

CREEP-FEEDING FALL CALVES

By

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Bachelor of Science

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Ames, Iowa

1959

Submitted to the faculty of the Graduate School of
the Oklahoma State University of Agriculture and
Applied Science in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE

May, 1962

NOV 8 1962

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ACKNOWLEDGMENT

The author wishes to express his appreciation to Dr. A. B. Nelson of the Animal Husbandry Department for his guidance during the course of this study and in the preparation of this thesis.

He also wishes to thank Mr. W. D. Campbell for his help in caring for the experimental cattle and in maintaining necessary records.

Special recognition is due the author's wife, Joan, for her assistance in the preparation and typing of this thesis.

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INTRODUCTION

In recent years many cattlemen in the range area have changed from a spring-calving system to one that involves calving in the fall or early winter. The managerial and feeding problems are markedly different when the latter practice is followed.

The nutritive requirements are higher for lactation than for gestation. Fall-calving cows nurse their calves during the winter when the native grass pastures are of lowest nutritive value; thus, these cows would be expected to produce less milk than when additional nutrients are furnished by green grass in the spring. The milk production of these cows would be expected to vary according to the quantity and quality of the available winter forage and to the level of supplemental winter feed. A means of supplementing the milk production of the cow is to provide additional nutrients in the form of creep-feed for the calf. In many experiments creep-feeding of spring calves has increased weight gain, but the value of these increased gains has not offset the feed cost. Most of the studies have been with spring calves. It is assumed that creep-feeding would be of greater value to the fall calf which is on dry native grass pasture for several months than to the spring calf which is on green pasture during most of the suckling period.

Reported in this thesis are the results of studies of the value of certain creep-feeds for fall calves and the value of creep-feeding fall calves only until green grass is available in the spring.

REVIEW OF LITERATURE

Trowbridge and Jones (1929) studied the value of different methods of managing good quality, fall-dropped, steer calves. The calves in Lot 1 were with their dams on pasture and were not creep-fed. The Lot 2 calves ran with their dams on pasture and were fed grain and alfalfa hay in a creep, while the Lot 3 calves were fed the same creep-feed but were kept separate from their mothers and allowed to nurse twice each day. The creep mixture consisted of two parts corn and one part oats until mid-March when it was changed to five parts corn, two parts oats, and one part linseed meal. The creep-fed calves weighed an average of 115 pounds more per head at eight months of age and were fat enough for slaughter. Both creep-fed lots showed greater net returns at weaning than the calves which were not creep-fed.

The results of the second trial of this three-year study were reported by Trowbridge et al. (1930). The creep-fed calves weighed an average of 130 pounds more at weaning than the non-creep-fed calves and were valued at \$2.40 more per 100 pounds. They were classed as slaughter cattle, whereas those which had not received grain were classed as feeders.

In the third trial Trowbridge et al. (1931) divided 25 two-month-old, high-quality, grade, Shorthorn steer calves into three lots as in the previous trials. At weaning in mid-May the calves in Lots 1, 2, and 3 had gained 197, 305, and 345 pounds, respectively. In all years the creep-fed calves which were allowed to nurse only twice a day were consistently heavier than the creep-fed calves remaining with their dams. These calves also consumed more creep-feed.

Hazen and Comfort (1943), in a two-year study, compared two creep-feed mixtures for fall-born steer calves from high-grade Shorthorn cows. The calves in Lot 1 were fed a mixture consisting of eight parts shelled corn, one part chopped alfalfa hay, and one part cottonseed cake. Those in Lot 2 were fed a mixture of four parts shelled corn, four parts cane molasses, one part chopped alfalfa hay, and one part cottonseed cake. The calves in Lot 1 gained an average of 47 pounds more in the 168-day suckling period than those in Lot 2. There was a considerable difference in gains in the first trial, but the gains were nearly equal in the second trial.

A series of seven experiments was conducted at the Fort Hays, Kansas, station to determine the value of creep-feeding fall calves under range conditions. The calves were from high-quality, grade, Hereford cows and sired by registered Hereford bulls. The cows were not given special care but were fed sufficient supplemental protein, in addition to the roughage, to meet their body needs. Native pasture supplied

the major part of the roughage, but other types of forage were used when available. The average calving date in these experiments was September 30. The calves were offered creep-feed approximately a month later, but only small quantities were consumed until January. The calves were creep-fed until weaning which was about July 5. At weaning all calves were placed in the feed lot and full-fed fattening rations.

