

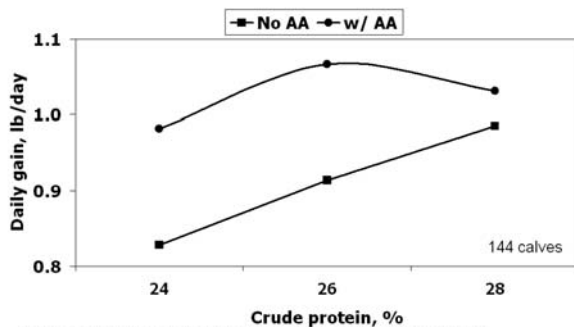


## Milk Replacer Research Amino acids for milk replacers fed at high rates

Previously, we have shown the positive effect that amino acids had on the performance of calves fed conventional milk replacers fed at 1 lb per head daily. More recently we have conducted a series of trials investigating the amino acid concentrations in Pinnacle MR (26% CP, 17% fat, fed at 1.5 lb of powder daily).

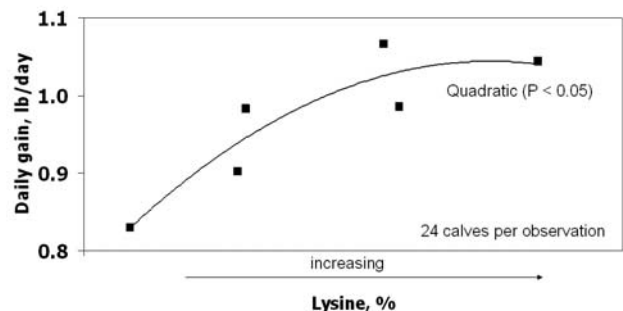
Note the effects of CP and amino acids shown in Figure 1. Here calves were fed one of six MR contained graded concentrations of CP with or without added lysine and methionine. Calves fed the diets with added amino acids grew 5 to 18% faster than calves fed the diets without added amino acids. In fact, calves fed the 24% CP MR with added amino acids grew as fast as the calves with 28% CP without added amino acids. Although, not shown, calves fed MR with added amino acids were more efficient than calves receiving MR without amino acids.

Figure 1. Effect of crude protein concentration and adding synthetic amino acids (AA) on body weight gain.



Calves fed 17% fat MR fed at 1.5 lb per day and weaned at 28 days.

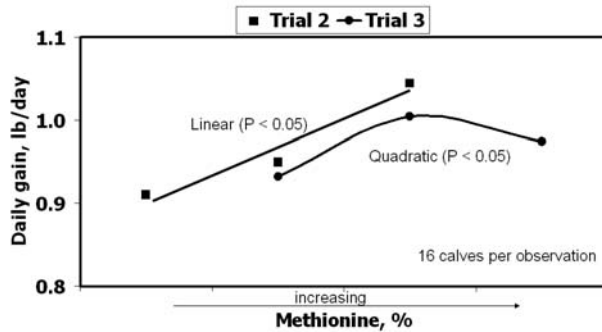
Figure 2. Effect of added lysine on body weight gain in Trial 1.



Calves fed 26% CP, 17% fat MR fed at 1.5 lb per day and weaned at 28 days.

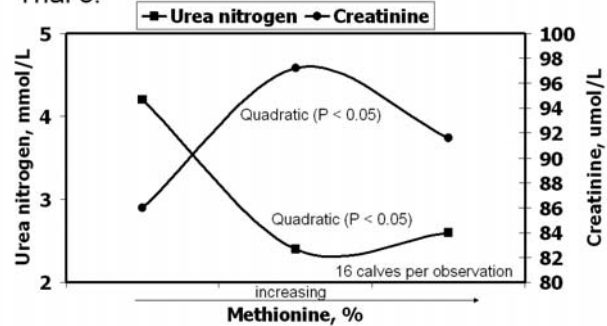
In Figures 2 – 4, we present the data on the effects of added lysine and methionine to the MR. In Trial 1, body weight gain responded quadratically to lysine (Figure 2). In Trial 2, gain responded linearly to methionine (Figure 3). When we replaced the low methionine MR with a higher concentration of methionine in Trial 2, there was quadratic response in gain to methionine. In Trial 3, we also measured several serum constituents. Serum urea nitrogen and creatinine responded quadratically to methionine concentration in the MR, matching well with the growth data (Figure 4). The reduction in serum urea nitrogen indicates a more efficient use of protein in the MR. The increase in creatinine indicates more muscle accretion and mass. There was a similar improvement in efficiency of gain to adding both lysine and methionine (data not shown).

Figure 3. Effect of added methionine on body weight gain.



Calves fed 26% CP, 17% fat MR fed at 1.5 lb per day and weaned at 28 days.

Figure 4. Effect of added methionine on serum urea nitrogen and creatinine concentration in Trial 3.

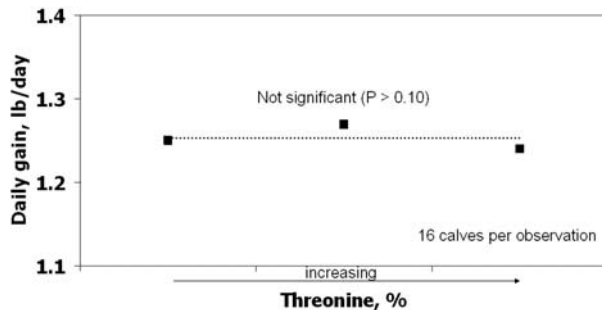


Calves fed 26% CP, 17% fat MR fed at 1.5 lb per day and weaned at 28 days.

Body weight gain did not respond to threonine concentration of the MR (Figure 5), however, serum urea nitrogen responded quadratically to threonine (Figure 6). The decrease in serum urea nitrogen at the intermediate threonine concentration does indicate that this concentration of threonine may be closer to correct, yet the impact on measured gain was numerically small and not statistically significant.

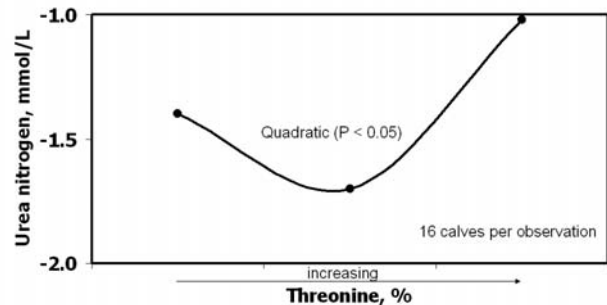
We also have evaluated the effects of adding arginine to Pinnacle MR. There was no response to arginine (data not shown).

Figure 5. Effect of added threonine on body weight gain in Trial 4.



Calves fed 26% CP, 17% fat MR fed at 1.5 lb per day and weaned at 28 days.

Figure 6. Effect of added threonine on change in serum urea nitrogen concentration in Trial 4.



Calves fed 26% CP, 17% fat MR fed at 1.5 lb per day and weaned at 28 days.

**SUMMARY:**

Body weight gain was improved by more than 15% when Pinnacle MR was formulated for the correct amino acid balance. Efficiency of gain was also improved with formulation for amino acids.

Reference: J. Dairy Sci. 91:2433-2442 (2008)