The Impact of Farm of Origin and Post-Shipment Diet on the Performance of Stocker Calves

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Story in Brief

The impacts of farm of origin (FO) and post-shipment diet were studied using 194 stocker calves (averaging 440 lb) assembled from 9 FO's, subjected to auction barn (AB) and order-buyer barn (OBB) environments, then shipped 850 miles. Upon arrival, the calves were fed three post-shipment diets.

The FO had a significant effect on transit weight loss. Overall weight loss during transit was 7.5 percent of the pre-shipment weight or 33 lb per calf. Total gains during the first 21 days after shipment were increased (15.4 lb) when a diet that contained 1.5 percent potassium was fed. Changing the supplemental protein from soybean meal to corn gluten meal had little effect on weight gains. Feed intake was increased by adding potassium to the basal diet, and feed efficiency was improved by 22 percent. The FO affected post-shipment weight gains but not feed intake.

Introduction

Each year during the fall, young calves in the southeastern part of the U.S. are weaned and moved into the marketing and transportation system that provides calves for wheat pasture stocker operations. From both an economic and management standpoint, these calves should be purchased before wheat pastures are available. However, to do so requires that a receiving diet be fed after shipment until wheat pasture is available. The composition of this diet can have a dramatic effect upon the performance of recently stressed stocker calves. This experiment was conducted to (1) determine the effects on performance of the amount of dietary potassium and the source of supplemental protein in the receiving diet and (2) evaluate the effect of farm of origin (FO) on health and post-transit performance.

Experimental Procedure

A total of 194 calves representing 9 FO's were assembled at a commercial auction barn in Tennessee 4 days before shipment. During the first 24-hour of assembly no feed or water was provided, and the calves were allocated 10 to 15 sq ft of pen space per calf to simulate an AB (auction barn) environment. Hay was fed during the last 3 days of assembly, and larger pens (25 to 30 sq ft/calf) were used to simulate a OBB(order-buyer barn) environment. Two commercial double-deck livestock trailers transported the calves 850 miles from Algood, Tennessee, to El Reno, Oklahoma. Upon arrival, each calf was weighed and assigned one of three post-shipment diet treatments presented in Table 1. The control diet (C) was supplemented with potassium chloride to

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Table 1. Composition of post-shipment diets

Ingredient[a]	Diet[b] C	HK	PP
Cottonseed hulls	39.4	37.4	39.4
Corn	51.0	51.6	52.0
Soybean meal	8.0	8.0	—
Corn gluten meal	—	—	6.6
Molasses, dry	1.0	1.0	1.0
Limestone	.6	.6	.7
Potassium chloride	—	1.4	.3
Nutrient composition of dry matter			
Crude protein (%)	11.1	11.1	11.0
TDN (%)	69.8	69.6	69.2
NE-maintenance (Mcal/lb)	.79	.79	.79
NE-gain (Mcal/lb)	.43	.43	.43
Calcium (%)	.36	.35	.36
Phosphorus (%)	.28	.28	.26
Potassium (%)	.79	1.50	.78

[a]Percentage of as-fed diet.
[b]C = control, HK = high potassium, PP = protected protein.

provide the second or high potassium (HK) diet with a potassium level of 1.5 percent. The soybean meal in the control diet was replaced by a "rumen bypass" protein, corn gluten meal, to produce the third or "protected protein" (PP) diet. Treatment groups (FO and receiving diets) were randomly assigned to 1 of 27 pens with the restriction that calves from the same farm would be in the same pen but not in the adjacent pens.

Calves were fed once each day, and the daily ration was increased to allow for maximum intake during the 21-day period. Weight losses were calculated as the difference between pre-shipment and arrival weights and expressed as a percentage of pre-shipment weight. The 21-day gains were calculated using a filled weight taken before the morning feeding minus arrival weight. Feed intakes were determined weekly and expressed as the amount of dry matter consumed per calf per day.

Results and Discussion

The amount of weight lost during transit was affected ($P<.01$) by the FO. The 194 calves averaged 441 pounds before shipment (on-truck weight) and lost an average of 33 pounds during transit, which represented 7.5 percent of their initial body weight. Losses varied from 5.7 percent to 10.0 percent, depending upon the FO. After 1 day in the AB and 3 days at the OBB, the impact of the FO was still significant in this study.

Feeding a high potassium diet after shipment increased the gain by over .73 lb/head/day or 15.4 lb over the 21-day period. During transit, calves excrete body water and body potassium. Feeding higher levels of potassium quickly replaces body potassium and increases the retention of water. Thus, the gains associated with potassium supplementation are expected to be largely body water. Quick restoration of body water with supplemental potassium did not decrease the incidence of respiratory disease.

The FO also had an effect on weight gain. Within the control group, 21-day gains ranged from 42.8 lb to 75.2 lb as a result of FO. Response to HK was positive in all except animals from one FO. Response to the protected protein diet (PP) was more variable than the HK diets. The PP diet had a positive response in calves from five of

Table 2. Effects of farm of origin on transit weight losses and effects of post-shipment diet on gains and feed intake during the first 21-day period post-shipment

Farm of origin	Weight losses (%)	Body weight gain (lb)			Feed intake (lb/head/day)		
		C	HK	PP	C	HK	PP
1	7.58	42.89	79.84	63.65	10.7	11.1	10.3
2	7.94	68.53	73.65	33.49	11.2	11.6	9.9
3	7.10	51.56	69.76	58.16	10.9	11.1	10.3
4	7.10	75.21	87.92	71.23	11.2	11.6	10.8
5	8.58	69.32	80.93	73.71	11.1	11.5	10.7
6	7.17	48.48	65.97	48.07	10.4	11.6	10.2
7	9.95	57.74	53.19	47.98	10.6	11.1	10.2
8	6.07	54.85	88.51	71.32	10.5	11.4	10.6
9	5.66	50.07	58.78	66.34	10.8	10.5	10.1
X	7.46	57.7	73.1	59.4	10.8	11.3	10.3

the FO's, no response in one and a negative response in calves from three FO's. The response to the PP diet was more dependent upon FO than were the responses to other diets. The percentage of animals treated for respiratory disease ranged from 20 to 65 percent, depending upon FO.

During assembly and transportation, calves use body stores of energy and protein. The rumen, which contains the microorganisms for protein synthesis and the release of energy from feedstuffs, may not be able to meet the needs of the recently stressed calf. The usually low feed intakes during the first 2 or 3 weeks in the new environment compound the nutritional problem. Feed dry-matter intakes for the first 21 days post-shipment for the study are presented in Table 2. FO did not significantly affect intake, but diet did. Intakes were higher for calves fed the HK diet than for those fed either the C or PP diet. Average daily consumption of the HK diet was higher than the other two diets, and feed efficiency was improved by 22 percent over the control group. Thus, the HK diet not only improved gains but also increased intake and improved feed efficiency. Calves fed the PP diet consumed .5 lb less feed/head/day than the C calves and feed efficiency was improved by 7 percent as compared to the C calves.

Weight Changes During Transportation of Stocker Calves

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Story in Brief

Sixty-four stocker calves weighing an average of 621 lb were used to determine the effect of transportation (250 miles) and pre-shipment diet on body weight changes and blood constituents. Feed and water deprivation alone accounted for 63 percent of the

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