



Added Lysine Can Fortify Soybean Meal TMR & Lysine Study

Background

A study at Miner Institute showed evidence that physical contact with total mixed ration (TMR) ingredients resulted in approximately 40% of the lysine in Kemin LysiPEARL[™] rumen-protected lysine being released during a 12-hour period (Ji et al., 2012). This is in line with Kemin LysiPEARL literature which shows a rumen undegraded protein (RUP) value for LysiPEARL of 54% of crude protein (RDP 46%). This study did not report rumen undegraded lysine (RU-lys) or intestinal digestibility of RU-lys. Therefore, intestinally available dietary lysine (IAD-lys) could not be calculated in the Miner study.

Question

Do the pools of lysine in Soy Best, Soy Best PEARL and LysiPEARL behave similarly or differently when exposed to a TMR environment?

Study

The present study, as reported in the Journal of Dairy Science,⁴ quantified the appearance of free lysine in water extracts taken from a corn silage-based diet mixed with various rumen protected lysine products during aerobic exposure for 0, 6, 18 and 24 hours at two moisture levels. The products were Soy Best (P1), Soy Best PEARL (P2, P3 and P5) and LysiPEARL (P4).

Soy Best PEARL is manufactured by injecting LysiPEARL into fresh soy gums and applying the gums onto Soy Best. This study would determine if the pool of native lysine and the pool of fortified lysine in Soy Best PEARL behave similarly or differently in a TMR environment.

Figure 1. Products in low moisture ration (48% moisture). Ration derived free lysine subtracted. NOTE: P1, P2, P3, P5 on left Y-axis; P4 on right Y-axis.

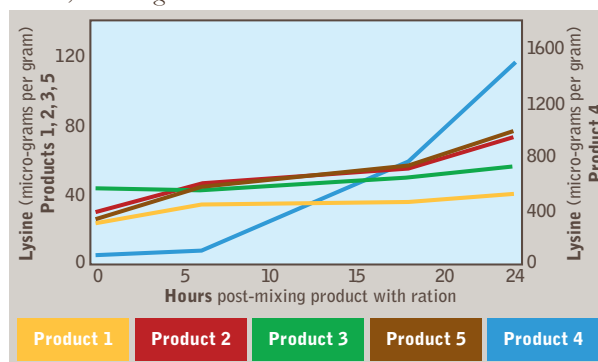
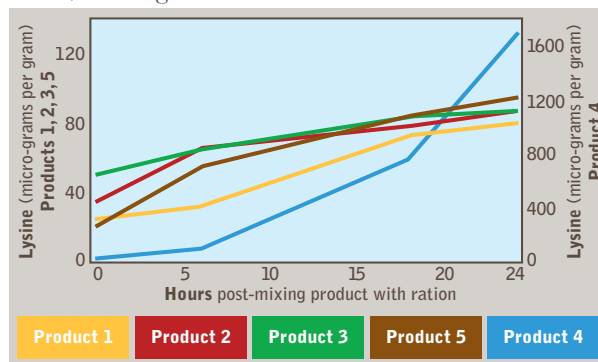


Figure 2. Products in high moisture ration (58% moisture). Ration derived free lysine subtracted. NOTE: P1, P2, P3, P5 on left Y-axis; P4 on right Y-axis.



Results

The linear trend of lysine release from Soy Best PEARL and Soy Best were not different ($p=0.25$ at L; $p=0.81$ at H), on an actual basis (Figures 1 and 2) or a log basis (Figures 3 and 4). Soy Best had a significantly lower intercept compared to Soy Best PEARL, consistent with the lysine content of the two products: 6.26 versus 9.37 lysine % of RUP for Soy Best and Soy Best PEARL respectively, as reported in product literature. Soy Best PEARL RUP contains 1.5 times more lysine compared to Soy Best. In another study (Weich et al., 2013), plasma lysine was increased 33.3 mg/dL by Soy Best PEARL and 21.4 mg/dL by Soy Best, or 1.56 times more (Figure 5).

