

ENERGY LEVELS AND ROUGHAGE SOURCES IN RECEIVING AND SICK PEN RATIONS FOR HEAVILY STRESSED CALVES

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Summary

Three trials were conducted to evaluate energy levels and roughage sources in receiving and sick pen rations for heavily stressed calves. A 50 to 60 percent concentrate ration was optimum. Those calves receiving a 40 percent cottonseed hull ration consumed more feed with increased weight gains compared to calves fed a 40 percent corn silage or corn bran ration. A dry 70 percent concentrate ration or Calf Manna provided for maximum nutrient intake with calves in the sick pen.

Introduction

A two to five percent death loss may be expected with lightweight calves brought to the Texas Panhandle from Southeastern United States. Death losses from 0 to 25 percent have been reported. The percentage of calves requiring treatment for pneumonia or other infections averages 40 percent and may be as high as 70 to 80 percent with certain loads. Rations formulated specifically for incoming calves provide one management tool for reducing mortality and morbidity.

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These trials are part of the continuing efforts of the Texas Agricultural Experiment Station to reduce losses with incoming cattle. These losses amount to at least \$10.00 for every calf shipped into this area.

Two trials were conducted with heavily stressed calves originating from the Southeastern United States to evaluate the effects of concentrate levels and roughage sources in receiving rations on performance and health. A third trial was conducted to evaluate: (1) animal response to topdressing receiving rations with a fortified supplement and (2) rations which provide for maximum consumption by sick cattle.

Procedure

Trial 1: One-hundred-twenty-eight steer and bull calves were randomly allotted to four rations shown on Table 1. Upon arrival cattle were placed in a pen without feed or water. Within 90 minutes after arrival, processing of the cattle was initiated. Routine processing of the cattle in trials 1, 2 and 3 consisted of weighing, ear tagging, allotting to treatment, branding and vaccinating. This took approximately 3 hours. After processing, calves were placed in pens with water and a mixed ration plus 2 pounds of loose hay per calf for the first day. On the second and third day, hay in the bunk was cut to 1 and 0.5 pound, respectively. After the third day the cattle received only milled ration.

There were three pens per treatment with 10 or 11 calves per pen. Calves were visually checked for sickness each morning and suspect animals were pulled and rectal temperatures recorded. Cattle with a temperature in excess of 104° F. were retained in the sick pen and treated for a minimum of three days. Visual observation and body temperature were considered when identifying sick cattle. The results of Trial 1 are presented in Tables 2 and 3.

Trial 2:

One-hundred-twenty calves were allotted to three rations with different roughages shown in Table 4. Each treatment was replicated in four pens. Procedures for processing and treating sick cattle in Trial 2 were the same as for Trial 1. Hay was fed as in the preceding trial for the first three days. Results from Trial 2 are presented in Tables 4, 5 and 6.

Trial 3:

One-hundred-thirteen calves were allotted to two treatments: (1) control ration (Ration 2, Table 9) and (2) control plus two pounds Calf Manna per head topdressed daily for the first 14 days. Calf Manna is a highly fortified supplement containing protein, energy, vitamins and minerals. Each treatment was composed of 55-58 calves replicated in three pens. Cattle were processed and pulled for sickness and placed on feed with hay in the same manner as in the previous two trials.

In addition to the topdress study, several rations for calves in the sick pen were evaluated in Trial 3. Upon detection of sick cattle, all cattle from both treatments were placed in a common sick pen. Calves in the sick pen had four rations from which to choose their daily feed consumption. The four rations (Ration 1, Ration 2, Calf Manna and Prairie Hay) are shown on Table 9.

Consumption of each of the four rations in the sick pen was measured daily. The results from Trial 3 are presented in Tables 7, 8, 9 and 10.

Results and Discussion

Daily feed intake in Trial 1 for 28 days was similar for calves receiving the 30, 50 and 70 percent concentrate rations. Those calves receiving the 90 percent concentrate ration consumed less feed (5.6 pounds), gained at a slower rate and had more sickness and death loss than all other cattle in Trial 1. Daily gain for the 28-day period favored those cattle fed the 70 percent concentrate ration (1.34 pounds per day).