The results of the first trial were reported by Duitsman and Kessler (1956). Thirty-eight calves and their dams were divided into two groups in mid-November. The average consumption of 1107 pounds of milo by the creep-fed calves (Lot 1) increased weaning weight an average of 79 pounds when compared to those which were not creep-fed (Lot 2).

In the second trial (Duitsman and Kessler, 1956) Lots 1 and 2 were treated as in the first trial. The calves of Lot 3 were fed a 17 percent protein mixture of milo and cottonseed meal. Average weaning weights were 555, 617, and 607 pounds for Lots 1, 2, and 3, respectively. The calves in Lot 1 consumed 1040 pounds of milo but were 52 pounds lighter at weaning than those in Lot 2. Those calves fed the 17 percent mixture (Lot 3) consumed an average of 851 pounds of milo and 213 pounds of cottonseed meal. These calves weighed 10 pounds more than the non-creep-fed calves. No explanation was given for the lower weaning weights of the Lot 1 calves. It was observed that the calves which had been creep-fed were fatter than the controls.

In the third trial Duitsman and Kessler (1957) placed three lots of calves on the same treatments as described in the second trial. The calves creep-fed an average of 1189 pounds of milo (Lot 1) weighed 647 pounds at weaning compared to 554 pounds for the non-creep-fed calves. The calves in Lot 3 were 63 pounds heavier at weaning than the controls.

The results of the fourth trial were reported by Brethour and Duitsman (1958). The treatments for Lots 1 and 2 remained the same, but the 17 percent protein mixture was replaced by whole oats. In this trial the creep-fed calves consumed an average of 718 pounds of rolled sorghum grain (Lot 1) and 684 pounds of oats (Lot 3) from birth to weaning and averaged 67 and 47 pounds more gain during this period than calves which were not creep-fed (Lot 2). No economical advantage was found by substituting oats for the sorghum grain because the cost per pound of oats was greater than that for milo.

In the fifth trial Brethour and Duitsman (1959) found that calves creep-fed 934 pounds of sorghum grain gained an average of 91 pounds more than the non-creep-fed calves. Average daily creep-feed consumption gradually rose from 0.9 pound in December to 7.9 pounds in April and then dropped to 3.8 pounds in May. Creep-feed consumption at weaning was 4.3 pounds per head daily.

Brethour and Duitsman (1960), in the sixth trial, reported that calves which were creep-fed sorghum grain gained an average of 42 pounds more than those not creep-fed. An average of 935 pounds of grain was consumed by each calf;

the daily feed intake followed the same pattern as in the fifth trial. Very little of the creep-feed was consumed in December and the greatest amounts were eaten in March and April. When green grass became available in May average creep-feed consumption declined.

Brethour and Duitsman (1961), in the seventh trial, reported that an average consumption of 619 pounds of rolled sorghum grain increased the average gain 53 pounds over the non-creep-fed calves.

The seven-year average increase in gain from creep-feeding an average of 987 pounds of milo was 51 pounds. If the results from the second trial in which the non-creep-fed calves gained 62 pounds more than the creep-fed calves are excluded, the average increase in gain was 71 pounds.

The quantity and quality of winter pasture available to the cows and calves apparently influences the amount of creep-feed consumed by the calves. Pope et al. (1957) found that creep-fed calves suckling dams wintered on rye-vetch pasture supplemented in January and February with alfalfa and oat hay consumed about 66 percent as much creep-feed until weaning as similar calves wintered with their dams on native grass pasture supplemented with cottonseed meal. The latter calves were 22 and 11 pounds heavier at the end of the winter phase in mid-April and at weaning, respectively. Carcass grades were slightly higher for the calves which had consumed the greatest amount of creep-feed.

