

Effects of feeding LysiPEARL™ and rumen-protected lysine sources on plasma lysine concentration in lactating dairy cows.



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INTRODUCTION

Lysine is an amino acid that is often limiting for milk and milk protein production in lactating dairy cow diets². Blood meal is often supplemented as a means to meet dietary lysine demands; however, it can be inconsistent in RUP levels and intestinal digestibility of RUP based on the method of drying¹. Commercial sources of rumen-protected lysine offer a more consistent method to balance metabolizable protein lysine for lactating dairy cows.

OBJECTIVES

These trials were designed to evaluate the effects of commercial rumen-protected lysine sources on plasma lysine concentration.

MATERIALS AND METHODS

Trial 1-

- Conducted July, 2009 at the SDSU Dairy Research and Training Facility
- 30 mid-lactation Holstein dairy cows housed in a free-stall barn until day of sampling
- Cows received 1 of 4 top-dressed treatments which were blended into 900 g of ground corn
- Treatments (n = 6) were designed to deliver 150 g of lysine HCL and included: 1) RPLT1, 2) LysiPEARL™ (Kemin Industries, Inc.), 3) P1BT, and 4) unprotected lysine HCL (ADM, Inc.)
- Plasma samples were collected 0.5 h prior to treatment administration and every 2 h thereafter for 20 h
- Plasma samples were analyzed for amino acid concentrations

Trial 2-

- Conducted December, 2011 at the SDSU Dairy Research and Training Facility
- 8 mid-lactation Holstein dairy cows were assigned to 1 of 2 treatments (n = 4)
- Treatments were TMRs including: 1) 2.27 kg (DM basis) of Soy Best[®] or 2) 2.27 kg of Soy Best[®] fortified with LysiPEARL™
- Treatments were fed for 8 d with blood samples taken on d -1 and d 8 relative to the start of the experiment
- Plasma samples were collected at 0.5 h before treatment feeding and every 2 h thereafter for 20 h
- Plasma samples were analyzed for amino acid concentrations

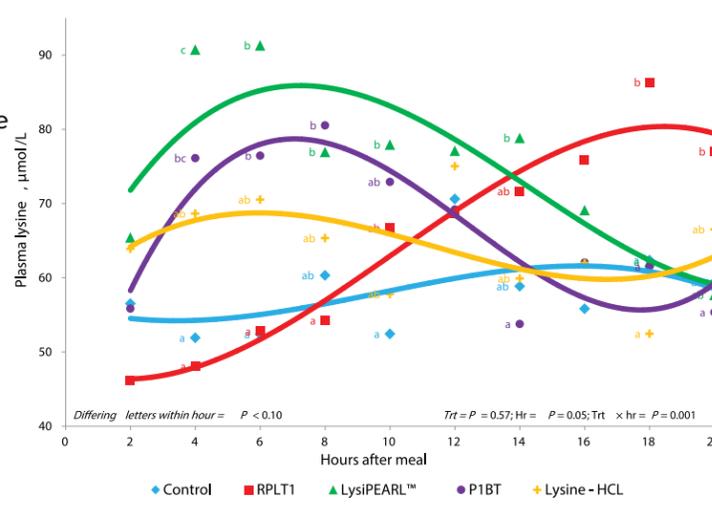
STATISTICAL ANALYSIS

Statistics were completed using SAS[®] 9.3 for both experiments. Models used in the MIXED procedure included cow, treatment, hour and treatment x hour. Baseline measures of plasma lysine prior to treatment administration were used as a covariate for experiment 1. Means were separated using the PDIFF statement to identify treatment x hour interactions.

RESULTS

Trial 1- LysiPEARL™ demonstrated effects of improving plasma lysine concentrations within 4 - 6 h after feeding in comparison with cows supplemented with unprotected lysine HCL. RPLT1 had a delayed effect in improving plasma lysine concentration. Plasma lysine concentrations were not affected by P1BT when compared with the control. Further investigation yielded information that the P1BT product had been damaged prior to trial, resulting in cracks in the product coating.

Figure 1- Plasma lysine response to protected lysine products and lysine HCL



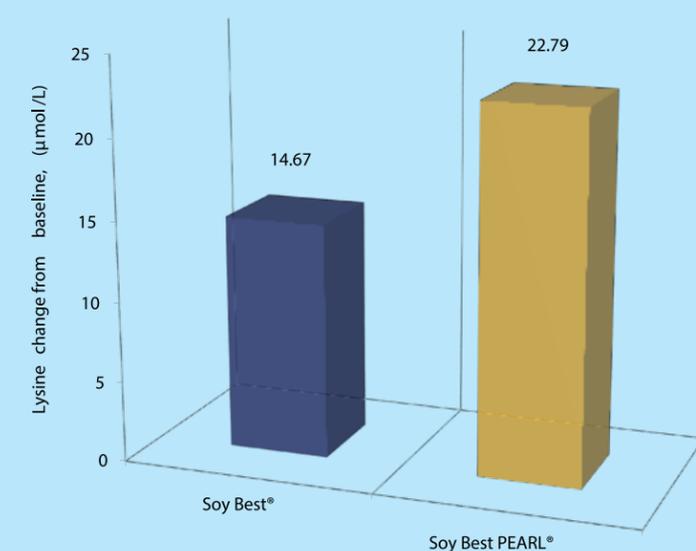
Trial 2- The addition of LysiPEARL™ to Soy Best[®] resulted in minimal treatment or treatment x time interactions (Figure 2). Low animal numbers per treatment may have led to difficulties in demonstrating significant treatment mean differences when dosed with lysine at the experimental level (68 g LysiPEARL™).

Table 1-

PRODUCT	LYSINE CONTENT	PLASMA LYSINE INCREASE PER UNIT OF PRODUCT LYSINE
Soy Best [®]	2.25%DM	$\frac{14.67\mu\text{mol/L}}{2.25\%DM} = 6.520$
Soy Best PEARL [®]	3.35%DM	$\frac{22.79\mu\text{mol/L}}{3.35\%DM} = 6.803$

Soy Best PEARL Lys = Soy Best Lys X 1.5

Figure 2- Plasma lysine concentration change from baseline (µmol/L) from cows fed diets formulated with Soy Best[®] or Soy Best PEARL[®]. Trt = P = 0.30; Hr = P = 0.07; Trt x hr = P = 0.24.



Supplementing cows with Soy Best PEARL[®] resulted in a 4.34% increase in plasma lysine concentration per unit of product lysine compared with Soy Best[®] (Table 1).

ΔSoy Best PEARL plasma Lys = ΔSoy Best plasma Lys X 1.5

CONCLUSION

The results demonstrate that rumen-protected lysine products are effective in increasing plasma lysine concentration when fed alone or when inserted into gums and combined with mechanically extracted soybean meal.

ACKNOWLEDGEMENTS

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