Those cattle fed the 30 and 50 percent concentrate rations consumed a greater quantity of feed the first week (4.9 versus 4.7 pounds) compared to cattle fed 70 and 90 percent rations (4.0 versus 2.7 pounds) (Table 3). Calves fed the 90 percent concentrate ration consumed less feed during each week compared to cattle on lower energy rations. Cattle which go on feed quicker generally have less sickness. Although there were no differences in sickness

among those cattle fed the 50 and 70 percent concentrate rations, it appeared that those receiving the 50 percent ration went on to feed quicker during the first week.

In studies prior to Trial 1, rumen fluid was taken from two groups of lightweight calves consuming 60 and 70 percent concentrate rations. Rations were similar in composition to the 70 percent concentrate ration in Trial 1. Forty calves were sampled on the 70 percent ration and 41 consuming the 60 percent concentrate ration. All animals were sampled from one to two hours post feeding. Over 20 percent of those cattle fed the 70 percent concentrate ration had a rumen pH of 5.4 to 5.6. Five percent had pH values below 5.0. Cattle with a rumen pH at these levels may be suffering from subclinical acidosis. Cattle fed the 60 percent concentrate did not have any samples in the pH range of 5.4 to 5.6. All samples were 5.9 or greater. This suggests that feeding a 70 percent concentrate receiving ration may impose additional digestive stress.

Calves fed the 50 percent ration consumed more the first seven days compared to those fed the 70 percent ration (4.6 versus 4.0 pounds). Consumption during the last 21 days of the trial was greater for calves fed the 70 percent concentrate ration (8.8 versus 8.2 pounds). Improvement in daily gains with calves fed the 70 percent ration versus the 50 percent ration (1.34 versus 0.86 pounds) was partially due to increased feed intake during this latter period. The elevation of rumen pH and improved feed intake during the first week suggests the use

of a 50 to 60 percent concentrate ration with heavily stressed incoming cattle rather than higher energy rations.

The effect of three roughage sources in receiving rations on performance and health of heavily stressed calves is shown on Table 5. All cattle received a 60 percent concentrate ration (dry matter) containing either 40 percent cottonseed hulls, corn silage or corn bran. Corn bran is a by-product of the corn starch milling industry. On an as fed basis it is very similar to silage in moisture content, approximately 70 percent. During the 28-day trial, feed consumption was improved with the cottonseed hull ration (12 pounds) compared to 9.2 and 7.0 pounds for the corn silage and corn bran rations, respectively. Cattle receiving cottonseed hull ration gained faster during the entire 28 days compared to those cattle on the other rations. Calves fed dry cottonseed hull ration gained 2.60 pounds per day for the first 14 days compared to 2.03 pounds for cattle fed a wet ration (corn silage or corn bran). Percent morbidity and mortality in Trial 2 was similar for all treatments.

Animals fed hull ration consumed 6.7 pounds of feed the first week compared to 6.0 and 4.0 pounds for cattle fed corn silage and corn bran rations. Cattle receiving the dry ration (cottonseed hulls) consistently consumed more feed on a weekly basis compared to cattle on silage or bran rations (Table 6). Cattle receiving the corn bran ration consumed the least amount of feed during the entire study. This trial suggests that a

dry ration promotes greater daily feed intake with heavily stressed incoming calves than a ration containing a high moisture roughage.

In Trial 3, two pounds of Calf Manna topdressed daily over the control ration was compared to the control ration (Ration 2, Table 9). Daily feed intake for the 28-day period was 7.6 pounds for control calves versus 7.5 pounds for those receiving Calf Manna. Average daily gain, percent sickness and death loss were similar for both treatments. Cattle receiving two pounds of Calf Manna per day consumed the same amount of total dry feed compared to control cattle during all weeks of the 28-day study (Table 8).

In a previous study reported by Koers, et al., 1974, top-dressing a receiving ration with one pound of Calf Manna resulted in feed consumption of 10.0 pounds versus 7.2 pounds for the control cattle for the first 14 days after arrival. Daily gain at the end of 28 days was equal between the two groups of cattle.

