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Amino Acid Supplementation to Growing Heifers Fed Soypass®

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Growing heifers fed Soypass® do not benefit from additional supplementation of amino acids.

Summary

Sixty individually fed heifers were used in an 84-day growing trial to determine effects of adding rumen protected methionine and/or bloodmeal on performance of growing heifers supplemented with Soypass®. Treatments were designed to be a 2x2 factorial with diets supplemented with or without rumen protected methionine and bloodmeal (0.3% of DM) to provide 0.72 g per day of additional histidine as factors. The rumen protected methionine source, Smartamine M®, provided 1.85 g per day of additional methionine. No statistical differences in performance among treatments were observed, suggesting growing animals fed Soypass® do not benefit from addition of supplemental rumen protected methionine or bloodmeal.

Introduction

Soypass® is a commercially available protein supplement produced by nonenzymatic browning of soybean meal. The treatment results in a product with similar CP content to soybean meal, but 80% of the protein bypasses the rumen compared to 30% undegraded intake protein (UIP) in soybean meal *(1999 Nebraska Beef Report* pp. 65-66). Thus, total metabolizable protein supplied to the animal is increased by feeding Soypass® rather than soybean meal and gain and protein efficiency (*1988 Nebraska Beef Report,* pp. 48-51) are improved.

Growing cattle may be limited by specific amino acids such as lysine, methionine, cysteine, and histidine (*1999 Nebraska Beef Report,* pp. 14-15). To determine which of these amino acids might be limiting and the severity of their deficiency, a review of literature was conducted. Using assumed intakes and gain from similar previous research trials, the amino acid compositions of soybean meal and omasal samples from animals on similar diets were compared to the amino acid requirements for growing animals to achieve maximum gain. A summary of the results of these calculations is provided in Table 1. Based on these analyses, it was determined that methionine and histidine might be limiting gain. Bloodmeal is an excellent source of UIP (89% of CP), and is relatively high in histidine (6.45% of UIP). The objective of this trial was to determine if growing cattle supplemented with Soypass® could benefit from additional supplementation of methionine and histidine from bloodmeal.

Procedure

An 84-day calf growing trial was conducted to determine the effect of additional supplementation of methionine and bloodmeal to calves supplemented with Soypass as a protein source. Sixty heifer calves (466+ 42 lb) were blocked by weight and assigned randomly to one of four protein supplementation treatments in a 2x2 factorial design. Treatments were: 1) Soypass® (SP); 2) Soypass® + methionine (SP+MET); 3)Soypass® + bloodmeal (SP+BM); and 4) Soypass® + methionine + bloodmeal (SP+MET+BM). There were 15 heifers per treatment. Heifers were individually fed a diet containing 40% sorghum silage, 30% corn bran, 20% ground corn cobs, and 10% supplement (Table 2). Supplements were formulated to contain equal amounts of UIP based on NRC requirements. Supplements containing bloodmeal were formulated to provide 0.72 grams per day of additional histidine. Supplements containing supplemental methionine were formulated to provide 1.85 grams per day of rumen protected methionine from Smartamine

Table 1. Balance of amino acids for growing animals fed a high forage diet and soybean meal.

Amino acid (g/day)	Supply[a]	Requirement[b]	Balance[c]
Lysine	36.4	33.0	+3.4
Methionine	13.4	15.4	-2.0
Cysteine	12.9	11.8	+1.1
Histidine	11.8	12.9	-1.1

[a]Calculated from amino acid composition of metabolizable protein from diet and soybean meal.
[b]Calculated from amino acids required for maximal gain as % of metabolizable protein supply.
[c]Calculated as supply - requirement.

Table 2. Composition of supplements (percentage of DM) fed to growing heifers.