An important factor to consider when deciding whether or not to creep-feed is the age of the cow when calving. Furr et al. (1960, 1961) have reported that creep-feeding considerably increased the weaning weights of October and November calves from two- and three-year-old cows. Creep-fed calves (Lot 1) from two-year-old cows grazing native grass pasture and wintered on a low level of supplemental feed (1.39 pounds of pelleted cottonseed meal per head daily) weighed 410 pounds at weaning on July 6 compared to 299 pounds for calves not creep-fed (Lot 2). The cows in Lot 3 which received approximately 7.5 pounds of a supplemental pelleted feed containing 65 percent ground milo and 35 percent cottonseed meal produced non-creep-fed calves weighing 358 pounds at weaning. In this trial it was more profitable to creep-feed the calves than to supplement the cows with additional feed.

In the second trial (same cows as three-year-olds) the creep-fed calves (Lot 1) weighed 85 and 24 pounds more at weaning than the Lot 2 and 3 calves, respectively. In this trial the cottonseed cake fed to the low level cows in Lots 1 and 2 was increased to 2.5 pounds per head daily. Both non-creep-fed lots of calves were more profitable. The calves in Lot 3 (high level) were \$8.83 more profitable than the Lot 1 calves (low level). Thus, in contrast to the previous year, it was more profitable to offer supplemental feed to the cows than to creep-feed the calves. However, in this year the price received for the feeder calves was approximately \$10.00 per 100 pounds less than in the previous year.

The four-year average of creep-feeding and level of wintering studies at the Oklahoma station (Furr et al., 1959) showed that creep-feeding increased gains an average of 87 pounds when the cows were wintered on a low level (1.5 pounds of pelleted cottonseed meal per head daily) and 52 pounds when the cows were wintered on a high level (2.5 pounds of pelleted cottonseed meal and three pounds of grain per head daily). The high level of feeding cows increased calf weights 47 pounds when the calves were not creep-fed as compared to 12 pounds when creep-fed.

In the six comparisons made in the first three trials (Nelson et al., 1956, 1957, 1958) the non-creep-fed calves were the most profitable even though they were lighter at weaning. In the fourth trial feeder cattle prices were considerably higher than in previous years, making creep-feeding on the low level of wintering more profitable. Creep-feeding on the high level of wintering was less profitable than not creep-feeding.

In the spring when the effect of the two levels of supplemental feed on the calf weights should be most apparent it was found that creep-feeding had increased gains 61 and 51 pounds for the low and high level of wintering, respectively. This is 70 and 98 percent of the weight difference which was obtained at weaning as a result of creep-feeding until weaning. In mid-April approximately one-third of the total creep-feed had been consumed. These results suggest that creep-feeding only until spring when green grass becomes

available might be a desirable method of production. If the creep-fed calves would maintain their weight advantage when taken off the creep mixture, the feed cost would be considerably reduced and the profit increased.

EXPERIMENTAL PROCEDURE

The cows used in these experiments were high quality, grade Herefords which had produced at least one calf. The calves were born in September, October, and November and were divided into their respective treatment groups after all the calves were born. After allotment each treatment group contained the same number of steers and heifers. Cows of different ages and breeding were used and each lot contained, as nearly as possible, the same number of cows of the same age and breeding. Calves were removed from the experiment because of death of the cow or sickness of the calf. Treatment groups were placed in different pastures each year. Bulls were rotated among pastures every two weeks to equalize genetic effects.

The cows were pastured yearlong on native grass (Blue-stem and associated grasses) at the Lake Carl Blackwell experimental range area. All cows were fed 2.5 pounds of pelleted cottonseed meal per head daily during the winter months beginning about mid-October. Supplemental feeding of the cows was stopped when green grass became available in the spring (mid-April). All cattle had access to a mineral mixture of two parts salt and one part steamed bone meal.

Creep-feeding of the calves was started between December 15 and January 15 in each trial and was terminated

either at weaning or in the spring when green grass became available. The treatments were as follows:

Trial I.

Lot 1 -- Creep-fed concentrate mixture until weaning.

Lot 2 -- Creep-fed concentrate mixture until spring.

Lot 3 -- Creep-fed concentrate mixture containing erythromycin until spring.

Lot 4 -- Creep-fed alfalfa hay until spring.

Trials II and III.

Lot 1 -- No creep-feed.

Lot 2 -- Creep-fed concentrate mixture until weaning.

Lot 3 -- Creep-fed concentrate mixture until spring.

Lot 4 -- Creep-fed pelleted concentrate mixture until spring.

