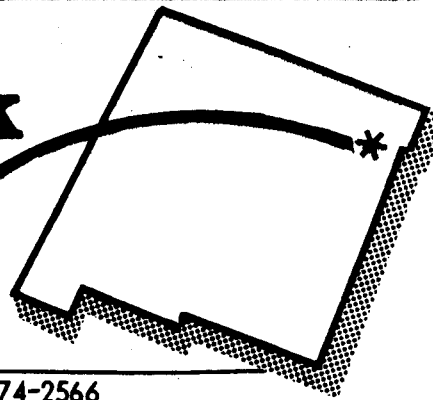




Clayton Livestock Research Center

PROGRESS REPORT



Route 1 Box 109

Clayton, New Mexico 88415

Tel. (505) 374-2566

Progress Report No. 31 (June, 1983)

INFLUENCE OF RECEIVING FEED AND DEGREE OF STRESS ON COMPENSATORY GROWTH OF BEEF STEERS

Glen P. Lofgreen, Herman E. Kiesling, Michael G. Shafer and Danny R. Garcia

It is well known that cattle which have been subjected to periods of low energy intake normally exhibit compensatory growth during subsequent periods of adequate energy intake. However, in two trials at this Center (Report Nos. 23 and 24) stressed calves received on low energy feed during a 4-week receiving period did not make compensatory gains while grazing dry native grass or wheat pasture. The grazing periods, however, were only 66 and 73 days, respectively. It was suggested that calves subjected to stresses of marketing, shipping and processing could lose the ability to make compensatory growth following a 28-day receiving period on low energy intake. To obtain further information on this question, a more comprehensive study was undertaken.

Three loads (377 head) of stocker calves of mixed beef breeding and weighing about 365 pounds were shipped from Florida to Clayton. Two of the loads were shipped directly to Clayton and were in transit 40 and 46 hours. The shrink from purchase to arrival was 9.3% for those requiring 40 hours and 12.2% for those requiring 46 hours trucking time. The third load was hauled to Hereford, Texas (36 hours), unloaded, rested 5 days then shipped to Clayton. These calves shrunk 6.1% from purchase weight to arrival weight.

Upon arrival at the Center each load was allowed to have access to grass hay and water

overnight and were processed the following morning. A mass medication program was used in which each calf received an intramuscular injection of LA200® (9 mg oxytetracycline/lb body weight) and two Albon SR® boluses (25 g per head) at processing. Within each load the calves were assigned to three receiving feeds: (1) native grass hay only, (2) native grass hay plus 2 lb daily of the 40% protein supplement shown in table 1 or (3) the 75% concentrate milled feed shown in table 2 fed free choice for 4 weeks plus native grass hay limited to the first week. Following 28 days all calves were fed a 50% concentrate milled feed for 14 days to equalize differences in fill which might have occurred

Table 1. Composition of 40% crude protein supplement¹

Ingredient	Amount
	%
Soybean meal	90.79
Calcium carbonate	1.50
Cottonseed hulls	1.75
Salt	3.00
Dicalcium phosphate	2.75
Vitamin A concentrate ²	.11
Trace mineral mix ³	.10

¹Gill, D. R. and E. J. Richey. 1982. Proc. Natl. Beef Symp. Oklahoma State Univ. March 10-12, p. BB-1.

²Contained 30,000 IU vitamin A per lb.

³Supplied courtesy of Dr. Don E. Williams, Hitch Feed Lot, Guymon, Oklahoma.

Table 2. Composition of 75% concentrate milled feed

Ingredient	Amount
	%
Ground alfalfa hay	18.0
Cottonseed hulls	7.0
Steam flaked milo	47.5
Hominy feed	7.0
Soybean meal	7.2
Fat	3.0
Molasses	7.0
Urea	.5
Limestone	.9
Monosodium phosphate	.4
TM salt	.5
Premix ¹	1.0

¹Supplied 1000 IU vitamin A and 4 mg baccitracin MD per lb of finished feed.

during the previous 4 weeks on the different types of receiving feed.

After a total of 238 days from arrival the cattle were slaughtered by Iowa Beef Processors, Inc. and carcass data obtained by Dr. Ted Montgomery of West Texas State University.

Data from the two loads of calves shipped directly from Florida to Clayton were pooled and are designated as data from high stress calves. Those rested for 5 days in Hereford are designated as low stress calves.

