Management and Treatment of the Weaner-Stocker Calf

Management and Treatment of the Weaner-Stocker Calf in California

G. P. Lofgreen, D. G. Addis, J. R. Dunbar, J. G. Clark, G. L. Crenshaw, D. D. Hinman
University of California
Davis, California

The increasing numbers of lightweight calves coming into commercial feedyards have emphasized the lack of knowledge concerning problems associated with handling of the newly-arrived calf. Some of the major problems are related to starting rations, processing procedures, preventive medication, treatment of the sick calf and even the proper type of handling facilities.

In 1970 a project was initiated at the Imperial Valley Field Station of the University of California to study the nutrition, management and health of the newly-received calf. It is the purpose of this paper to review the findings in the areas of energy level in the receiving ration, time of processing, preventive medication and corral construction.

Energy Level in the Receiving Ration

A preliminary study had indicated that calves subjected to stress due to lack of feed and trucking showed a preference for high energy feeds and chose a ration composed of 72 percent concentrates. Unstressed calves selected a 63 percent concentrate ration. Preliminary data indicated the rumen microflora returned to a normal pattern more rapidly on a ration containing 55 percent concentrates than on one containing more hay. Since this was a preliminary study with small numbers of calves, a second trial was conducted in which calves subjected to natural stress were used. Thirty-seven head of No. 1 crossbred (approximately 1/8 Brahman) calves were selected at random from a load of 112 head which had been shipped from Gonzales, Texas, to El Centro, California. The in transit time was 37 hours, and the in transit shrink was 7.5 percent. Table 1 shows the composition of the ration chosen by these calves from the three rations offered.

It was clearly shown that stressed calves preferred to eat a high energy ration when given a choice. This, however, does not mean that the high energy ration is necessarily the best for the health and performance of the calves. For this reason three loads of calves (336 head) were used to compare receiving rations containing 20, 55, 72, and 90 percent concentrates.

One load of calves originated in Abilene, Texas, and two in Gonzales, Texas, and were in transit from 36 to 44 hours. The load which was in transit 44 hours made a rest stop at Willcox, Arizona. The other two loads made no rest stops. The average purchase weight was approximately 360 pounds for all three loads. Upon arrival the calves were unloaded, individually weighed, ear tagged, castrated as necessary (about 70 percent bulls), branded, vaccinated, wormed, given a pour-on for grub control, and were given an intramuscular injection of an antibiotic and vitamin A. After processing the calves were given free access to their respective rations and to water. At least once daily the calves were observed and those requiring treatment were pulled, treated, marked, and returned to their pens. A calf pulled for treatment was treated for three successive days or until his temperature returned to normal, whichever took the longest.

The ingredient composition of the rations is shown in Table 2.

Since all rations were not compared in all trials, the data are presented showing only those comparisons made in the same trial. Table 3 presents the comparisons for the first two weeks of the trials. In the comparison of the 20 vs. 55 percent rations and the 55 vs. 72 percent comparison the higher energy rations in each case promoted a more rapid rate of gain for both weeks and, thus, a more rapid recovery of purchase weight. In the 72 vs. 90 percent comparison, however, the calves fed the 72 percent ration gained more rapidly the first week and continued to gain well during the second week.

Table 1

Feed Consumption of Self-Selection Lot

Item	Percent Concentrate in Rations Offered			Percent concentrate in Combination Selected
	20	55	90	
	lb./head/day			
Day 1	0.64	0.56	1.48	66
2	0.48	0.44	2.92	77
3	0.67	0.70	2.72	73
4	0.61	0.83	4.22	77
5	0.50	0.59	5.09	81
6	0.36	0.59	5.67	83
7	0.59	0.81	6.03	81
Mean for 1st week	0.55	0.65	4.02	78
2nd week	0.62	1.06	7.62	81
3rd week	0.68	1.05	8.12	81
4th week	0.46	1.03	11.69	85

Table 2

Composition of Rations

Ingredient	Concentrate Level, %			
	20	55	72	90
Alfalfa hay	75.0	40.0	23.0	5.0
Sudan hay	5.0	5.0	5.0	5.0
Rolled barley	2.5	37.5	49.5	60.2
Wheat millrun	3.0	3.0	3.0	3.0
Hominy feed	4.0	4.0	4.0	7.0
Linseed meal	-	-	4.5	5.8
Urea	-	-	-	0.5
Fat	3.0	3.0	3.0	3.0
Molasses	7.0	7.0	7.0	7.0
Limestone	-	-	0.5	1.0
TM salt	0.5	0.5	0.5	0.5
Vitamin A	1000 IU per lb. of ration			

