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Protein Supplements for Feedlot Rations Compared

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Summary

Protein supplements composed of either soybean meal, a combination of soybean meal and urea, or milo Starea improved gain 5% and feed efficiency 4% over supplements of either urea or wheat Starea ($P < .25$). Cost of gain favored the nonprotein nitrogen compounds; thus, choice of supplement was related to relative cost of supplements.

Introduction

The high cost of natural protein supplements makes less expensive, nonprotein nitrogen products attractive for finishing feedlot-cattle. Previous research has indicated reduced gains when compounds like urea are substituted for soybean meal; however, cost of gains may still favor the nonprotein nitrogen. Further savings are shown by data presented in another article in this publication suggesting no protein supplement after feedlot-cattle reach 950 lbs.

In this study we (1) compared substituting urea nitrogen for 50% and 100% of the nitrogen from soybean meal and (2) two Starea products (one composed of milo and one of wheat) with soybean meal and urea.

Materials and Methods

We divided 155 Angus steers (averaging 620 lbs.) equally into five groups. The 21 in each group were subdivided into three pens. Each pen received one of the following protein supplements: (1) soybean meal; (2) soybean meal-urea; (3) urea; (4) milo Starea; and (5) wheat Starea. Corn silage and rolled milo were the other major ingredients. Rations and protein supplements are summarized in table 8.1.

The cattle were fed 168 days to an average slaughter weight of 960 lbs. Carcass information was obtained through the cooperation of Wilson Packing Company, Kansas City.

Results

Results are summarized in table 8.2. Average daily gains for soybean-fed cattle, soybean-urea, and milo Starea, were similar. Cattle fed urea and wheat Starea tended to gain less (1.9 lb/day) but not significantly less (at the 25% level of probability). Feed efficiency trends were similar to daily gains.

The only difference in carcass characteristics was a lower percentage of kidney knob in steers fed a soybean meal-urea supplement.

Cost of gain was lower whenever soybean meal could be reduced or eliminated, so choice of protein supplement is closely associated with cost of gain and marketing time. Prices used (shown below, table 8.2) give lower cost gains from urea rations even though steers getting soybean meal gained 7% more. Identical prices were used for urea and Starea.

Table 8.1. Composition Percentages (dry matter basis) of Rations (Trial 1)

Nitrogen source	SBM ^a	SBM-Urea	Urea	MS-70 ^b	WS-70 ^c
Crude protein content of ration, %	11.6	11.6	11.6	11.6	11.6
Ration composition, dry weight basis, %					
Oct. 19 to Nov. 15, 1972					
Corn silage	23.2	21.7	21.7	21.7	21.7
Rolled milo	69.7	73.3	73.3	73.3	73.3
Protein supplement	7.1	5.0	5.0	5.0	5.0
Nov. 16, 1972 to Feb. 26, 1973					
Corn silage	20.1	20.1	20.1	20.1	20.1
Rolled milo	72.5	72.5	72.5	72.5	72.5
Protein supplement	7.4	7.4	7.4	7.4	7.4
Feb. 27 to Apr. 4, 1973					
Corn silage	13.5	13.5	13.5	13.5	13.5
Rolled milo	38.0	38.0	38.0	38.0	38.0
Corn	40.6	40.6	40.6	40.6	40.6
Protein supplement	7.9	7.9	7.9	7.9	7.9
Crude protein content of supplement, %	32.4	32.8	32.6	32.5	32.5
Supplemental protein, % of ration crude protein	20.7	20.9	20.8	20.7	20.7
Supplement composition, %:					
Soybean meal (44% CP)	73.7	33.4	----	----	----
Urea (281% CP)	----	5.2	9.2	----	----
Milo Starea-70	----	----	----	42.0	----
Wheat Starea-70	----	----	----	----	42.0
Ground milo	----	31.9	60.9	28.1	28.1
Limestone	15.4	14.8	15.2	15.2	15.2
Dicalcium phosphate	----	3.0	3.0	3.0	3.0
Salt	9.2	10.0	10.0	10.0	10.0
Zinc-5	1.0	1.0	1.0	1.0	1.0
Vitamin A	0.2	0.2	0.2	0.2	0.2
Aureofac 10	0.5	0.5	0.5	0.5	0.5
Total	100.0	100.0	100.0	100.0	100.0

^aSBM = Soybean meal.

^bMS-70 = Milo Starea-70 percent protein equivalent.

^cWS-70 = Wheat Starea-70 percent protein equivalent.

Table 8.2. Feedlot Performances and Carcass Traits of Steers Fed Indicated Supplements

Nitrogen source	SBM	SBM-Urea	Urea	MS-70	WS-70
Feedlot data					
No. of steers	20	20	19	21	20
Initial wt., lbs.	624	615	618	625	620
Final wt., lbs.	978	965	946	968	946
Daily gain, lbs.	2.1	2.1	1.9	2.1	1.9
Feed/gain	9.5	9.9	10.1	9.5	10.0
Feed cost/100 lbs. gain ¹	\$20.13	\$19.45	\$18.23	\$17.77	\$18.89
Carcass data					
Carcass wt., lbs.	590	583	558	584	570
Rib eye area, sq. cm.	72	68	70	74	74
Kidney knob, % ₂	3.5 ^a	2.8 ^b	3.3 ^a	3.4 ^a	3.3 ^a
Maturity score ²	2.0	1.9	2.3	2.3	2.0
Marbling score ³	16.7	15.3	17.1	16.6	16.1
Yield grade ⁴	3.1	3.1	3.0	2.8	2.6

¹Feed costs based on \$/ton: milo, \$38.80; silage, \$10.00; soybean meal, \$166.00; urea and Starea, \$100.00.

²Maturity score: A = 1, 2, 3; B = 4, 5, 6.

³Marbling score: small, 13-15; modest, 16-18; moderate, 19-21.

⁴Yield grade: most desirable, 1; least desirable, 5.

a-b Horizontal values with different superscripts on the same line differ significantly ($P < .05$).