In Trial 3 all cattle pulled for sickness were kept in a common sick pen and had access to four rations (Table 9). During the first week after arrival, cattle in the sick pen selected grass hay for 37 percent of their total diet compared to 16 percent the second week. Consumption of Ration 1, which contained 7 percent corn silage and corn bran on a dry matter basis, was 7.7 percent of the total diet during the first week versus 35 percent in the second week. Consumption of Ration 2 and Calf Manna remained constant at approximately 26 percent of total dry matter consumption

for both the first and second weeks. These data show that sick calves selected over 50 percent of the daily intake as high energy feedstuffs. Daily feed intake for those cattle in the sick pen during the first week was 2.8 pounds per day versus 3 pounds the second week. This compares to 5 and 6.6 pounds per day for the healthy cattle during the first and second week after arrival.

It appears that to maintain maximum nutrient intake with sick cattle a dry 60-70 percent concentrate ration or a supplement similar to Calf Manna be fed. A limited amount of hay should be fed in the bunk in combination with the mixed ration.

In general practice, calves are fed 2 pounds of hay per head along with a mixed ration the day of arrival. On the second and third days, calves receive 1 and 0.5 pound of hay, respectively, in combination with the milled ration. Observations have indicated that use of a mixed ration alone has not been as successful with incoming cattle as using the ration plus a limited amount of loose hay. It would appear that some hay in the bunk aids in bringing the cattle to the feedbunk. Using hay with the mixed ration during the first two to three days after arrival is a management practice which encourages feed consumption by the severely stressed calves.

Literature Cited

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Trials 1 and 2 were conducted at the Texas Tech University Center, Pantex, Texas, and Trial 3 was conducted at the Southwestern Great Plains Research Center, Bushland, Texas.

Table 1. Receiving Rations with Four Different Concentrate Levels.^a Trial 1.

Item	% Concentrate			
	30	50	70	90
	%	%	%	%
Flaked milo	13.0	34.0	55.0	76.0
Cottonseed hulls	35.0	25.0	15.0	5.0
Alfalfa hay	35.0	25.0	15.0	5.0
Cottonseed meal	11.0	10.0	9.0	8.0
Premix ^b	6.0	6.0	6.0	6.0
	100.0	100.0	100.0	100.0

^aDry matter basis - 14% protein.

^bPremix analysis: 19.7% protein, 6.8% calcium, 0.68 phosphorus, 1.7% sulfur and 1.86% potassium.

Table 2. Effect of Concentrate Level in Receiving Rations on Performance and Health of Heavily Stressed Calves.^a Trial 1.

Item	% Concentrate			
	30	50	70	90
No. calves	31	32	33	31
Date received	-----August 1973-----			
Origin	-----Southeast-----			
Initial wt., lb.	315	321	327	322
Daily feed intake, lb. ^b	7.9	7.3	7.6	5.6
Avg. daily gain, lb.	1.02	0.86	1.34	0.79
Feed/lb. gain	7.8	8.5	5.4	6.7
Sick pen, %	42	37.5	39.4	67.8
Dead, %	3.34	3.2	3.1	9.7

^a28 day trial.

^bDry matter basis.

Table 3. Effect of Concentrate Level on Daily Feed Intake by Week.^a Trial 1.

Week	% Concentrate			
	30	50	70	90
	1b.	1b.	1b.	1b.
1st	4.9	4.6	4.0	2.7
2nd	6.0	5.8	5.7	5.4
3rd	8.9	8.1	9.3	6.4
4th	11.9	10.8	11.5	7.8
28 day avg.	7.9	7.3	7.6	5.6

^aDry matter basis.

Table 4. Receiving Rations with Three Different Roughage Sources.^a Trial 2.

Ingredient	Roughage source		
	Cottonseed hulls	Corn silage	Corn bran
	%	%	%
Flaked milo	43.15	47.22	50.80
Cottonseed hulls	40.00		
Corn silage		40.00	
Corn bran ^b			40.00
Premix ^c	6.0	6.0	6.0
Cottonseed meal	10.6	6.5	2.4
Dicalcium phosphate		0.03	0.55
Aureo S-700	0.25	0.25	0.25

^aDry matter basis - 11.5% protein.

^bBy product of corn starch milling industry; 70% moisture - as fed basis.

^cPremix analysis: 19.7% protein, 6.8% calcium, 0.68% phosphorus, 1.7% sulfur and 1.86% potassium.

Table 5. Effect of Roughage Source in Receiving Rations on Performance and Health of Heavily Stressed Calves. Trial 2.

