Dietary Factors Affecting Feed Intake In Receiving Feedlot Cattle

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ABSTRACT

Four trials and 822 cattle were used to evaluate the effects of certain dietary factors on initial feed intake in receiving cattle. Cattle offered water only the first 6 to 8 hours off the truck consumed more feed the first day (d) in the feedlot than those offered feed only (1.23 vs .78% of live weight (LWT), P<.05). Cattle offered a mixed corn silage/milo diet consumed more (P<.05) the first d and the first week in the feedlot than cattle offered chopped alfalfa hay (1.27 vs .93 and 1.61 vs 1.41% of LWT, respectively). Cattle offered diets containing 12.5% crude protein (CP) tended to consume more the first d than cattle offered diets containing 10.5% CP. Also, cattle tended to consume greater amounts of diets containing urea and cottonseed meal as supplemental protein than diets containing a corn gluten meal/blood meal mixture. In conclusion, cattle should be offered water and a ration containing a moderate nutrient density (greater than 10.5% CP) when first received at the feedlot.

INTRODUCTION

Inadequate feed consumption as a result of shipping stress, can result in increased health problems and decreased animal performance. Hutcheson (1986) reported that healthy cattle consumed 1.55 vs .9% of live weight (LWT) for morbid cattle. It is not possible for an animal consuming less that 1% of its LWT to achieve adequate nutrient intake. Two major causes of the low intake are the effects of the transportation experience and deprivation of feed and water (Cole et al. 1986). It is not uncommon to fast cattle before shipping, which increases the length of the deprivation period. Stress encountered during transport can have long-term effects. It may lengthen the time required for re-alimentation after the fasting period (Cole et al., 1986). This can lead to a delay in getting the cattle "on feed" and started up the concentrate ladder to the finishing ration. Therefore, any setback at the initiation of the feeding period will result in an extended feeding period and increased costs to the cattle feeder.

The magnitude of the shipping stress will depend in part on the length of feed and water deprivation and management of the cattle when they are received in the feedlot. Diets offered to receiving cattle vary from long grass hay to mixed rations containing 30 to 75% concentrate. Some managers also feel that allowing cattle to fill up on water after truck unloading will decrease feed intake during this critical period (Anonymous, 1985; Thomas, 1986). Barney and Dean (1985) and Hutcheson (1986) reviewed the effects of ration type, feed additives and parasite control on cattle performance the first 28 days (d) in the feedlot, however, factors affecting intake the first week (wk) were not reported. The objectives of these studies were to evaluate the effects of certain dietary factors on initial feed intake in receiving cattle.

EXPERIMENTAL PROCEDURES

Four trials were conducted to evaluate dietary factors affecting feed intake during the first d and first wk of receiving feedlot cattle. Table 1 shows the number of cattle, average weights, length of haul, average shrink and overall intakes for the four trials. Cattle in trials 1, 3, and 4 were gathered off of wheat pasture before being shipped; the feeding background of the cattle in trial 2 was not known. Experimental diets are shown in table 2. Alfalfa hay was chopped through a 2″ screen using a tub grinder. All rations were mixed and weighed individually by pen. Cattle were fed once daily and Aureo-S 700 (provided 350 mg of Aureomycin and 350 mg of sulfamethazine per head per day) was top dressed. Feed remaining in the bunk was weighed back one d and one wk after the cattle were put in the pens. Average individual feed intake (DM basis) is expressed on a per head per d basis and was calculated by dividing the feed consumed per pen by the number of cattle in the pen and adjusting for diet dry matter content. The number of cattle per pen (6, 7 or 8 head) varied with trial and was balanced over treatment.

Table 1. Number of cattle, average arrival weight, length of haul, shrink and daily feed intakes (dry matter)[a]

	Trial			
Item	1	2	3	4
Number of cattle	200	200	192	230
Arrival weight, lb	477	423	648	564
Length of haul, miles	135	720	225	135
Shrink				
lb/hd	12	30	34	15
%	2.6	6.6	4.9	2.6
Average Daily intake				
One day, lb	7.5	4.6	7.4	7.4
One day, % of LWT[b]	1.5	1.0	1.1	1.2
One week, lb	9.7	9.4	10.3	11.2
One week, % of LWT	1.9	2.1	1.5	1.9

[a]Least-squares means

[b]LWT = live weight

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Table 2. Experimental Diets[a]