Lot 5 -- Creep-fed alfalfa hay until spring.

Lot 6 -- Creep-fed pelleted alfalfa hay until spring.

The concentrate mixture consisted of 55 percent steam rolled milo, 30 percent whole oats, 10 percent cottonseed meal, and 5 percent cane molasses. The Lot 3 calves in Trial I received 45 milligrams of erythromycin per head daily. The alfalfa hay was fed in bale form in an open bunk. The concentrate mixture and the pelleted feeds were fed in self-feeders.

Weights of the cows and calves were recorded at approximately monthly intervals. The calves were weaned in July and were sold as feeder calves at the Oklahoma City stockyards. In all instances the value of the calves as feeders was

greater than for slaughter. The financial statements in the tables are calculated on feeder cattle prices and current feed costs.

RESULTS AND DISCUSSION

Trial I, 1958-1959

A summary of the results obtained in the first trial is given in Table I. The average calf weights on January 7, 1959 were nearly the same for all treatment groups. Lots 1 and 2 were treated alike until April 23, 1959, at which time the creep-feed was removed from Lot 2. Treatment of the Lot 3 calves differed from Lot 2 in that an antibiotic, erythromycin, was included in the creep-feed in such amounts that the calves consumed an average of 45 milligrams per head daily. Average gain from January 1 to April 23 was 175, 172, and 174 pounds for Lots 1, 2, and 3, respectively. These weight gains would indicate that the addition of erythromycin to the creep-feed was of little or no value during the winter months when the creep-feed was offered. These results agree with Matsushima (1952) who found no appreciable differences in the 196-day weaning weights of calves creep-fed with and without aureomycin. In subsequent tests Matsushima et al. (1957, 1959) noted slight depressions in the weaning weights of calves creep-fed a shelled corn and rolled oats mixture containing aureomycin compared to the same mixture without the antibiotic.

TABLE I
 CREEP-FEEDING FALL CALVES, TRIAL I, 1958-1959

Lot number	1	2	3	4
Creep-feed	Mixture until weaning	Mixture until spring	Mixture plus erythromycin until spring	Alfalfa hay until spring
Number of calves	18	18	18	18
Average calving date, October	15	8	19	15
Average weight per calf, lb.				
Initial 1-7-59	171	177	174	175
Spring 4-23-59	346	349	348	292
Weaning 7-3-59	512	482	478	457
Gain to spring (106 days) ¹	175	172	174	117
Gain, April to July (71 days) ²	166	133	130	165
Total gain (177 days) ³	341	305	304	282
Average weight per cow, lb.				
Initial 9-26-58	1189	1205	1159	1214
Loss to spring	296	314	311	325
Percent loss to spring	24.9	26.1	26.8	26.8
Gain, spring to weaning	195	147	161	181
Loss, initial to weaning	101	167	150	144
Creep-feed per calf				
Pounds	847	514	517	310
Dollars	22.70	13.78	13.86	3.10
Dollar values				
Value of total gain	114.24	102.18	101.84	94.47
Value of gain minus creep-feed cost	91.54	88.40	87.98	91.37

¹L.S.D.(P<.01) = 30.8 lb.

²L.S.D.(P<.01) = 20.3 lb.

³L.S.D.(P<.01) = 36.1 lb.

Average creep-feed consumption during the winter was 425 pounds for Lot 1 compared to 514 and 517 pounds for Lots 2 and 3, respectively. No explanation can be given for the decreased feed consumption by the Lot 1 calves. During this same period the calves fed the alfalfa hay gained 117 pounds, which is 57 pounds less than the average gain of the other three lots. Since this study did not include a non-creep-fed lot the value of the alfalfa hay as compared to not creep-feeding was not determined. However, in a four-year study Furr et al. (1959) reported that creep-feeding this same concentrate mixture from January to April increased calf gains 56 pounds. Since the gain of the calves creep-fed the alfalfa hay was 57 pounds less than those fed the concentrate mixture it appears that the alfalfa hay was of no apparent value. Trials II and III were designed to include a non-creep-fed lot in order that the value of the alfalfa hay could be determined.