Table 3

Performance for the First Two Weeks

Item	Concentrate Levels Compared, Percent					
	20 vs. 55		55 vs. 72		72 vs. 90	
	20	55	55	72	72	90
Number of trials	1		2		2	
Number of calves	39	38	74	74	73	74
Purchase weight, lbs.	364	366	368	366	360	364
Off-truck weight, lbs.	336	338	340	337	332	337
Days required to regain purchase weight	16	13	10	9	7	9
Food Consumption, lbs.						
Day 1	2.55	3.10	3.45	3.36	3.13	3.36
Mean for first week	4.74	5.50	5.63	5.44	5.90	5.04
Second week	7.84	8.38	8.59	8.86	8.82	7.77
Daily Weight Gain from Arrival, lbs.						
First week	1.14	1.86	1.99	2.02	2.24	1.40
Second week	2.29	2.43	2.74	3.73	3.80	4.05
Feed Per Pound Gain, lbs.						
First week	4.16	2.96	2.83	2.69	2.63	3.60
Second week	3.42	3.45	3.14	2.38	2.32	1.92

Table 4

Performance During the Four-Week Receiving Phase

Item	Concentrate Levels Compared, Percent					
	20 vs 55		55 vs 72		72 vs 90	
	20	55	55	72	72	90
Gain from purchase weight, lb.	11	22	35	45	59	61
Daily feed consumed, lb.	8.58	8.98	9.14	9.31	9.46	8.78
Daily gain from purchase, lb.	0.38	0.76	1.25	1.61	2.11	2.18
Feed per pound gain, lb.	22.58	11.82	7.31	5.78	4.48	4.03
Processing cost per head, $	1.30	1.30	1.69	1.69	2.07	2.07
Medication cost per head, $	1.59	1.65	1.35	1.57	1.38	1.45
Processing and medication cost per pound gain, cents	26.27	13.41	8.69	7.24	5.85	5.77

Table 5

Effect of Concentrate Level in the Receiving Ration on Performance Throughout the Entire Feeding Period

	Concentrate level in the receiving ration, percent		
	55	72	90
Weight gained during the 28-day receiving period, lb./head	48	57	62
Weight gained during the succeeding 225 days on a finishing program, lb./head	574	576	588
Total weight gained in 253 days, lb.	622	633	650
Advantage over the 55% level at the end of the receiving phase, lbs.	–	9	14
Advantage at the end of the entire feeding period, lb.	–	11	28
Carcass Characteristics:			
Hot carcass weight, lb.	629	632	640
Yield, %	61.6	61.3	61.2
Quality grade[1]	12.4	12.6	12.0
Cutability[2]	2.9	3.0	3.0
Fat in carcass, %	33.0	34.1	33.5
Protein in carcass, %	14.4	14.1	14.3

[1]Quality grade key: 13 = choice, 12 = low choice, 11 = high good.
[2]Cutability is scored from 1 to 5 with 1 being the most desirable.

Table 6

Performance for the First Two Weeks

Item	72% Concentrate	
	No loose hay	With loose hay
Number of calves	30	29
Purchase weight, lb.	211	207
Off-truck weight, lb.	190	187
Days to regain purchase weight	9.9	9.9
Feed consumption, lb.		
Mean for first week	2.21	2.50
Mean for second week	4.80	4.61
Daily gain from arrival, lb.		
Mean for first week	0.77	0.88
Mean for second week	2.86	2.52
Feed/lb. of gain, lb.		
Mean for first week	2.87	2.84
Mean for second week	1.68	1.83

Table 7

Performance for the 28-day Receiving Period

Item	72% Concentrate	
	No loose hay	With loose hay
Mean purchase weight, lb.	211	207
28-day weight less 3%, lb.	238	234.5
Daily feed consumed, lb.		
72% concentrate milled ration	5.00	4.70
Loose alfalfa hay	–	0.42
Total	5.00	5.12
Daily gain from purchase, lb.	0.98	0.97
Feed per pound gain, lb.	5.10	5.28

