resulted in excellent production on a cow and calf program. There has been no indication of any limiting factor (s) for beef production during the last five years of this experiment. Therefore, this research in the Wilburton area has been terminated.

Summary

Results of studies with beef cattle at the Range Cattle Minerals Station near Wilburton for the year 1955-56 may be summarized as follows:

1. Cows with access to a palatable mineral mix containing cottonseed meal consumed 4 times more phosphorus and weaned slightly heavier calves than cows with access to a simple mineral mix of salt and bonemeal.
2. Feeding trace minerals to cows had no apparent affect either on the cows or on their calves.
3. Drenching with phenothiazine had little effect on cows or calves. None of the cattle appeared to be infested with internal parasites to any important extent.
4. Increasing the amount of cottonseed cake from 1.5 to 3.5 pounds during the wintering period did not prove beneficial compared to feeding a constant amount of 2.5 pounds throughout the winter.
5. Cows moved from Stillwater to Wilburton performed satisfactorily during their second year at Wilburton.
6. The performance of all cattle at the Wilburton Station was very acceptable.

Methods of Management for the Small Commercial Herd Producing "Two-Way" Calves

L. S. POPE, R. D. HUMPHREY AND DWIGHT STEPHENS

In general, the beef industry in Oklahoma has moved toward younger cattle and more intensified systems of production. Increased interest has developed in the production of fat slaughter calves as a means of obtaining a quick return from the cow herd. A strong market for fat calves exists in April, May and June—following the bulk of fed cattle and before grass cattle arrive. Many plain calves can be fattened sufficiently while on the cow and creep-feeder to produce a desirable light-weight carcass of 275 to 350 lbs. in the Good and Choice grades. The keen demand for calf carcasses by large chain stores has stimulated their production in many areas of the state.

Plain calves can often be handled profitably under this system. However, many producers with high-grade commercial herds are considering the possibility of developing "two-way" calves—with enough quality and finish to sell to either the feeder or packer. This necessitates fall-calving and creep feeding in order to obtain desirable weight and finish by the May and June market. Steer calves of good quality may find a strong early feeder market, while the heifers may sell best to the packer.

This report covers the third trial in a project on methods of management for the cow herd. Results of previous trials indicate that the

cost of maintaining the beef cow appears to be a serious drawback to this type of production. Cows nursing calves during the winter require more supplemental feed than dry cows. The problem is to keep feed costs at a minimum without effecting the weight or quality of the calves.*

Procedure

Three lots of 19 grade Hereford cows each were used to study the effect of different management systems at the Fort Reno Station. The cows dropped calves from late September to early December of 1955. During the winter of 1955-56, they were handled as follows:

Lot 1—Native grass, at a stocking rate of eight acres per head, with 2½ lbs. of cottonseed meal and 3 lbs. of ground ear corn per head daily during the winter period (November 1 to mid-April).

Lot 2—Native grass, 5 acres per head, plus 1½ lbs. of cottonseed meal and silage from a self-feeding trench silo during the wintering period.

Lot 3—Rye-vetch winter pasture (1½ acres per cow) and no supplemental feed except for 42 days during January and February when it was necessary to feed alfalfa and oat hay.

The cows of Lots 1 and 2 remained on native grass year-long at the described stocking rates. Cows of Lot 3 were allowed 4 acres of native grass per head for the summer period. Supplements for Lots 1 and 2 were fed every day in bunks. The cows of Lot 2 were given access to silage from a self-feeding pit silo on alternate days. Previous tests have shown that large intakes of silage were unprofitable under this system of management. Thus a method of feeding on alternate days was followed in an attempt to limit silage consumption.

Winter pasture for Lot 3 proved to be adequate during the fall and early winter. During a 42-day period in January and February it was necessary to remove the cows from winter pasture and supplement them on native grass with 4 lbs. of alfalfa and 12 lbs. of oat hay per head daily. In late February, the cattle were moved back to the winter pasture.

All cattle had access to a mineral mixture of 2 parts salt and 1 part steamed bone meal. The native grass pastures were predominately bluestems—although there were annual grasses and side oats grama in certain areas. Calves in all lots were creep-fed, using a mixture of 5.5 parts coarsely ground milo, 3 parts whole oats, 1 part cottonseed meal and 0.5 parts dried molasses.

After the wintering phase (last 47 days of the test) 15 calves from each lot, with their dams, were re-divided so that a study could be made of the effect of adding 5 mg. stilbestrol, or 5 mg. stilbestrol and 40 mg. antibiotic, to the creep ration.

All calves were sold on the Oklahoma City yards, June 5, at approximately 8 months of age. In computing on-foot value, the actual

*Results of previous trials can be found in Okla. Agri. Expt. Sta. Misc. Publ. MP-43 and MP-45

value of the carcass was divided by the final weight taken at Fort Reno. An appraisal of the calves as feeders was also obtained at selling time.