The similarity in lysine release rate for Soy Best and Soy Best PEARL in the present study is also consistent with results from a previous study (Macgregor et al., 2012), in which rumen-undegraded lysine was 62.9 and 61.1% of lysine for Soy Best and Soy Best PEARL respectively and were not significantly different. Intestinal digestibility of rumen undegraded lysine in the previous study, measured by means of an in vitro enzymatic procedure, was significantly ($P < 0.05$) higher for Soy Best PEARL (89.9%) than for Soy Best (83.0%).

Conclusions

1. Lysine release rate from Soy Best is not different from Soy Best PEARL in a TMR environment.
2. Because of the gums technology, the native lysine and the fortified lysine in Soy Best PEARL behave as one pool in regard to a TMR environment and to rumen kinetics.
3. Intestinal digestibility of RU-lysine in Soy Best PEARL is significantly greater than in Soy Best, apparently due to the high digestibility of the RU-lysine from LysiPEARL.¹

Footnotes:

1. Macgregor, C. A., K. Kalscheur and D. Sapienza. Added lysine can fortify soybean meal. *Feedstuffs*. Vol. 84, No. 29, July 16, 2012.
2. Weich, W.D., K.F. Kalscheur, F.R. Valdez, C.A. Macgregor Jr. 2013. Effects of feeding LysiPEARL™ and rumen-protected lysine sources on plasma lysine concentration in lactating dairy cows. *J. Dairy Sci.* Vol. 96, Suppl. 1, Abstract W71.
3. Ji, P., C. S. Ballard, R. E. Clark, B. M. Sweeney, C. Kokko. 2012. Assessment of lysine released from rumen-protected lysine products exposed to high and low moisture TMR over 24 hours. *J. Dairy Sci.* Vol. 95 (Suppl. 2):356 (Abstr. #T294).
4. Sapienza, D. A. and C. A. Macgregor, Jr. 2013. Lysine loss during aerobic exposure of a corn silage based ration with mechanical extracted soybean meal with gums and various rumen-protected lysine products. *J. Dairy Sci.* Vol. 96, Suppl. 1, Abstract T35.

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Figure 3. Log basis linear trend of lysine release in low moisture ration (48% moisture).

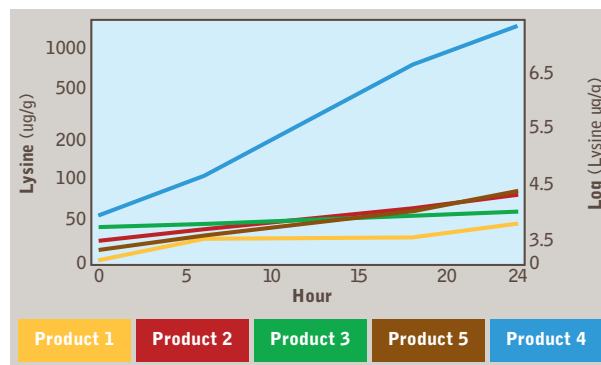


Figure 4. Log basis linear trend of lysine release in high moisture ration (58% moisture).

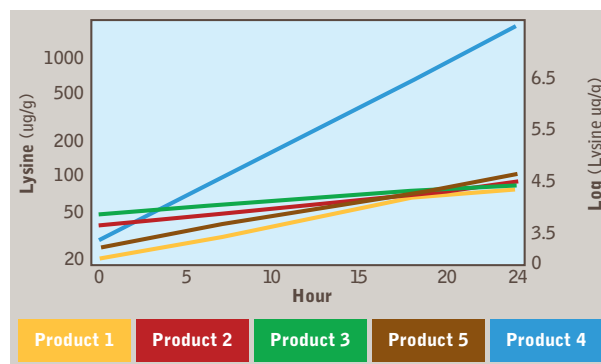
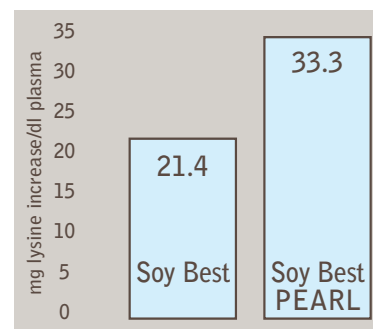


Figure 5. Increase in plasma lysine from feeding Soy Best or Soy Best PEARL to lactating Holstein cows




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