Agricultural Experiment Station U. S. Department of Agriculture

Department of Animal and Range Sciences

CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

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Effects of supplemental protein sources on performance of newly received calves

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Protein and(or) energy restriction can negatively influence performance of newly weaned and shipped calves. Feeding high ruminal escape protein sources has, in some cases, had a positive effect on performance of newly received calves. Our study was conducted to evaluate the effect of including escape protein sources in concentrate diets on health and performance of newly received calves.

One hundred twenty mixed-breed calves (steers and bulls) were shipped by semi-tractor trailer from Kentucky to the Clayton Livestock Research Center. Calves were approximately 18 h in transit and experienced a 7.1 % shrink from a pay weight of 407 lb. After arrival at approximately 10:00 PM, calves were housed in a common pen with ad libitum access to large round bales of sorghum sudangrass hay and water. On the following morning, each calf was weighed and processed according to procedures reported in CLRC Progress Report No. 70. Each calf also was injected with LA-200 (Pfizer Agric. Division, New York, NY - 4.5 ml/100 lb BW - 200 mg oxytetracycline/ml) and bolused with Albon SR (Hoffmann La-Roche, Nutley, NJ - two boluses per calf - 12.5 mg sulfadimethoxine/bolus).

At time of processing, treatments were assigned randomly to individual calves based on processing order. Treatments were: 1) soybean meal (SBM) as the supplemental protein source; 2) blood meal (BM) plus soybean meal (2:1) or 3) feather meal (FM) plus soybean meal (2:1). Ingredient and chemical composition of the three treatment diets are shown in Table 1. After processing and application of treatments, calves were assigned randomly to one of three pens per treatment (10 calves per pen) and fed their respective 65% concentrate diet. All calves were allowed free-choice access to sorghum sudangrass hay during the first week of the study. The trial lasted 28 days, and calves were weighed on days 14 and 28. Feed bunks were cleaned at 7, 14 and 28 days, and samples taken to determine pen dry matter (DM) intake. Calves were monitored daily for symptoms of bovine respiratory disease (BRD). Any calf with BRD symptoms was treated with antibiotics (see CLRC Progress Report No. 70). Two calves died from BRD during the trial.

No differences were observed in DM intake among calves on the three treatments throughout the trial (Table 2); hence, at approximately 2% of the dietary DM, BM or FM did not have a negative effect on palatability. Calves fed the BM diet consumed more during the first 7-day period; however, for the entire 28 days, calves fed the SBM-supplemented diet consumed 5% and 8% more DM per day than those receiving BM or FM, respectively. Calves fed BM gained approximately .09 and .43 lb/day more than those fed SBM or FM, respectively. Thus, overall performance of calves fed the BM diet was slightly superior to that of calves receiving SBM. Both BM- and SBM-fed calves had superior gain and feed conversion compared with FM-fed calves, but differences were not statistically significant. Feed-to-gain ratios of BM-fed calves also tended to be improved compared with SBM and FM. Our results agree with recent research by Blasi et al. (1991), who reported that calves receiving BM gained more than calves fed a 100% FM protein supplement.

No statistical differences were observed in morbidity or mortality during the trial, although fewer calves fed BM were treated for BRD than were those fed SBM or FM.

Our results suggest that blood meal may be an effective source of protein for newly received calves. Further research is needed to determine protein source combinations and optimum levels of supplementary escape protein to improve animal performance without decreasing palatability of the receiving diet.

Reference

Blasi, D.A., T.J. Klopfenstein, J.S. Drouillard and M.H. Sindt. 1991. Hydrolysis time as a factor affecting the nutritive value of feather meal and feather meal-blood meal combinations for growing calves. J. Anim. Sci. 69:1272.

Table 1. Ingredient and chemical composition of 65% concentrate receiving diets with different protein sources (dry matter basis)[a]

Item	SBM	FM	BM
		%	
Diet composition			
Sudangrass hay	25.59	25.59	25.59
Alfalfa hay	9.78	9.78	9.78
Whole corn	10.14	10.14	10.14
Steam-flaked milo	40.48	40.48	40.48
Molasses	4.41	4.41	4.41
Limestone	1.00	1.00	1.00
Dicalcium phosphate	.63	.63	.63
Salt	.49	.49	.49
Urea	.24	.24	.24
Ammonium sulfate	.25	.25	.25
Soybean meal	4.94	1.01	1.01
Feather meal	0.0	2.06	0.0
Blood meal	0.0	0.0	2.07
Receiving premix[b]	2.04	2.04	2.04
Chemical composition			
Dry matter	90.3	83.6	84.5
Ash	8.0	7.3	7.5
Crude protein	12.5	13.7	13.8
ADF	16.3	18.2	15.7
NDF	26.2	28.3	25.2

[a]SBM = soybean meal, FM = feather meal, BM = blood meal, ADF = acid detergent fiber, NDF = neutral detergent fiber.

[b]See CLRC Progress Report No. 70.

Table 2. Influence of protein source on performance of calves during a 28-day receiving period

Item	Treatment[a]			SE[b]
	SBM	FM	BM	
No. of calves	40	40	40	
Initial BW, lb	368.3	388.9	374.5	10.6
28-day BW, lb	411.7	395.6	408.1	16.1
Daily gain, lb				
days 0 to 14	.58	.19	.59	.33
days 14 to 28	3.25	2.95	3.41	.43
days 0 to 28	1.91	1.57	2.00	.18
Daily DM intake, lb/steer				
days 0 to 7				
Hay	2.86	2.45	2.79	.25
Concentrate	2.93	3.03	3.19	.46
Hay + concentrate	5.78	5.47	5.98	.42
days 0 to 14	6.68	5.89	6.55	.44
days 14 to 28	11.05	10.47	10.34	.53
days 0 to 28	8.86	8.18	8.44	.42
Feed-to-gain				
days 0 to 28	4.64	5.25	4.36	.27
Calves treated for BRD, %	35.9	37.5	27.5	
Treatments per sick calf	2.7	2.8	2.5	
Mortality, %	0.0	2.5	2.5	

[a] SBM = soybean meal, FM = feather meal, BM = blood meal.

[b] Standard error of means, n = four pens per treatment.

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