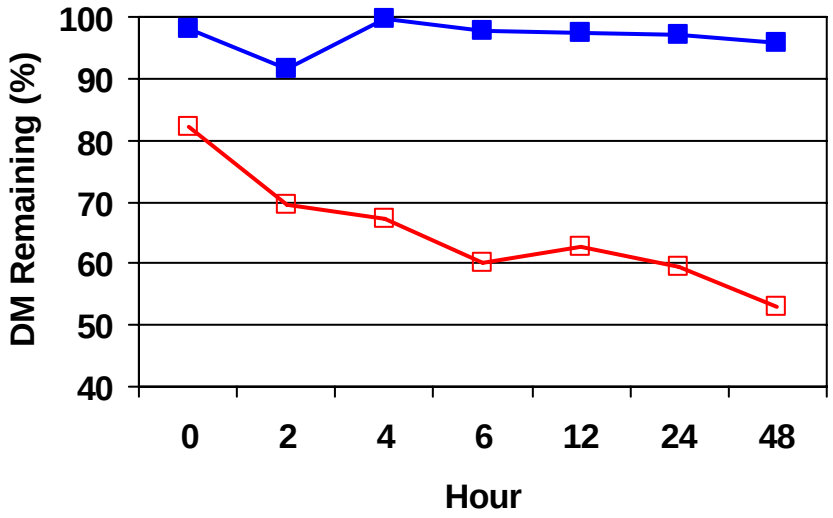

Figure 1. N remaining after each hour of incubation (-■- Reashure; -□- Procholine-50).

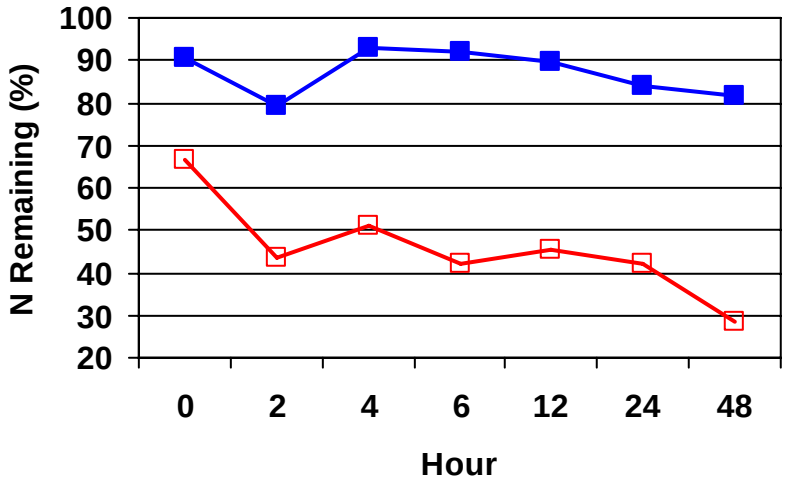

Figure 2. DM remaining after each hour of incubation (-■- Reashure; -□- Procholine-50).

CONCLUSION AND FUTURE STUDIES

This trial confirmed the greater effectiveness of Reashure® over ProCholine ™ 50. Further studies using lactating dairy cows are needed to confirm the industrial viability of using rumen-protected choline products and their benefit to the dairy industry.

REFERENCES

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