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Digest*



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BLOOD MEAL-FEATHER MEAL COMBINATIONS FOR GROWING CALVES

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SUMMARY

Two calf growth trials were conducted to determine if minimum quantities of blood meal added to feather meal would result in a complementary effect. Protein efficiency was improved for feather meal when 12.5%, 25% and 50% blood meal was added to the supplement and most of the response was achieved at the 12.5% level. This suggests a strong complementary effect of mixing blood meal with feather meal and the optimum level of blood meal is near 15%.

INTRODUCTION

Feather meal is an economical, high-bypass protein source for ruminants. However, it is high in sulfur amino acids and low in other key amino acids required by growing calves. Results, from previous Nebraska research examining the effects of combining equal amounts of feather meal and blood meal together demonstrated that protein efficiency was improved compared with feather meal fed alone. Feather meal is an excellent source of sulfur amino acids and this complementary response was attributed to an improved amino acid profile by addition of lysine through blood meal. Since blood meal is more than twice the cost of feather meal, it would be advantageous to know the minimum amount of blood meal required to maintain economical and biological efficiency when using feather meal.

Objective:

Determine if small additions of blood meal to feather meal would result in protein efficiencies greater than that obtained when feather meal is used as the sole escape protein source.

PROCEDURES

Two 94-day trials were conducted to evaluate the protein value of feather meal, (FTH), blood meal (BM) and 87.5:12.5, 75:25 and 50:50 protein combinations of FTH: BM. Each trial contained sixty growing calves (497 lbs). The FTH source was devoid of blood, heads, feet and offal. The basal diet contained 46.5% ground corncobs, 46.5% forage sorghum silage (essentially no grain) and 7% supplement (Table 1). Diets supplied 11.5% crude protein, 52% TDN, .50% calcium and .30% phosphorus using book values and protein analysis. Calves were individually fed (at equal percent of body weight) once daily with Calan electronic gates. Calves were implanted with Compudose. Initial and final weights were the average of three consecutive day weights taken before the morning feeding.

The slope-ratio technique was used to compare protein source combinations. Four levels of the FTH, BM and the FTH-BM combination supplements were fed to provide increasing amounts of protein (25%, 33%, 41% and 49% of the supplemental protein). The weight gain of the calves fed a urea supplement was used as the base for comparison of the weight gains for the other supplements. Protein efficiency was calculated by regressing the weight gains obtained from each of the four levels of bypass protein contained within each supplement. These values represent the unit change in output (animal gain) resulting from a unit change in variable input (amount of protein in supplement). A high protein efficiency value indicates that a protein source is being converted more efficiently to live weight gain compared to a protein source that may have a low protein efficiency.

RESULTS AND DISCUSSION

The urea control calves gained .84 lb/day while maximum gain due to protein supplementation was 1.56 lb/day. The most efficiently used protein supplement was 100% BM (Figure 1) (P .05). Previous analyses show that escape

of BM protein is 18% higher than FTH which explains 20% of the lower numerical value with the 50:50 combination. No differences ($P=.30$) in protein efficiency were observed among the supplements containing the various combinations of FTH-BM. Relative to the supplement containing only FTH, all FTH-BM combinations yielded significantly higher protein efficiencies ($P .05$). A complementary relationship between BM and FTH (Figure 2) existed. A 59%, 23% and 4% improvement in protein efficiency relative to the 100% FTH and 100% BM supplement was obtained when 12.5%, 25% and 50% BM were added, respectively (Table 2).

If all the blood from poultry slaughter is available, it will amount to about 10% of the dry weight of feathers. Based on the results of this report, use of FTH with that amount of blood would be an advantageous option. However, it is important that blood be added after feathers are hydrolyzed because of detrimental effects on BM protein digestibility and net bypass if blood is subjected to hydrolysis along with raw feathers. It is therefore important for the producer and nutritionist to be aware of the processing method used when formulating supplements containing FTH.

CONCLUSIONS

Protein efficiency was maintained when amounts equal to 12.5% and 25% BM were added to FTH compared to 50% addition. Formulation of protein supplements containing FTH can be made more economical without compromising biological efficiency by using relatively small amounts of BM--probably 15% is optimal.