In the 71-day period from April 23 to July 3 the calves which had previously been fed the alfalfa hay gained 165 pounds compared to 166 pounds for the Lot 1 calves which were continued on the concentrate mixture. This is an average of 34 pounds more gain than the average gain of 132 pounds made by the calves in Lots 2 and 3 which were creep-fed only until spring. The value of the increased gain was nearly equal to the cost of the creep-feed.

Average cow weight losses during the winter (September 26 to April 23) were nearly the same for all lots. At weaning

the cows in Lot 1 had regained a larger percentage of their winter weight loss than the cows in the other three groups.

Trial II, 1959-1960

The results of Trial II are shown in Table II. In this trial a control lot (non-creep-fed) and lots fed pelleted forms of the concentrate mixture and alfalfa hay were included and the antibiotic treatment was discontinued.

The average calf weights when the creep-feeding was started were more variable than in the previous year. The range was from 126 pounds in Lot 4 to 148 pounds in Lot 2.

Calves in all creep-fed lots made greater gains in the 134-day period from December 18 to April 30 than did the non-creep-fed calves. Lots 2 and 3, which received identical treatment until April 30, made the greatest gains. The average gain of these two lots was 167 pounds (162 and 172 pounds) which is 44 pounds more than the 123 pounds gain made by the control calves. Although the calves in Lot 3 gained 10 pounds more than those in Lot 2 they consumed 61 pounds (239 vs 300 pounds) less feed per head.

On April 30 creep-feeding was continued in Lot 2 but discontinued in Lots 3, 4, 5, and 6. In the 86-day period until weaning on July 25 the calves receiving the creep-feed gained 194 pounds; this is 35 pounds more than the 159 pounds gain made by the non-creep-fed calves, which made the second highest gain. The gain of the non-creep-fed calves was 13 pounds more than the gain of the calves in Lot 3 which had

TABLE II
 CREEP-FEEDING FALL CALVES, TRIAL II, 1959-1960

Lot number	1	2	3	4	5	6
Creep-feed	None	Mixture until weaning	Mixture until spring	Pelleted mixture until spring	Alfalfa hay until spring	Pelleted alfalfa hay until spring
Number of calves	17	18	17	18	17	17
Average calving date, November	6	1	11	8	6	5
Average weight per calf, lb.						
Initial, 12-18-59	139	148	136	126	130	134
Spring, 4-30-60	262	310	308	276	277	292
Weaning, 7-25-60	421	504	454	427	428	434
Gain to spring (134 days) ¹	123	162	172	150	147	158
Gain, April to July (86 days) ²	159	194	146	151	151	142
Total gain (220 days) ³	282	356	318	301	298	300
Average weight per cow, lb.						
Initial, 10-13-59	1179	1216	1194	1170	1199	1174
Loss to spring	292	306	289	304	297	272
Percent loss to spring	24.8	25.2	24.2	26.0	24.8	23.2
Gain, spring to weaning	140	197	132	153	135	119
Loss, initial to weaning	152	109	157	151	162	153
Creep-feed per calf						
Pounds	---	922	239	194	308	224
Dollars	---	23.05	5.98	5.04	3.08	3.36
Dollar values						
Value to total gain	70.50	87.22	79.50	75.25	74.50	75.00
Value of gain minus creep-feed cost	70.50	64.17	73.52	70.21	71.42	71.64

¹L.S.D. (P < .01) = 19.1 lb.

²L.S.D. (P < .01) = 19.4 lb.

³L.S.D. (P < .01) = 33.0 lb.

previously received the mixture and 17 pounds more than the gain of the calves which had received the pelleted alfalfa hay until spring. Gains made by the calves in Lots 4 and 5 were eight pounds less than that of the Lot 1 calves.

Total gain over the 220-day creep-feeding period was greatest for the calves receiving the concentrate mixture for the entire period (356 pounds) and least for the non-creep-fed calves (282 pounds). Gains of the calves creep-fed the alfalfa hay, pelleted alfalfa hay, and pelleted concentrate mixture were nearly equal; this average gain was 18 pounds more than the non-creep-fed lot and 18 pounds less than that made by the calves receiving the meal mixture until spring.

The consumption of the concentrate mixture was decreased by pelleting. This decrease was apparently responsible for the decreased winter gain. Less pelleted alfalfa hay was consumed than long hay but gains remained nearly equal. Wastage of the baled alfalfa hay was not measured and therefore the quantity offered is used as the quantity consumed.