	Ration								
Ingredient	1	2	3	4	5	6	7	8	9
					%				
Alfalfa hay, chopped	95.0								
Corn silage		73.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
Cottonseed hulls			22.1	22.1	22.1	22.1	22.1	22.1	22.1
Corn, flaked		15.6							
Milo, flaked			29.0	33.3	32.8	28.7	24.6	30.9	28.4
Cane molasses	4.0	3.0	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Cottonseed meal		5.62	4.97			5.34	9.40		
Blood meal								1.26	2.27
Corn gluten meal								1.83	3.28
Urea		.40	.27	.62	1.11				
Calcium carbonate		.73	.60	.56	.56	.66	.74	.56	.56
Dicalcium phosphate				.40	.40	.17		.38	.36
Salt	.5	.25	.17	.17	.17	.17	.17	.17	.17
Trace mineral premix[b]	.25	.25	.18	.18	.18	.18	.18	.18	.18
Vitamin A premix[c]	.25	.25	.18	.18	.18	.18	.18	.18	.18
Trials	1,2,3	1,2	3	4	4	4	4	4	4

[a]As fed basis.
[b]Adds the following mineral levels to the final ration: Mn 12, Zn 20, Fe 10, Cu 1.5, I .24, Co .15 and Mg 5 ppm.
[c]Adds 1002 IU vitamin A per lb DM.

Receiving procedures. Cattle were unloaded into holding pens with no feed or water available and processing started immediately. Each animal was individually weighed, ear-tagged, the switch cut and horns tipped if necessary. They received the following injections: combined IBR, BVD and PI_3, seven-way clostridium and dewormer (Tramisol or Ivomec, balanced over dietary treatment). Cattle were then gate cut into holding pens containing the appropriate number for that study. Immediately after the completion of processing, cattle were taken to their respective pens. Treatments were randomly assigned to pens.

Trials 1 & 2. Two trials and a total of 400 crossbred cattle (100 heifers and 100 steers in trial 1; 200 heifers in trial 2) were used to evaluate the effect of water only, feed only or free access to both water and feed the first 6 to 8 hours off the truck, on initial feed intake. Cattle were unloaded, processed and assigned to pen and treatment (24 and 31 pens for trials 1 and 2, respectively). The first day's diet was primarily chopped alfalfa hay (ration 1, table 2). The second d a 50:50 mixture of ration 1 and a corn silage ration (ration 2, table 2) was fed. Ration 2 was fed ad lib for the rest of the study (7 d).

Trial 3. One hundred and ninety two crossbred steers were used to evaluate the effects of chopped alfalfa hay (ration 1, table 2) vs a corn silage/milo ration (ration 3, table 2) on feed intake. Cattle were unloaded, processed and randomly assigned to pen and treatment (12 pens per treatment). The first d in the feedlot cattle were offered either ration 1 or 3 (table 2). All cattle were fed ration 3 for the remainder of the trial (7 d).

Trial 4. Two hundred and thirty crossbred heifers were used to evaluate the effects of protein source and level on feed intake. Heifers were unloaded, processed, and randomly allotted to pens and one of six treatments. Supplemental protein sources were urea, cottonseed meal (CSM) and a 50:50 mixture of blood meal:corn gluten meal (BM-CGM; N basis). These sources were added to the diet in appropriate amounts to achieve diet crude protein contents of 10.5 and 12.5% (3 × 2 factorial). Diet composition for the protein treatments is shown in table 2 (rations 4, 5, 6, 7, 8 and 9).

Statistical analysis was done using the General Linear Models procedure of SAS (SAS, 1985). The model contained treatment effects as the independent variables.

RESULTS

Cattle used in the studies were shipped from approximately 135 to 720 miles to reach the Burnett Center for Beef Cattle Research, Texas Tech University (table 1). Percentage shrink was related to length of haul (2.25 + .63/100 miles, $r = .90$, $P<.05$). Increasing length of haul decreased one d intake as a percentage of LWT (1.36 - .053/100 miles, $r = -.70$, $P = .09$) but tended to increase one wk intake (1.70 + .049/100 miles, $r = .54$, $P = .15$).

Trials 1 and 2. Table 1 shows the 1 d and 1 wk average daily feed intakes in lb/head and as a percentage of LWT for each trial. In trial 1 (2.6% shrink), there was no effect of treatment on feed intake. Water only, feed only, and the combination resulted in cattle consuming about 1.5% of LWT the first d and about 1.9% of LWT the first wk. The same treatments in trial 2 (6.6% shrink) resulted in significance differences among treatments. Water only resulted in greater 1 d intake than did feed only (1.23 vs .78% of LWT, respectively). Access to both water and feed resulted in an intermediate intake (1.01% of LWT). One wk intakes were not different.

