



Department of Animal and Range Sciences
 CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

Route 1 Box 109

Clayton, New Mexico 88415

505-374-2566

Progress Report No. 85 (July, 1993)

Effects of Origin of Cattle and Supplemental Protein Source on the Performance by Newly Received Feeder Cattle¹

S. A. Gunter, M. L. Galyean, K. J. Malcolm-Callis, and D. R. Garcia

During shipping, feeder cattle are deprived of feed and water for extended periods of time. This feed deprivation decreases the yield of microbial protein from the rumen. Previous research at the Clayton Livestock Research Center (Progress Report No. 71) indicated that a 2:1 mixture of blood meal and soybean meal as the supplemental protein in a 65% concentrate receiving diet may improve feed efficiency and decrease morbidity in newly received, Southeastern calves. Researchers have speculated that because of the high ruminal escape value of blood meal, it might replace microbial protein during the redevelopment of the ruminal microbial population.

Newly received cattle are often mixed with cattle from a different origin after arriving at a feedlot. The mixing of cattle that differ in origin may increase the morbidity in calves that have been sheltered and unchallenged by antigens. An example of this incident would be when calves from large ranches in the Southwest are mixed with auction barn calves from the Southeast. The following study was conducted to evaluate the response of newly received cattle from New Mexico and Arkansas to supplemental blood meal or fish meal.

Sixty crossbred calves from New Mexico (Native calves; transit time, 4 hours; transit shrink 4.4%) and 60 auction barn calves from Arkansas (Southeastern calves; transit time, 17 hours; transit shrink 4.4%) were shipped to the Clayton Livestock Research Center. Native calves were housed in holding pens with access to sorghum sudangrass hay and water until processing the next day, whereas Southeastern calves were processed immediately after arrival. Treatments were arranged in a 2 x 3 factorial and consisted of: 1) Native origin and soybean meal as the supplemental protein source in the diet; 2) Native origin and blood meal as the supplemental protein source in the diet; 3) Native origin and fish meal as the supplemental protein source in the diet; 4) Southeastern origin and soybean meal as the supplemental protein source in the diet; 5) Southeastern origin and blood meal as the supplemental protein source in the diet; 6) Southeastern origin and fish meal as the supplemental protein source in the diet.

At processing, each calf was weighed, branded, injected with Synanthic wormer (Syntex Animal Health, Inc.), treated with Tiguon (Cutter Animal Health, Mobay Corp.), vaccinated with a clostridial 7-way (Coopers Animal Health), and injected with Rocaviv A and D₃ solution (Hoffmann-LaRoche, Inc.). After processing, calves were moved to the feedlot and fed their assigned treatment diets plus long-stemmed wheat hay (14.5% CP, 34.4% ADF). Additional hay was offered during the first week of the trial only. Each calf was weighed again on days 14 and 28. The 65% concentrate diets (Table 1) were sampled weekly to determine dry matter content. Chemically analyzed values for crude protein, acid detergent fiber, calcium, and phosphorus were 13.6, 17.8, .85, and .36% of dry

matter, respectively, averaged across diets.

Throughout the trial, calves were evaluated for signs of bovine respiratory disease (BRD). Sick calves were treated with either 3 days of Naxcel (1 mL/100 BW) plus penicillin (20 mL) on day 1 or Micotil (1.5 mL/100 BW). One calf died, and one calf was removed from the experiment as a result of causes unrelated to treatments.

Supplemental protein source did not affect ($P > .91$) daily gain (Table 2) at any period of the trial. Previous research at this station has shown that adding 2% blood meal to receiving diets tended to ($P > .05$) increase daily gain by 5% (Progress Report Nos. 71 and 76). Fluharty and Loerch (1992) compared soybean meal and blood meal as supplemental protein sources for receiving diets (14% CP) and found that body weight gain was similar between protein sources during the first 28 days of the receiving period.

Dry matter intake of hay and concentrate was not affected ($P > .46$) by supplemental protein source (Table 2). During the first 2 weeks, dry matter intake by the calves was approximately 1.5% of their body weight. Low feed intake during the first 2 weeks of the experiment may have limited the potential benefits of escape protein. During the last 2 weeks, dry matter intake by the calves was approximately 2.2% of their body weight. This level of intake was typical for cattle of this type and has been noted in other experiments (Progress Report Nos. 71 and 76).

Feed efficiency (feed/gain) was not affected by protein source during the trial

Table 1. Composition of diets fed to newly received feeder cattle

Ingredient	Soybean meal	Blood meal	Fish meal	% of dry matter		
Sudangrass hay	17.8	17.8	17.8			
Alfalfa hay	17.4	17.4	17.4			
Whole corn	9.9	10.3	10.1			
Steam-flaked milo	38.7	40.3	39.3			
Soybean meal	4.5	.5	1.0			
Blood meal	—	2.0	—			
Fish meal	—	—	2.7			
Molasses	5.1	5.1	5.1			
Fat	2.0	2.0	2.0			
Limestone	1.0	1.0	1.0			
Dicalcium phosphate	.6	.6	.6			
Salt	.5	.5	.5			
Urea	.2	.2	.2			
Ammonium sulfate	.3	.3	.3			
Premix ^a	2.0	2.0	2.0			

^a Hominy feed-based premix supplied trace minerals mixture (.1% of diet), Rumensin (20 g/ton), Tylan (10 g/ton), Vitamin A (1,134 IU/lb of diet), and Vitamin E (45 IU/lb of diet). Trace mineral composition: 4.4% Mn, 12% Zn, 6.6% Fe, 1.3% Cu, .3% I, .2% Co, and 20% Mg.