The consumption of an additional 622 pounds of creep-feed after April 30 by the calves in Lot 2 increased the cost of production which was not offset by the value of the increased gain. The Lot 2 calves were fatter and heavier and consequently sold at \$0.50 per 100 pounds less than the calves in the other groups. It is of practical importance to note that the end product is altered by creep-feeding. Because of the additional weight and finish of these calves the feeder calf

price is lowered but usually remains above the price paid for slaughter.

The winter weight losses of the cows in each of the six lots were nearly equal and similar to the winter losses in the previous trial. As was noted in Trial I, dams of calves which were creep-fed until weaning regained a larger percent of their winter weight loss by the time the calves were weaned than the cows in any of the other groups.

Trial III, 1960-1961

Trial III was a repetition of the treatments used in Trial II. A summary of the data is shown in Table III.

Average birth date and initial weight on December 21 were very uniform among the six lots. In the period from December 21 until May 12 the creep-fed calves in Lots 2 and 3 gained an average of 188 pounds. This is 50 pounds more than the 138 pounds gained by the non-creep-fed calves in Lot 1. During this same period calves in Lots 4 (pelleted mixture), 5 (alfalfa hay), and 6 (pelleted alfalfa hay) gained 145, 156, and 159 pounds, respectively. Thus, the calves receiving the baled alfalfa hay gained 18 pounds more than the control calves.

Creep-feed consumption during the winter was 328 and 311 pounds for Lots 2 and 3, respectively. Calves in these two lots received identical treatment until spring, but those in Lot 3 gained 27 pounds more during this period. This difference in gain cannot be accounted for by differences

TABLE III
 CREEP-FEEDING FALL CALVES, TRIAL III, 1960-61

Lot number	1	2	3	4	5	6
Creep-feed	None	Mixture until weaning	Mixture until spring	Pelleted mixture until spring	Alfalfa hay until spring	Pelleted alfalfa hay until spring
Number of calves	17	17	17	16	17	16
Average calving date, November	7	4	9	7	6	4
Average weight per calf, lb.						
Initial 12-21-60	135	134	135	136	136	137
Spring 5-12-61	273	308	336	281	292	296
Weaning 7-20-61	433	486	478	438	455	460
Gain to spring (142 days) ¹	138	174	201	145	156	159
Gain, May to July (69 days) ²	160	178	142	157	163	164
Total gain (211 days) ³	298	352	343	302	319	323
Average weight per cow, lb.						
Initial 10-7-60	1169	1126	1156	1168	1124	1116
Loss to 4-14-61	276	314	261	274	258	270
Percent loss to 4-14-61	23.6	27.9	22.6	23.5	23.0	24.2
Gain, 4-14-61 to weaning	210	233	225	222	226	224
Loss, initial to weaning	66	38	36	52	32	46
Creep-feed per calf						
Pounds	---	775	311	71	108	259
Dollars	---	19.76	7.93	1.90	1.36	4.53
Dollar values						
Value of total gain	75.99	89.76	87.46	77.01	81.94	82.36
Value of gain minus creep-feed cost	75.99	70.00	79.53	75.11	80.58	77.83

¹L.S.D. (P<.05) = 20.1 lb.

²L.S.D. (P<.01) = 12.9 lb.

³L.S.D. (P<.05) = 24.7 lb.

in creep-feed consumption since calves in Lot 3 consumed an average of 17 pounds less feed. The difference in gain was noted in the latter part of January, and this difference gradually increased each month except for one month. A possible explanation may be that the pasture in which the Lot 3 cows grazed contained more winter growth, and milk production may have been stimulated. Cows in Lot 2 lost 5.3 percent more weight until mid-April than did the cows in Lot 3. Weight losses of cows in Lots 1, 4, 5, and 6 differed only slightly from the weight losses of the Lot 3 cows. Their weight losses are comparable to the winter losses of previous years. By May 12 the Lot 3 cows were regaining their weight more rapidly than the cows in the other groups. The difference in winter gain which exists between these two lots of calves may be due to pasture differences.