Table 8

Time of Processing – 34-day Receiving Phase

Item	Processed at origin	Processed on arrival	Processed @ 2-3 wks.
No. of calves	119	119	120
Death loss	0	1	2
Culls	0	0	1
% death loss and culls	0	0.8	2.5
No. of calves treated	65	66	71
% of calves requiring treatment	55	55	59
% returns	31	36	48
Processing and medication cost, $/head	3.12	3.67	3.92
Mean purchase weight, lb.	259	264	261
Days required to regain purchase weight	7	8	6
Daily gain from purchase, lb.	1.57	1.46	1.28
Feed required per lb. gain, lb.	4.89	5.26	5.72
Processing & medication cost per lb. gain, ¢	5.83	7.33	8.77

Table 9

Feed and Water Consumption and Weight Gains

Item	Control	Terramycin[R]	
		Oral	I.M.
Daily feed consumption, lb.			
First week	2.47	1.65	1.97
Second week	4.22	4.30	4.32
Entire 28 days	4.90	4.82	4.89
Daily gain from arrival, lb.			
First week	1.14	1.07	1.26
Second week	2.93	3.02	3.00
Entire 28 days	1.75	1.72	1.72
Daily water consumption, gal.			
First week	2.61	2.43	2.66
Second week	3.24	3.27	3.57
Entire 28 days	3.54	3.52	3.71
Feed per pound gain, lb.			
First week	1.90	1.54	1.56
Second week	1.44	1.42	1.44
Entire 28 days	2.80	2.80	2.84
Daily gain from purchase wt., lb.	1.05	1.01	1.04
Feed per lb. gain from purchase, lb.	4.67	4.77	4.70

Those fed the 90 percent ration gained poorly the first week but recovered well and made exceptional gains during the second week.

Table 4 shows the data for the same ration comparisons for the entire four-week receiving phase. In the comparison of the 20 vs. 55 percent and the 55 vs. 72 percent rations the feed cost per pound of gain again favored the higher energy ration in each case. In the 72 vs. 90 percent comparison, although favoring the higher energy ration, the difference was small.

Table 10
Animal Health

Item	Control	Terramycin[R] Oral	Terramycin[R] I.M.
% of calves requiring treatment	42.0	22.0	24.0
No. of treatments per calf treated	3.4	4.3	3.6
Percent returns	5.0	0	0
Treatment cost per head, $	0.77	0.61	0.53
Preventive medication cost, $ per head	0	1.22	1.44
Processing cost, $ per head	1.48	1.48	1.48
Total of preventive medication, treatment and processing costs, $ per head	2.25	3.31	3.45

It is interesting that the medication cost per head was greater in each comparison on the higher energy ration. When expressed on a per pound of gain basis, however, the higher energy ration was the cheaper. The difference between the 72 and 90 percent rations, however, was again small. The same is true when the feed costs are combined with the processing and medication costs.

In order to determine if the differences observed during the four-week receiving period would be detectable after an entire feeding period, one group of calves was placed on a finishing program and records were kept of those which had been received on the 55, 72, and 90 percent rations. Table 5 contains the data obtained during this test. It will be noted that the group started on the 72 percent ration had a nine pound advantage over the 55 percent ration at the end of the four-week receiving period, and this was increased to an 11-pound advantage at the end of the 253-day period. Those fed the 90 percent receiving ration increased their advantage from 14 to 28 pounds. The carcass data reveal no differences attributable to receiving rations. From these data it appears that high energy rations containing from 72 to 90 percent concentrates or 45 to 50 megcal. of NE_g per 100 pounds produce better results that lower energy rations when fed to newly received calves subjected to shipping stress.

Since no loose hay is used in our receiving program (this is a common practice in most yards), a simple experiment was conducted to determine the performance of newly received calves with and without loose alfalfa hay as part of their receiving nutritional program.

Fifty-nine head of No. 2 crossbred calves were used in the study. The average purchase weight was 209 pounds. They were purchased by a commission firm in Houston, Texas. The calves were in transit 36 hours, and the shrink was 9.4 percent. During processing (on arrival) experimental animals were randomly assigned to one of the following nutritional programs:

1. 72% concentrate ration only.
2. 72% concentrate ration plus long stem alfalfa hay free choice.