Table 3. Results of 28-day receiving period

Item	Receiving feed		
	Hay only	Hay + suppl.	75% conc.
<u>High stress calves</u>			
Number of calves	81	82	82
Initial weight, lb	379	374	383
Feed intake, as fed, lb	273 ^a	312 ^b	315 ^b
Weight gain, lb	6 ^a	35 ^b	66 ^c
Feed to gain ratio	45.50 ^c	8.91 ^b	4.77 ^a
<u>Low stress calves</u>			
Number of calves	44	44	44
Initial weight, lb	347	343	350
Feed intake, as fed, lb	255 ^a	308 ^b	335 ^c
Weight gain, lb	13 ^a	34 ^b	70 ^c
Feed to gain ratio	19.62 ^c	9.06 ^b	4.79 ^a

^{abc}Means in same row having unlike superscripts differ (P<.01).

Results of the 28-day receiving period are shown in table 3. During the receiving period the high and low stress calves responded similarly to the three receiving feeds with those received on the grass hay alone gaining the least weight above their purchase weight and those receiving the 75% concentrate milled feed plus grass hay the first week gaining the most. The calves receiving grass hay plus 2 lb daily of protein supplement exhibited intermediate gains. At the conclusion of the receiving period calves received on hay alone had a weight gain deficit of 60 and 53 lb for the high and low stress groups, respectively, compared to those received on the 75% concentrate feed. Calves received on hay plus protein supplement had weight gain deficits of 31 and 36 lb for the high and low stress groups respectively.

Compensatory growth made by calves fed the two low energy rations (grass hay alone or grass hay plus 2 lb of protein supplement) was measured by plotting the gain deficits compared to calves received on the high energy ration from purchase weight to slaughter weight. These gain differences are shown in figure 1 for high stress calves and in figure 2 for low stress calves. All group

Table 4. Carcass characteristics

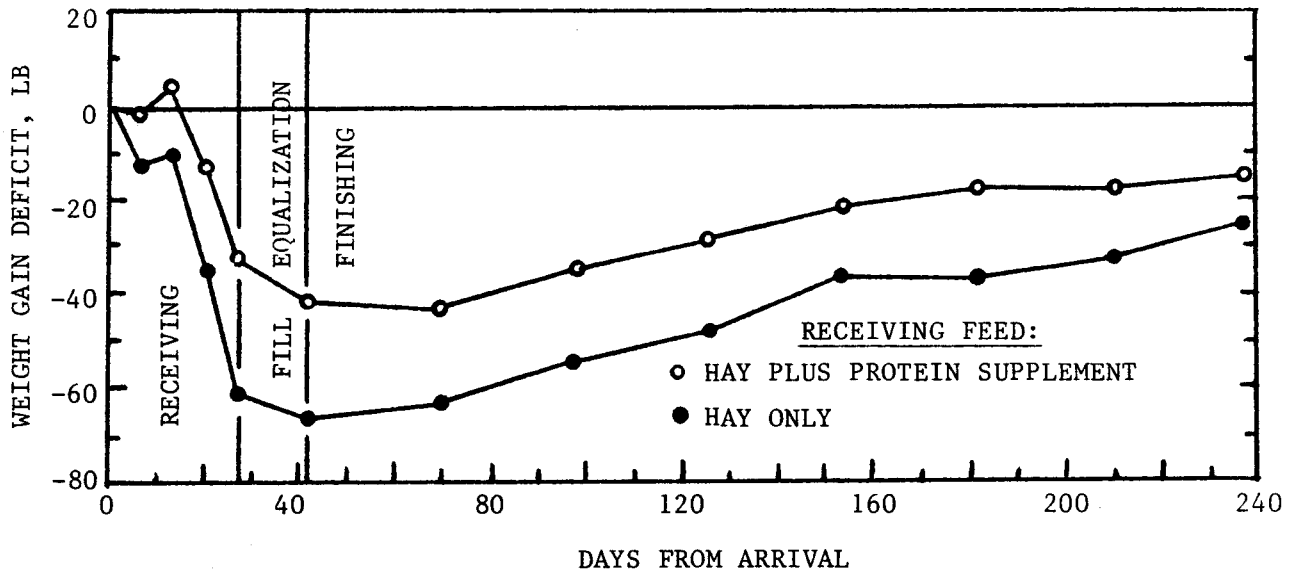
Item	Receiving feed		
	Hay only	Hay + suppl.	75% conc.
<u>High stress calves</u>			
Carcass weight, lb	662 ^a	679 ^b	691 ^c
Rib eye area, in ²	12.0 ^a	12.5 ^b	12.3 ^{ab}
Back fat, in	.61	.57	.60
Yield grade	3.1	3.0	3.1
Marbling score ^d	4.8	4.9	4.7
Quality grade ^e	11.8	12.0	11.4
<u>Low stress calves</u>			
Carcass weight, lb	655	648	659
Rib eye area, in ²	12.2 ^b	11.8 ^a	12.1 ^b
Back fat, in	.60	.59	.62
Yield grade	2.7	2.9	2.6
Marbling score ^d	4.9	4.8	5.0
Quality grade ^e	11.2	10.9	11.2