Consumption of the pelleted mixture by the Lot 4 calves was low, and this may account for the small increase in gain over the non-creep-fed calves. These calves consumed only an average of 0.50 pound per day compared to the previous year when 1.45 pounds were consumed daily. Consumption of the alfalfa hay was considerably decreased from the previous year but slightly more alfalfa pellets were consumed daily (1.7 vs 1.8 pounds). The gain of calves in Lots 5 and 6 was nearly the same as the gain of calves in these two lots in the previous trial.

In the 69-day period from May 12 until weaning the calves which were continued on the mixture made the greatest

gain. The non-creep-fed calves gained 18 pounds more than the calves which had received the mixture only until spring, but 18 pounds less than those which were continued on the creep-feed. Gains of calves in Lots 4, 5, and 6 differed slightly from the gain of the calves in Lot 1.

The total increase in gain (winter and summer) due to creep-feeding was 54 pounds (Lot 1 vs 2). Creep-feeding the mixture only until spring resulted in a total increase of 45 pounds (Lot 1 vs 3). The difference between Lots 1 and 3 in the spring was 63 pounds, thus when the creep-feed was removed from Lot 3 these calves did not maintain their weight advantage over the non-creep-fed calves. This same general trend was noted in each of the last two years for all creep-feed treatments which were stopped in April. The difference in total gain for Lots 2 and 3 is small because of the 27-pound disadvantage in winter gain by the Lot 2 calves.

Total creep-feed consumption by the calves in Lot 2 was 775 pounds. The cost of the additional 447 pounds of creep-feed consumed from May to July was not offset by the value of the increased gain. This reduced return is in agreement with the results obtained in Trial II and also with the results obtained in a four-year study reported by Furr et al. (1959).

Averages of the Results

A study of the two-year averages (Trials II and III) found in Table IV indicates that the calves which were

TABLE IV
 CREEP-FEEDING FALL CALVES (AVERAGE OF TRIALS II AND III)

Lot number	1	2	3	4	5	6
Creep-feed	None	Mixture until weaning	Mixture until spring	Pelleted mixture until spring	Alfalfa hay until spring	Pelleted alfalfa hay until spring
Number of calves	34	35	34	34	34	33
Average weight per calf, lb.						
Initial	137	141	136	131	133	136
Spring	268	309	322	278	284	294
Weaning	427	495	466	432	442	447
Gain to spring	131	168	186	147	151	158
Gain, spring to weaning	159	186	144	154	158	153
Total gain	290	354	330	301	309	311
Creep-feed per calf						
Pounds	---	894	275	132	208	242
Dollars	---	21.40	6.96	3.47	2.22	3.94
Dollar values						
Value of total gain	73.25	88.48	83.48	76.13	78.22	78.68
Value of gain minus creep-feed cost	73.25	67.08	76.52	72.66	76.00	74.74

creep-fed until weaning were the heaviest at weaning and the non-creep-fed calves were the lightest. The increase in gain attributable to the creep-feeding of 894 pounds of the concentrate mixture was 64 pounds (Lot 1 vs 2). The increase was 37 pounds during the winter and 27 pounds during the summer. The total increase is slightly higher than the seven-year average increase reported by the Kansas workers.

In the period from the beginning of creep-feeding until spring the calves in Lots 2 and 3 consumed an average of 295 pounds of creep-feed and gained an average of 46 pounds more than the non-creep-fed calves. The calves in Lots 4, 5, and 6 gained 21 pounds more until spring than those in Lot 1.

Differences in gain from spring to weaning for those calves not creep-fed during the summer were small, although the least summer gain was for the calves in Lot 3, which had previously been creep-fed the concentrate meal mixture. Summer gains of calves in Lots 4, 5, and 6 were nearly equal and averaged only four pounds less than the gain of the calves in Lot 1.

Total gain until weaning was greatest for calves creep-fed until weaning and least for the control calves (354 vs 290 pounds). Calves which received the pelleted mixture, alfalfa hay, and pelleted alfalfa hay averaged 17 pounds more total gain than the non-creep-fed calves. Calves which received the mixture until spring (Lot 3) made 24 pounds less total gain than calves creep-fed until weaning (Lot 2). This difference is greater than would be expected had the gain response for these two lots been more nearly

the same during the winter. It appears that the spring weight advantage of creep-fed calves is not maintained until weaning when creep-feeding is discontinued in the spring.