Item	Roughage source		
	Cottonseed hulls	Corn silage	Corn bran
No. calves	40	40	40
Date received	-----November 1974-----		
Origin	-----Southeast-----		
Initial wt., lb.	350	340	325
Daily feed intake, lb. ^a	12.0	9.2	7.0
Avg. daily gain			
1st 14 days, lb.	2.60	2.48	1.58
Avg. daily gain			
2nd 14 days, lb.	3.30	2.87	3.29
Avg. daily gain			
28 days, lb.	3.06	2.67	2.42
Feed/lb. gain	3.9	3.4	2.9
Sick pen, %	47.5	42.5	40.0
Dead, %	7.5	7.5	4.2

^aDry matter basis.

Table 6. Effect of Roughage Source on Daily Feed Intake by Week.^a Trial 2.

Week	Roughage source		
	Cottonseed hulls	Corn silage	Corn bran
	lb.	lb.	lb.
1st	6.7	6.0	4.0
2nd	10.1	7.8	6.4
3rd	15.6	9.8	7.6
4th	14.8	13.2	10.2
28 day avg.	12.0	9.2	7.0

^aDry matter basis.

Table 7. Effect of Calf Manna Topdressed Over Receiving Rations on Performance and Health of Heavily Stressed Calves.^a Trial 3.

Item	Treatments	
	Control	Calf Manna ^b
No. calves	55	58
Date received	-----August 1973-----	
Origin	-----Southeast-----	
Initial wt., lb.	329	325
Avg. daily gain, lb.	1.64	1.62
Daily feed intake, lb. ^c	7.6	7.5 ^d
Feed/lb. gain	4.6	4.6
Sick pen, %	87	82
Dead, %	20	22

^a28 day trial.

^b2 lb. of Calf Manna topdressed daily per calf for 14 days.

^cDry matter basis - ration 2 on Table 9.

^dIncludes 2 lb. of Calf Manna.

Table 8. Effect of Calf Manna on Daily Feed Intake by Week^a. Trial 3.

Week	Treatment	
	Control	Calf Manna ^b
	lb.	lb.
1st	4.9	5.0
2nd	6.4	7.0
3rd	9.1	8.5
4th	10.4	9.6
28 day avg.	7.6	7.5

^aDry matter basis.

^bIncludes 2 lb. of Calf Manna topdressed daily for first 14 days.

Table 9. Formulation of Rations Fed on Free Choice Basis to Calves in Sick Pen.^a Trial 3.

Ingredient	Rations			
	Ration 1	Ration 2	Calf Manna	Hay
	%	%	%	%
Calf Manna			100	
Prairie hay				100
Flaked milo	48.8	55.5		
Cottonseed hulls	15.9	16.9		
Dehydrated alfalfa		10.0		
Cottonseed meal	2.8	8.0		
Molasses	4.9	7.1		
Salt		0.5		
Calcium carbonate		0.6		
Potassium chloride		0.5		
Ammonium sulfate		0.25		
Dicalcium phosphate		0.25		
Premix		0.4		
Vitamin A		+		
Corn silage	3.8			
Corn bran	3.8			
Alfalfa	17.6			
Supplement	2.4			
	100.0	100.0	100.0	100.0

^aDry matter basis.

Table 10. Daily Feed Intake of Four Rations Fed ad libitum to Heavily Stressed Calves in the Sick Pen.^a Trial 3.

Item	1st week		2nd week		1st & 2nd week	
	Total	% of Total	Total	% of Total	Total	% of Total
	lb.	%	lb.	%	lb.	%
Ration 1 ^{b,c}	87	7.6	484	35.2	571	22.7
Ration 2	327	28.6	362	26.3	689	27.4
Calf Manna	301	26.3	311	22.6	612	24.3
Grass hay	428	37.4	217	15.8	645	25.6
Animal days ^d	409		461		860	
Daily intake, lb.	2.8		3.0		2.9	
Daily intake, % of body wt.	0.83		0.84		0.84	

^aAs calves recovered from sickness, they were returned to original pen.

^bDry matter basis.

^cAll rations were available in the sick pen on an ad libitum basis.

^dThere were approximately 60 calves in the sick pen during weeks 1 & 2.