Ingredient	Treatment			
	SoyPass Control[a]	SoyPass + Bloodmeal[ab]	SoyPass + Smartamine M[ac]	SoyPass + Bloodmeal + Smartamine M[abc]
Soypass	37.5	31.6	37.5	31.6
Fine ground milo	26.4	29.3	25.8	28.8
Urea	12.6	12.6	12.6	12.6
Limestone	7.1	7.1	7.1	7.1
Dicalcium phosphate	6.5	6.5	6.5	6.5
Salt	3.0	3.0	3.0	3.0
Bloodmeal	—	3.0	—	3.0
Smartamine M	—	—	0.6	0.5
Potassium Choride	2.8	2.8	2.8	2.8
Tallow	2.0	2.0	2.0	2.0
Ammonium sulfate	0.8	0.8	0.8	0.8
Selenium premix[d]	0.5	0.5	0.5	0.5
Trace mineral premix[e]	0.5	0.5	0.5	0.5
MGA[f]	0.2	0.2	0.2	0.2
Vitamin premix[g]	0.1	0.1	0.1	0.1

[a]Supplements were formulated to provide equal amounts of undegradable intake protein.
[b]Supplements were formulated to provide 0.72 g/day histidine from bloodmeal.
[c]Supplements were formulated to provide 1.85 g/day methionine from Smartamine M.
[d]Premix contained .06% Se.
[e]Premix contained 10% Mg, 6% Zn, 4.5% Fe, 2% Mn, .5% Cu, .3% I, and .05% Co.
[f]Supplements were formulated to provide 0.5 mg per head per day MGA.
[g]Premix contained 5,000 IU vitamin A, 3000 IU vitamin D, 3.75 IU vitamin E per gram of premix.

Table 3. Performance data.

Item	Treatments[a]				SEM	P-Value		
	SP	SP + SM	SP + BM	SP + BM + SM		BM[b]	SM[c]	Inter[d]
ADG, lb	1.88	1.85	1.99	1.94	0.06	0.12	0.59	0.87
Intake, lb	12.55	12.36	12.65	12.48	0.21	0.59	0.38	0.97
Feed:gain	6.71	6.78	6.47	6.47	0.19	0.15	0.84	0.85

[a]Treatments: SP = Soypass control; SP + SM = Soypass + Smartamine M.; SP + BM = Soypass + bloodmeal; SP + BM + SM = Soypass + Smartamine M + bloodmeal.
[b]Main effect of bloodmeal.
[c]Main effect of Smartamine M.
[d]Bloodmeal*Smartamine interaction.

M® (Aventis Animal Nutrition, Inc.). Supplements containing both bloodmeal and Smartamine M® supplied a total of 1.85 grams per day of supplemental methionine and 0.72 grams per day of supplemental histidine. Level of methionine and histidine supplementation were based on the deficiencies presented in Table 1 and accounting for additional protein provided by feeding Soypass® in place of soybean meal. The level of bloodmeal closely agreed with the amount suggested previously (*1990 Nebraska Beef Report, pp. 65-67*) to achieve maximum gain.

Heifers were individually fed, once daily, at equal percentage of body weight with Calan electronic gates. The DM fed as a percentage of body weight was adjusted as needed to minimize orts while maintaining intakes near ad libitum consumption. Average DMI was 2.43 % of body weight. Body weights were measured on three consecutive days on days 0, 56 and 84. Heifers were also weighed once on day 28. Intakes were recalculated following each weighing.

Results

Performance data are shown in Table 3. No statistical differences among treatments for ADG, feed intake, or feed conversions were observed. Main effect P-values are provided because no bloodmeal by Smartamine M® interaction occurred. Methionine supplementation did not improve performance indicating growing animals supplemented with Soypass® are not limited by methionine. There was a trend for bloodmeal supplementation to increase ADG (P = 0.12) and improve feed conversion (P = 0.15). While we assume that the trend is due to increased histidine availability, it is not possible from this trial to determine if this is the true cause for the trend, or if it is a result of a different characteristic of bloodmeal. While further investigation into this trend is warranted, we conclude from these data, growing animals supplemented with Soypass® are not deficient in undegradable methionine or histidine.

[1]Jim MacDonald, graduate student; Terry Klopfenstein, professor, Animal Science, Lincoln; Casey Macken, research technician.