Pelleting of the concentrate mixture markedly decreased consumption. Apparently pelleting of this feed renders it less palatable. Average consumption of the alfalfa pellets was greater than the baled hay, but the consumption of baled alfalfa hay was greater in Trial II. Differences in winter gain of Lots 5 and 6 were small (151 vs 158 pounds).

Three-year averages (Trials I, II, and III) of calves creep-fed the mixture until weaning, mixture until spring, and alfalfa hay until spring are shown in Table V.

TABLE V
COMPARISON OF MIXTURE UNTIL WEANING, MIXTURE UNTIL
SPRING, AND ALFALFA HAY UNTIL SPRING
(THREE-YEAR AVERAGE)

Treatment	Mixture until weaning	Mixture until spring	Alfalfa hay until spring
Number of calves	53	52	52
Average weight per calf, lb.			
Initial	151	149	147
Spring	321	331	287
Weaning	501	471	447
Gain to spring	170	182	140
Gain, spring to weaning	180	140	160
Total gain	350	322	300
Creep-feed per calf			
Pounds	848	355	242
Dollars	21.84	9.23	2.51
Dollar values			
Value of total gain	108.68	101.41	95.17
Value of gain minus creep-feed cost	86.84	92.18	92.66

Since this table is a composite of the data for these treatments in Trials I, II, and III the trends established and previously discussed on the basis of the average results of Trials II and III would not be expected to change markedly.

Winter gain due to creep-feeding the mixture was an average of 36 pounds greater than the gain obtained by feeding alfalfa hay. The difference was 30 pounds in one comparison and 42 pounds in the second comparison. Gain from spring to weaning was greater for the calves previously fed the alfalfa hay than for those which had previously received the mixture. Creep-feeding 848 pounds of the mixture until weaning resulted in 50 pounds more total gain than feeding 242 pounds of alfalfa hay until spring.

In the period from spring to weaning the calves which were continued on creep-feed gained 40 pounds more than those which were creep-fed only until spring. The difference in total gain was only 28 pounds, while the difference in creep-feed consumption was 493 pounds.

SUMMARY

A series of tests was conducted to evaluate different creep-feeds for fall calves and creep-feeding only until spring under North Central Oklahoma range conditions. In Trial I, 72 mature Hereford cows were divided into four lots and the calves creep-fed a concentrate mixture until weaning, the concentrate mixture until spring, the concentrate mixture containing erythromycin until spring, or alfalfa hay until spring. In Trials II and III a total of 204 calves were used in six treatments. The antibiotic treatment was discontinued. The additional treatments were not creep-feeding, creep-feeding the pelleted concentrate mixture until spring, and creep-feeding pelleted alfalfa hay until spring. The concentrate mixture consisted of 55 percent steam rolled milo, 30 percent whole oats, 10 percent cottonseed meal, and 5 percent cane molasses. All lots of cows grazed native grass pasture yearlong and during the winter were supplemented with 2.5 pounds of pelleted cottonseed meal per head daily. The calves were sold as feeders after weaning in July at about nine months of age.

All calves creep-fed during the winter made greater gains until spring than calves which were not creep-fed. Calves creep-fed the concentrate meal mixture gained an average of 46 pounds more than the control calves while

calves receiving the pelleted feeds and alfalfa hay out-gained the control calves an average of 21 pounds. When creep-feeding was discontinued the calves which had previously received the mixture gained 15 pounds less until weaning than the control calves. Summer gains were only slightly less for calves which had previously received the pelleted feeds and baled alfalfa hay, but calves which were continued on the mixture gained an additional 27 pounds more than the non-creep-fed calves. The two-year average increase in total gain due to the creep-feeding of 894 pounds of concentrate mixture was 64 pounds.

Consumption of the concentrate mixture was markedly decreased by pelleting, but pelleting resulted in greater consumption of alfalfa hay. Apparently pelleting caused the mixture to be less palatable, and gains were decreased. Gains were nearly equal in all periods for calves fed either form of the alfalfa hay. Gains made by the calves receiving erythromycin during the winter were nearly equal to gains of similar calves not receiving the antibiotic.

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