Experimental animals remained on their respective ration during a 28-day receiving period. Processing included branding, castration as needed, ear tagging, Warbex[R] pour-on and vaccination for IBR-PI_3 and Blackleg-malignant edema. In addition, each animal was given Vitamin A.D.E. (500,000 IU of vitamin A), wormed with Tramisol[R] (360 mg/100 lb.) and 1 gm of Terramycin[R] (IM) and 2 SEZR boluses.

The performance for the first two weeks is shown in Table 6. There was no difference between the two treatments in days required to regain purchase weight (both groups required 9.9 days). Data on feed consumption, gain, and feed efficiency indicate little variation between the two ration treatments.

There was little difference in the medication required by the two groups with 43 percent of the calves without loose hay requiring treatment and 40 percent of those receiving loose hay. The number of treatments required per calf treated was 1.0 for the no hay group and 1.3 for those provided loose hay. Because of the slightly higher treatments, the medication cost for those on loose hay was $0.62 per head while those without hay cost $0.55.

Table 7 presents the summary for the entire 28-day receiving period. These data reveal no advantage in providing loose alfalfa hay with the 72 percent concentrate ration used in our receiving studies.

Time of Processing

The relative merits of processing calves at point of origin, upon arrival at destination, or delaying processing for two to three weeks are often discussed. A common view is expressed that the bodies of stressed calves will not develop antibodies efficiently until recovered from stress, and thus, vaccination should be delayed until the stress has been overcome. Since it is usually necessary to identify the calves upon arrival, one faces the decision whether to provide all the processing at this time or to handle the calves once or twice more for delayed vaccination or castration and perhaps other kinds of processing.

Three loads of calves (358 head) were used to study the effects of processing at origin, processing on arrival, or delaying processing for two to three weeks. One load of calves originated at West Point,

Mississippi, and was in transit 68 hours including one rest stop. The other two loads originated at Houston, Texas, and were in transit 32 to 38 hours with no rest stops. In all loads one-third of the cattle selected at random were processed at origin, one-third upon arrival at destination, and for the remaining one-third processing was delayed for two to three weeks after arrival.

All calves were fed a 72 percent concentrate ration with no loose hay provided. Free access to this ration and to water was provided immediately following unloading and processing those to be processed. Processing consisted of the same procedures as outlined for the calves used in the study on providing loose hay.

Table 8 contains a summary of the results of these studies. The two calves which died in the delayed processing group died from hemorrhage associated with castration which occurred from one to two weeks following castration. A third calf in this group hemorrhaged but was saved by a blood transfusion. The calf lost in the group processed on arrival died from pneumonia with 50 percent of the lung consolidated. Although there was little difference in the number of calves requiring treatment among the three processing times, the number of returns was lowest in the group processed at origin. This, combined with the slightly greater number of treatments per animal treated, resulted in higher medication costs for the groups processed on arrival or delayed.

The daily gain, feed required per pound of gain, and the costs per pound of gain favor the group processed at origin. Although these data favor processing at origin, many other factors need to be considered in making a decision on location of processing. No costs have been included for labor in processing, and the relative cost of processing at origin or upon arrival must be considered as well as other factors. If the criteria for selecting the ideal time for processing are 1) maximizing gain, 2) developing protective vaccination titers against disease, and 3) minimizing feed, processing, and medication costs per pound of gain, these studies indicate that processing at origin immediately prior to shipment or immediately upon arrival would be superior to delaying these procedures for two to three weeks.

Preventive Medication:

Two trials have been completed in which the treatments compared were:

1. Controls - no preventive medication.
2. Oral antibiotic through medicated feed and water.
3. Three successive days intramuscular injection of Terramycin^R.

Two hundred and ten No. 2 crossbred Brahma calves were shipped from Houston, Texas, to the Imperial Valley Field Station. Their average purchase weight was 207 lbs. The 36-hour in-transit shrink was 9.4%. The load consisted of 86 percent bulls and 14 percent steers. Twenty cc of Terramycin^R (1 gm.) was administered to all calves prior to being loaded for shipment to California. Immediately upon arrival in California (8:30 a.m., 6-27-72), 60 calves were randomly selected from the load for processing and assignment to another test. The remaining 150 head were processed and randomly assigned to the three treatment groups shown above. Processing consisted of vaccination for blackleg, malignant edema, IBR and PI_3; worming with 360 mg per cwt. of Tramisol; IM injection of vitamins A, D and E (500,000 IU of vitamin A); ear tagging; taking of rectal temperature, branding, castration, administration of a grubicide (Warbex^R pour-on at 1/2 oz. per cwt.). In addition, all calves assigned to Terramycin^R IM received 20 cc (1 gm.) for the first three days. The Terramycin^R added to the feed and water was soluble powder concentrate.