Table 3. Daily feed intake (dry matter) for trials 1,2,3, and 4[a]

Item	Dry matter intake[b]			
	One day		One week	
	lb	% of LWT	lb	% of LWT
Trial 1				
Water only	7.3	1.44	9.6	1.86
Feed only	7.6	1.52	9.7	1.92
Water and feed	7.6	1.51	9.8	1.94
Standard error		.14		.06
Trial 2				
Water only	5.5	1.23[b]	9.2	2.06
Feed only	3.7	.78[c]	9.4	2.04
Water and feed	4.6	1.01[b]	9.4	2.08
Standard error		.13		.06
Trial 3				
Alfalfa hay, chopped	6.1	.93[b]	9.6	1.45[b]
Corn silage/milo	8.6	1.27[c]	11.0	1.61[c]
Standard error		.08		.03
Trial 4				
Source:				
Urea	7.9	1.34	11.3	1.92
CSM[e]	7.7	1.29	11.4	1.92
BM[f]/CGM[g]	6.6	1.10	10.8	1.80
Standard error		.09		.07
Percent (%):				
Protein 10.5	7.0	1.19	11.0	1.87
Protein 12.5	7.8	1.30	11.4	1.90
Standard error		.07		.06
Source by percent:				
Urea 10.5	8.0	1.36	11.0	1.88
Urea 12.5	7.8	1.32	11.6	1.96
CSM 10.5	6.8	1.15	10.9	1.85
CSM 12.5	8.6	1.43	11.9	2.00
BM/CGM 10.5	6.2	1.05	11.1	1.87
BM/CGM 12.5	7.1	1.16	10.6	1.73
Standard error		.12		.10

[a]Least-squares means.

[b,c,d]Means in the same trial and column with different superscripts are different ($P<.05$).

[e]CSM = cottonseed meal.

[f]BM = blood meal.

[g]CGM = corn gluten meal.

Trial 3. Steers consumed more of the corn silage/milo ration than the chopped hay ration (1.27 vs .93% of LWT, respectively; $P<.001$) the first d in the feedlot. Negative effects of the chopped hay appeared to carry over, since steers given ration 1 the first d consumed less during the first wk than steers given ration 2 (1.46 vs 1.61% of LWT, respectively; $P<.05$) even though both groups were given the same diet for six of the seven days.

Trial 4. There was no significant interaction of protein source and level. Heifers tended to consume more of the 12.5% rations than the 10.5% CP rations (1.30 vs 1.19% of LWT, respectively, $P=.25$) the first d in the feedlot. However, 1 wk intakes were not different due to protein level. The first d feed intake for urea and CSM tended to be higher than BM-CGM (1.34 and 1.29 vs 1.10% of LWT, $P=.07$ and .13 respectively). One wk intakes for urea and CSM also tended to be higher than BM-CGM (1.92 and 1.92 vs 1.80% of LWT, respectively, $P=.24$).

DISCUSSION

Trials 1 & 2. The contrasting results of trial 1 and 2 suggest that length of haul or percentage shrink may have affected the response of cattle to treatment. The "long haul" cattle (trial 2) consumed less when offered feed first than when offered water first. There was, however, no effect of treatment in the "short haul" cattle (trial 1). It should be noted that the 2.6% shrink in the trial 1 cattle was a relatively small weight loss. Lofgreen et al. (1983) termed cattle with 6.1% shrink "low stress" and cattle with 10.8% shrink "high stress". Although water intake was not determined, trial 2 cattle were obviously thirsty and drank before feeding when given the choice. These results indicate that there was no negative effects of allowing the cattle to fill up on water before feed was available.

Trial 3. Steers consumed more of the corn silage/milo diet (approximately 50% concentrate equivalent) than chopped alfalfa the first d in the lot (table 3). Chopped hay was apparently less palatable than the mixed ration. The cattle appeared to be mostly long yearlings and may have received rations containing corn silage and concentrates previously. There were no digestive problems noted with the mixed ration indicating receiving cattle (consuming 1.0 to 1.5% of LWT) can initially be fed a ration containing 50% concentrate with no negative effects. In fact, the increased nutrient intake due to greater nutrient density may be beneficial as indicated by the greater 1 wk intakes observed in the cattle fed the mixed diet in this study.

Trial 4. It is possible that the greater first d intake of the 12.5% vs the 10.5% CP rations was due to a more rapid recovery of rumen fermentation activity. First wk intakes were not different between protein levels. There was no difference in intake on the first d or first wk when comparing urea and CSM. However, both tended to be superior to the BM-CGM combination. This is most likely attributable to a palatability problem of the blood meal and/or the corn gluten meal.

In conclusion, these results indicate that along with proper processing and health management, cattle should have access to at least water and probably water and feed when first received at the feedlot. Feed should contain a greater nutrient density than hay alone and should contain more than 10.5% crude protein.

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