^{abc}Means in same row having unlike superscripts differ (P<.05).

^d3 = Traces, 4 = slight, 5 = small, 6 = modest.

^e10 = good, 11 = high good, 12 = low choice.

FIGURE 1. COMPENSATORY GAINS OF HIGH STRESS CALVES (10.8% SHRINK)



exhibited compensatory growth. In the case of calves subjected to high stress neither group fully compensated for the poor gains made during the receiving period. However, the compensatory gains of both groups of calves in the low stress group were more rapid than those achieved by the high stress calves and those received on hay alone fully compensated for the lower gains made during the receiving period. Those received on hay plus protein supplement compensated for nearly all their gain deficit.

Figure 3 presents a plot of the changes in the fraction of the gain deficit of the two low energy groups with time. Both high and low stress groups are included. This figure shows that calves received on hay only and those received on hay plus protein supplement make compensatory gains at about the same rate in relation to the total deficit. At 238 days both groups had made up approximately 75% of the deficit observed at the end of the fill equalization period.

FIGURE 2. COMPENSATORY GAINS OF LOW STRESS CALVES (6.1% SHRINK)

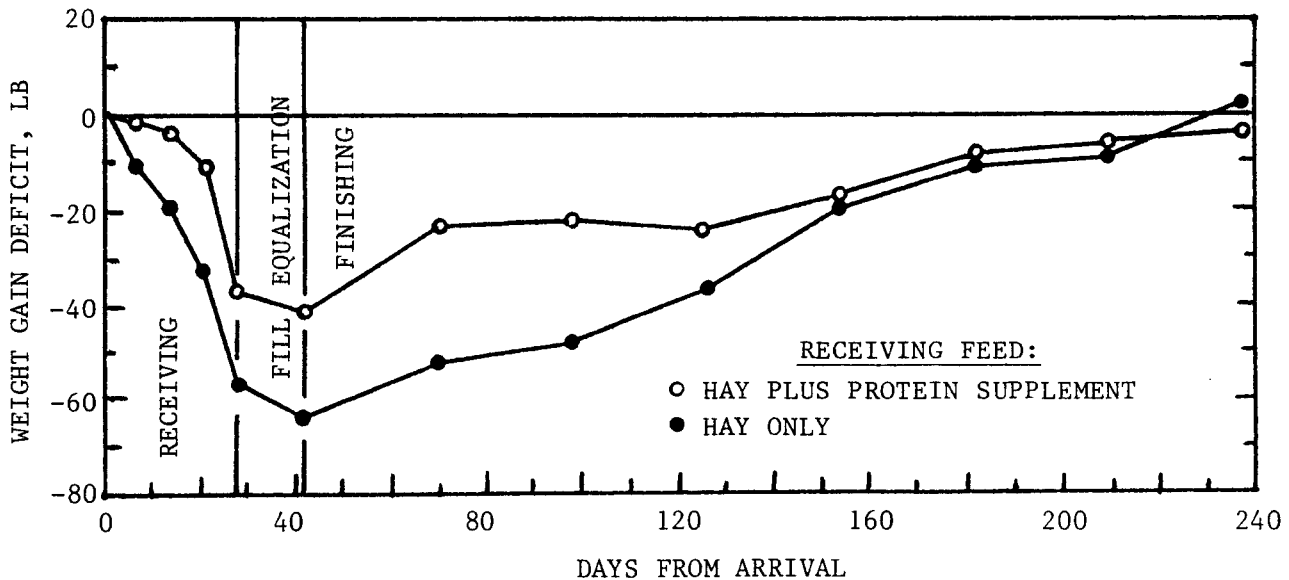
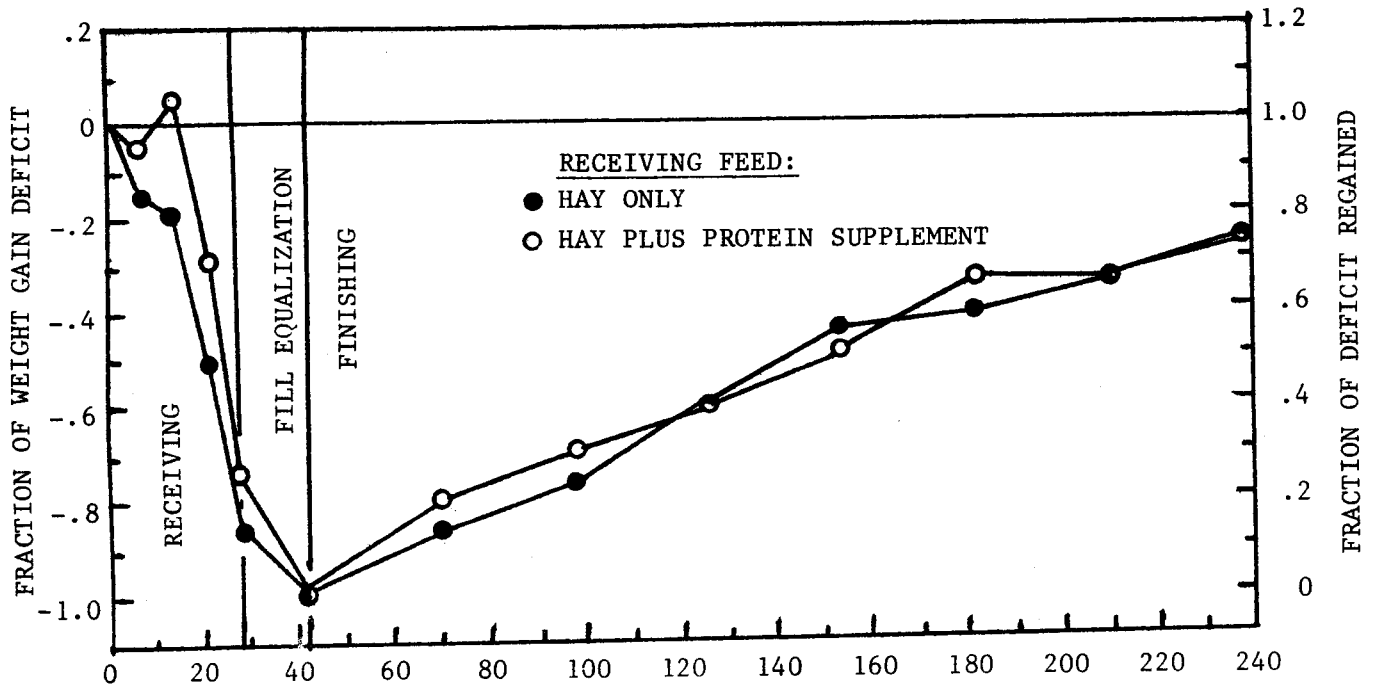


FIGURE 3. FRACTION OF GAIN DEFICIT REGAINED WITH TIME



The carcass data (table 4) reflect the gains made by the various groups of calves. In the case of the high stress calves the carcass weights and rib eye areas reflect the greater gains of calves received on higher energy rations. These differences did not occur in the low stress calves since their compensatory gains resulted in cattle of approximately the same size at slaughter.

Based on these studies high energy receiving feeds would be indicated for newly received calves which had been highly stressed since such calves fed hay alone or hay plus a protein supplement apparently never compensate fully for the poor gains made during the receiving period. Calves which have not been greatly stressed could be received on good grass hay alone since they appear to compensate fully for poor receiving gains.

A. B. Nelson

A. B. Nelson, Head, Department of Animal and Range Sciences

Agricultural Experiment Station
NEW MEXICO STATE UNIVERSITY
 Las Cruces, New Mexico 88003
 Koert J. Lesman, Director
FREE ANNUAL REPORT OR BULLETIN
OR REPORT OF PROGRESS

POSTAGE AND FEES PAID
 U. S. DEPARTMENT OF AGRICULTURE
 AGR 101
 BULK THIRD-CLASS