A 72% concentrate ration, NE_m 75 and NE_g 45, was fed to all cattle on a free choice basis throughout the entire 28 days. No long hay of any type was used. Each calf assigned to **Terramycin^R I.M.** received an individual injection of 20 cc Terramycin^R (1 gm.) for the first three consecutive days. Calves on **Terramycin^R oral** were to receive medicated feed and water calculated to deliver 2 gms. per head per day (1 gm. via H_2O, 1 gm. via feed) until the animals were eating two percent of their body weight. After this, preventive medication was to be continued at a reduced rate (1 gm./head/day) until no additional sickness occurred. Control calves had no California-administered preventive medication of any type.

As animals exhibited signs of sickness they were removed from their respective pens and temperatured. Any animal with an elevated temperature (104° or above) received medication. The treatment was continued until one full day after temperature returned to normal. If the first drug used did not reduce temperatures by the second day the drug was discontinued and an alternative treatment was used. A favorable temperature response to drugs (103° or less) was one criterion for evaluation of animal response to any particular treatment.

Table 9 shows the feed and water consumption and weight gains for the 28-day receiving period.

Feed consumption the first four days was depressed when Terramycin was added to the feed, resulting in lower average daily gains. Water consumption, however, was not affected by the addition of Terramycin. Therefore, beginning on the fifth day after arrival, terramycin was eliminated from the feed and added to the water only at a rate of 1 g. per head per day.

Most commercially available antibiotic feed additives contain a highly palatable oil seed meal base carrier. In addition to providing an animal with the specific drug, energy and protein would also be obtained. To eliminate this nutritional variable, only the soluble powder concentrate Terramycin was used orally.

Feed and water consumption the second week was similar for all groups. There was little difference between the three groups during the entire 28 days in feed or water consumption, average daily gain, or feed required per pound of weight gain. The preventive medication programs used appeared to have no effect on weight gain or efficiency of feed conversion.

Animal health records (Table 10) indicate that the two preventive programs did reduce the number of animals treated by 43 and 47 percent (I.M. and oral). However, the number of treatments per sick animal before return to normal was not influenced by the preventive medication.

The total of all costs for feed, processing, preventive medication and individual sick animal treatments was lowest for the control animals and highest for oral and I.M.

Thus, although individual animal sicknesses were reduced by an average of 45 percent when preventive medication programs were administered, the additional cost of the drug without increased weight gain or improved feed efficiency resulted in higher costs per pound of gain.

A second and third trial according to the same design are under way at present. Other products for addition to the feed are being used to overcome the palatability problem encountered in trial 1.

Corral Construction

At the initiation of the project, existing corrals built for larger cattle were used for the newly received calves. During the three years of experience in the project, certain modifications in corral construction appeared to be desirable and a new facility has just been completed incorporating these changes.

Because of the size of the conventional feed bunk, small calves have difficulty reaching the feed and in an effort to do so step into the bunk and then continue out of the pen. Thus, the feed bunks in the new facility have been redesigned for calves. The inside lip of the trough was lowered by four inches to a height of 15 inches and an inside depth of approximately 10 inches, making it possible for a 150-pound calf to reach feed at the bottom of the manger. Additionally, the outside wall of the bunk was brought six inches closer to the inside with the bottom being curved in such a manner to keep the feed close to the inside of the trough.

An additional problem in the conventional pen is the ease with which calves go through the manger line fence when being worked for pulling sick calves or for other purposes. The new facility has been provided with adjustable sucker rod guards extending over the manger which virtually eliminates the possibility of a calf going through the front fence.

We have also found it desirable to use small receiving pens, holding 20 to 30 calves per pen, rather than having an entire load in one large pen. This facilitates observing for sickness and separation of the calves to be pulled for treatment.