¹We thank Elanco Products Co. for supplying the Rumensin and Tylan, Syntex Anim. Health, Inc. for supplying Synanthic, and Zapata Haynie Corp. for supplying fish meal.

Table 2. Body weight, average daily gain, dry matter intake and feed efficiency of newly received cattle fed diets containing supplemental protein from soybean meal, blood meal or fish meal

Item	Soybean meal	Blood meal	Fish meal	SE ^a
No. of cattle	40	40	40	
Body weight, lb				
Initial	449	446	449	.94
Day 28	504	502	506	.93
Average daily gain, lb/day				
Days 0-14	1.2	1.2	1.2	.21
Days 15-28	2.8	2.7	2.7	.20
Days 0-28	2.0	1.9	2.0	.13
Dry matter intake, lb/day				
Days 0-14				
Concentrate	4.7	4.6	4.7	.30
Wheat hay	1.9	2.0	2.0	.07
Days 15-28	10.5	10.4	10.5	.33
Days 0-28	8.5	8.6	8.6	.25
Feed/gain				
Days 0-14	6.2	6.1	6.0	1.2
Days 15-28	3.8	4.0	4.0	.27
Days 0-28	4.3	4.4	4.4	.28
Calve treated for BRD, %	35.0	37.5	30.0	--

^a Standard error, n=4 pens/treatment.

(Table 2). This failure of protein source to significantly affect feed efficiency agrees with previous research at this station (Progress Report Nos. 71 and 76). Fluharty and Loerch (1992) reported a slight improvement in feed efficiency when blood meal replaced soybean meal (3.6 vs. 4.1, respectively). Unlike our results, this improvement in feed efficiency resulted from a tendency for cattle fed diets containing blood meal to consume less feed.

Percentage of calves treated for BRD did not differ ($P = .58$) among protein sources. Additionally, calves responded equally as well ($P = .98$) to either Naxcel plus penicillin or Micotil. Because Naxcel must be given for 3 days and Micotil is a single-dose antibiotic, the data indicate that choice of antibiotic for the treatment of BRD in newly received cattle should be based on cost and accessibility to cattle for treatment.

The initial body weight between both sources of calves did not differ ($P = .49$; Table 3). However, because Southeastern cattle gained body weight at a

Table 3. Body weight and average daily gain of cattle received from New Mexico (Native) and Arkansas (Southeastern)

Item	Native	Southeastern	SE ^a
No. of cattle	60	60	
Body weight, lb			
Initial	452	444	7.9
Day 28	491	516	9.3
Average daily gain, lb/day			
Days 0 to 14	.6 ^a	1.8 ^b	.20
Days 15 to 28	2.1 ^a	3.3 ^b	.13
Days 0 to 28	1.4 ^a	2.6 ^b	.13
Calves treated for BRD, %	18.3	43.3	

^a Standard error, n=12 means/treatment.

^{b,c} Means with uncommon superscripts differ ($P < .05$).

faster ($P < .003$) rate, Southeastern cattle weighed more ($P = .08$) on day 28. Because steers from both sources were in the same pen, it was not possible to calculate feed intake or feed efficiency for the steers by source. Therefore, we can not determine if the superior performance from the Southeastern cattle resulted from greater feed intake, improved feed efficiency, or both.

The percentage of BRD in Native calves was less ($P = .003$) than in Southeastern calves. As with protein effects, Native and Southeastern calves responded equally as well ($P = .82$) to either Naxcel plus penicillin or Micotil.

Based on this study and the literature reviewed, selection of soybean meal, blood meal, or fish meal as a supplemental protein source in receiving diets should be based on unit cost of protein; however, this basis for selection may not apply to other protein sources (Hutcheson et al., 1993). In addition, Southeastern calves gained weight more rapidly during the receiving period, but had a greater incidence of BRD than native New Mexico calves.

Literature Cited

- Fluharty, F. L., and S. C. Loerch. 1992. Effects of protein level and protein source on performance of newly arrived feedlot steers. Ohio Beef Cattle Res. Industry Rep. Anim. Sci. Dept. Series 92-1.
- Hutcheson, J. P., T. L. Stanton, C. F. Nockels, and O. Robertson. 1993. The effects of three protein sources on feedlot performance of receiving calves. Colorado State Univ, Beef Program Rep. pp 67-73.

Tommy Alan

Department Head
Animal and Range Sciences
New Mexico State University

Department of Animal and Range Sciences
New Mexico State University
Box 30003, Department 3-I
Las Cruces, NM 88003-0003

Non Profit Organization
U. S. Postage Paid
Permit No. 162
Las Cruces, NM