Table 1. Optimum combinations of blood meal and feather meal diets^{ab}.

Ingredient	Urea control ^b	Blood meal ^c	Feather meal ^c
Sorghum silage, %	46.5	46.5	46.5
Ground corncobs, %	46.5	46.5	46.5
Urea, %	2.17	1.05	1.05
Blood meal, %		3.89	
Feather meal, %			3.82
Ammonium sulfate, %	.25	.25	.25
Limestone, %	.20	.18	.24
Dicalcium phosphate, %	.93	.92	.82
Salt, %	.25	.25	.25
Trace minerals, %	.05	.05	.05
Vitamins, %	.01	.01	.01
Corn, %	3.14	.40	.51

^aDry matter basis.

^bCombinations of urea with appropriate proteins provided 25, 33, 41 and 49% of the supplemental protein.

^cBlood meal - feather meal combination treatments contain respective proportions of these two supplements.

Table 2. Summary of gain responses to feather meal - blood meal combinations.

Protein mixture	PE Response ^a
87.5% feather meal - 12.5% blood meal	+59%
75% feather meal - 25% blood meal	+23%
50% feather meal - 50% blood meal	+4%

^aPE response - Protein efficiency for the mixture divided by the weighted means of the PE for feather meal and blood meal fed alone.

Figure 1. Protein efficiency of calves fed feather meal (FTH) and blood meal (BM) combinations

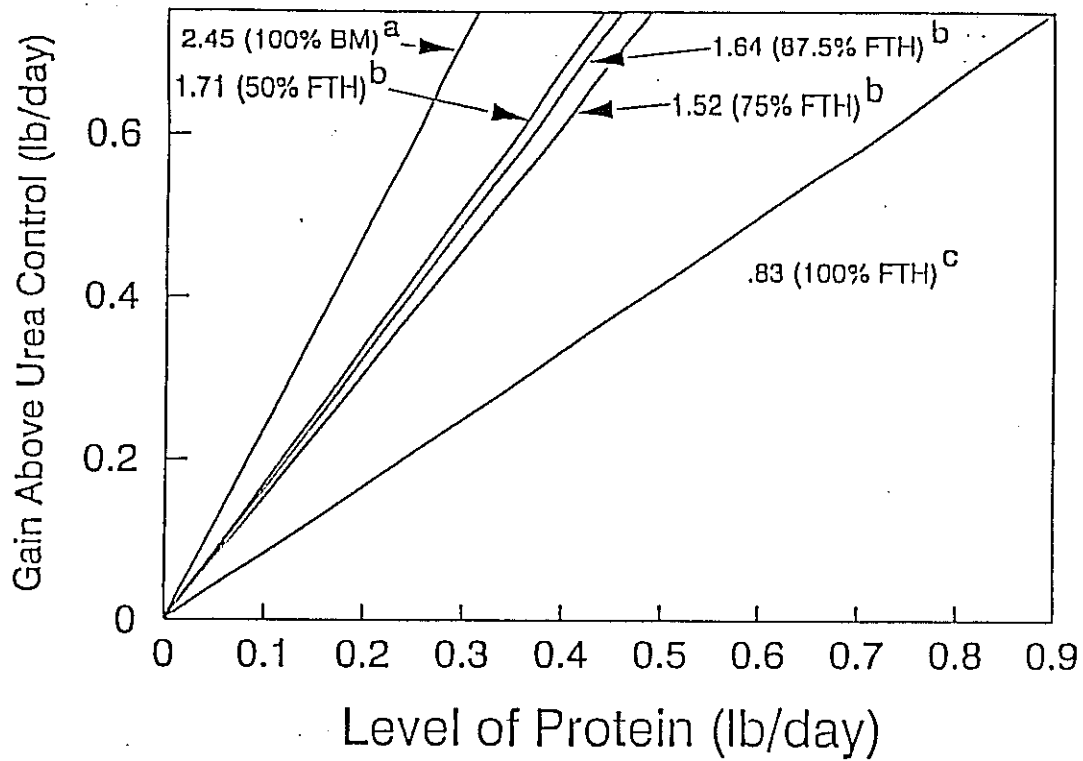


Figure 2. Complementary effect of feather meal - blood meal combinations

