



balchem[®]

ReaShure[®]-***XC***
Precision Release Choline

Balchem Research Summary

In Situ Evaluation of ReaShure[®]-XC and Four
Competitive Rumen Protected Choline Products

Background

Choline is essential for the growth and health of all animals and humans. It is a biochemical building block and precursor to numerous compounds necessary to support life. However, for supplemental choline to elicit biological responses in the cow, choline needs to be digested in the small intestine. But before arrival at the small intestine, an encapsulated choline product must first be tough enough to withstand the rigors of mixing, transportation, storage and the rumen microbial environment. Because free choline is almost completely degraded in the rumen^{1,2}, proper ruminal protection is essential for choline to be available for small intestine digestion. The different technologies used to manufacture these products can greatly affect the level of protection provided in the rumen. Thus, evaluating the rumen stability of protected choline products is necessary.

Objective

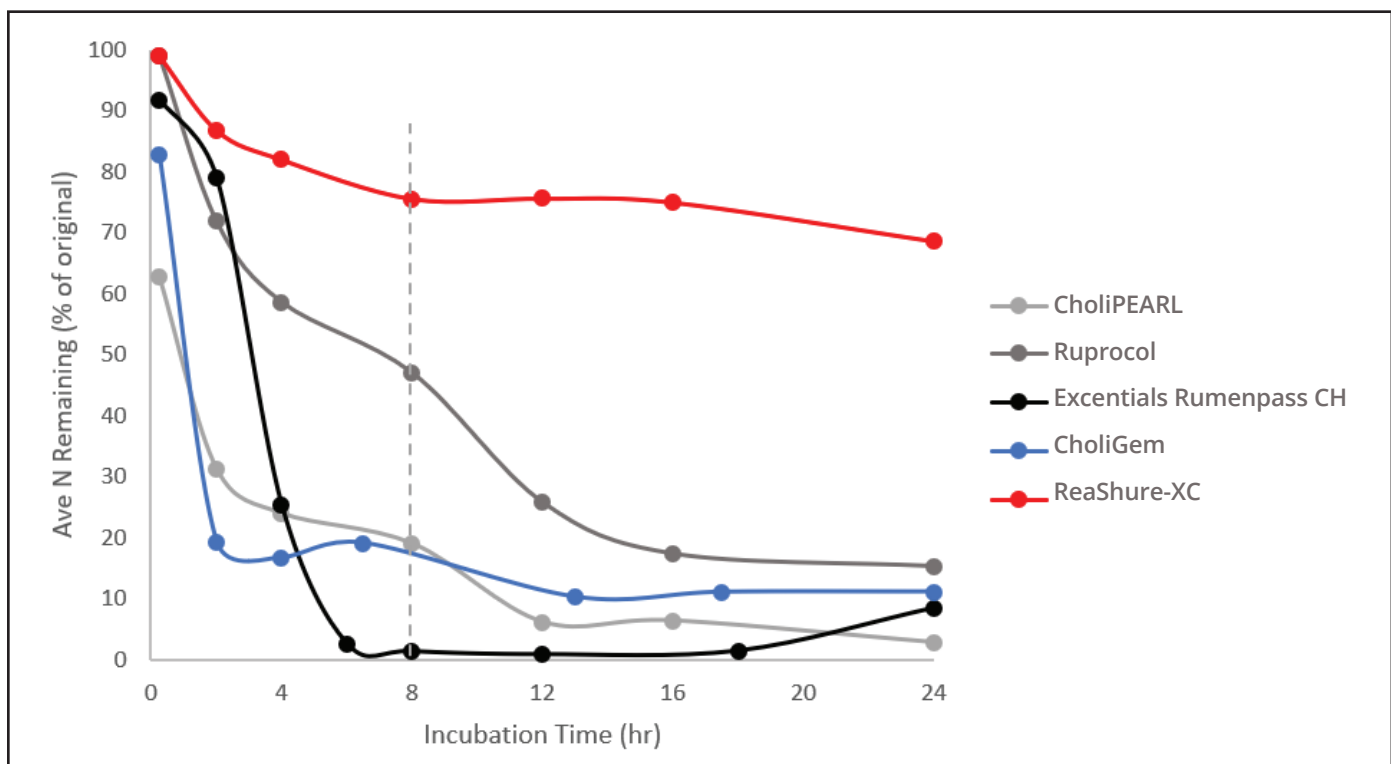
In this experiment, ReaShure®-XC, CholiPEARL®, Ruprocol®, Excentials RumenPass CH and CholiGem™, five commercially available rumen protected (RP) choline products, were tested *in situ* at various incubation times in the rumen to determine the efficacy of each product's ruminal protection mechanism.

Method

A 3rd party laboratory, Cumberland Valley Analytical Services (CVAS) located in Waynesboro, PA (USA), evaluated all five RP-choline products for ruminal degradation utilizing an *in situ* procedure. Duplicate samples of the RP-choline products were individually sealed into dacron bags (5×10cm, 50 µm pore size, Ankom Technology) and were suspended in the rumen of three cannulated lactating cows for 0.25, 2, 4, 8, 12, 16 and 24 hr. Nitrogen (N; proxy for choline) content was determined for each product at each time point. Samples of each product that were not rumen incubated (0 hr) were also analyzed for N content. Nitrogen disappearance at each timepoint was calculated and reported as a percent of the original N for each product (Figure 1).

Figure 1.

Rumen *In Situ* Nitrogen Stability of RP-Choline Products.



Results

CholiPEARL[®], CholiGem[™] and Excentials RumenPass CH lost a majority of their choline after just a short period of incubation time in the rumen (4 hrs or less - Figure 1). As rumen incubation time increased, all products continued to degrade. By 8 hrs (the typical rumen retention time for these types of products), less than 50% of the choline content was remaining in all the competitive products. On the contrary, ReaShure[®]-XC was consistently more stable over time and by 8 hrs, 75% of the choline content survived ruminal degradation.

Conclusions

The first requirement for an effective rumen protected choline is to shield the choline from ruminal degradation.

ReaShure[®]-XC was the only product tested that protected the majority of its choline payload from being destroyed in the rumen.

The other products tested, CholiPEARL[®], CholiGem[™], Excentials RumenPass CH and Ruprocol[®], provided very little ruminal protection, losing the vast majority of their choline payload before it could even make it to the small intestine for absorption.

Not all rumen protect choline products are created equal. ReaShure[®]-XC's encapsulation technology is far more effective in protecting choline from the harsh rumen environment when compared to CholiPEARL[®], CholiGem[™], Excentials RumenPass CH and Ruprocol[®].

References

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2. Sharma, B.K. and R.A. Erdman. 1988. Effects of High Amounts of Dietary Choline Supplementation on Duodenal Choline Flow and Production Responses of Dairy Cows. *J Dairy Sci.* 71: 2670-2676.

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