Results

The weight gains, supplemental feed and yearly feed costs for the cows under different systems of management are given in Table 1. Only cows raising calves were compared. It is apparent that the average winter weight loss was slightly greater for the cattle wintered on silage and cottonseed meal supplement (Lot 2) than for those on native grass and supplement (Lot 1). Both groups, however, lost more weight than those of Lot 3 wintered on rye and vetch pasture (with supplemental hay as needed). Spring gain from April 19 to June 5 indicated that the cows were making fast recovery and were not apparently affected by any of the previous winter treatments. As in the past, yearly feed costs were greatest for cows of Lot 2 receiving silage and cottonseed meal supplement ($57.70 per head). The cheapest method of wintering was obtained in Lot 3 where maximum use was made of winter pasture, with a reserve feed supply as needed ($41.26). Although the charge made for the rye-vetch pasture for Lot 3 was about $20.00 per cow for the season, total

Table 1.—Average cow data from different feeding systems in the production of fall-dropped calves.

Winter treatment	Lot 1 Native grass + Supplement	Lot 2 Native grass +Silage and Supplement	Lot 3 Rye-vetch pasture
No. of cows producing calves	18	17	18
Av. cow weights (lbs.)			
Fall, 9/15/55	1206	1184	1156
Spring, 4/19/55	1053	1005	1093
Winter weight loss	—153	—179	—63
Spring gain to 5/5/56	85	79	83
Av. daily winter ration, (Nov. 1 to April 9), lbs. or acres:			
Cottonseed meal	2.5	1.5	
Ground ear corn	3.0		
Alfalfa hay[1]			4.0
Oat hay[1]			12.0
Silage[2]		51	
Rye-vetch pasture			1.5A
Native grass pasture	8A	5A	4A (Summer only)
Yearly feed cost/cow ($)			
Winter Supplement	23.59	7.56	6.64
Silage		32.64	
Rye-vetch pasture			20.62
Native grass	22.50	17.50	14.00
Total	46.09	57.70	41.26

[1]Fed during a 42-day period in January and February when it was necessary to supplement Lot 3 cows

[2]Silage (from drouth-damaged, immature corn) was available from a self-feeding pit silo every other day. Amount consumed was estimated from silo measurements at 42 lbs. silage per cubic foot.

yearly cost was nearly $16.00 per head less than for those cows wintered on silage, and $5.00 less for those of Lot 1 wintering on native grass. Further, in the three trials conducted to date, cows of Lot 3 have not received any supplemental grain or protein; all feed and pasture have been produced on the station.

Data on the number of calves marketed, final weights and carcass values are given in Table 2. The results are based on average steer and average heifer comparisons for all lots. Final market weights favored calves from Lot 2 whose dams fere fed silage plus supplement during the winter. These calves weaned approximately 23 lbs. heavier than those of Lot 1 (native pasture and supplement) and approximately 34 lbs. greater than those of Lot 3 (rye-vetch pasture). One reason for the lighter weaning weights of Lot 3 calves is apparent in the total amount of creep-feed consumed by the calves, which was 250-300 lbs. less than that consumed by calves of Lots 2 and 3. When using winter pasture, it has become apparent that less creep-feed is consumed by the calves where the cows are not fed regularly in the same place, and where the calves consume rather large amounts of pasture. However, if this has

Table 2.—Average calf data from study of systems of management (all calves creep-fed and sold for slaughter)[1].

Winter treatment of dams	Lot 1 Native grass + Supplement	Lot 2 Native grass, silage and supplement	Lot 3 Rye-vetch pasture
No. of calves marketed	18	17	18
Steers	10	9	10
Heifers	8	8	8
Av. birth date October	20th	9th	11th
Av. calf weights (lbs.)			
Birth	77	77	69
End of winter phase, 4/19	462	474	440
Final weight, 5/5	551	574	540
Slaughter data:			
Av. yield, percent[2]	57.2	57.7	56.4
Av. carcass grade (U.S.D.A. standard)	Choice—	Choice—	Good+
Av. market value/cwt. ($)[3]	19.50	19.74	18.63
Total value per calf ($)	107.77	113.27	100.65
Creep-feed consumed/calf (lbs.)	898	856	590
Creep-feed cost per calf ($)	21.21	20.22	13.97
Cow feed cost/cow-calf unit ($)	46.09	57.70	41.26
Total cow + calf feed cost ($)	67.30	77.92	55.23
Net return over feed cost ($)	40.47	35.35	45.42

[1]Based on average of steer and heifer data for each lot.
[2]Hot carcass weights shrunk 2½% (minus hide weight). Values based on final Ft. Reno weights.
[3]On-foot market value calculated from yield, grade, and current value of carcass, based on Ft. Reno weights.

no effect on weight gains or carcass quality, it may prove to be a financial advantage for this system.

Carcass grades indicate that calves from Lots 1 and 2 were slightly fatter than those from Lot 3; a further reflection of the smaller amount of creep-feed consumed by the latter group. Lot 3 calves graded slightly lower and computed on-foot value was 90c to $1.10 less per cwt. than for the other lots.

Considering the total cow-and-calf feed cost, the greatest net return was made from cows on rye-vetch winter pasture, and least from those on silage and supplemental protein. Results have indicated that calves from dams wintered on silage and supplement have weighed more and were slightly fatter, but the small increase in market value was not enough to offset the high cost of feed.

Selling as Feeder Calves vs. Slaughter Calves

In Table 3, the possible financial returns if the calves had sold as feeder calves or as "two-way" calves are compared. In considering the sale of the calves as feeders, a customary 3 percent shrink was applied to the final weights at Fort Reno, and the appraised value of the calves as feeders at the yards was used. Steer or heifer calves from all lots would have sold for the same relative price, regardless of treatment of their dams.

Table 3.—Financial returns if calves had sold as feeders, or as "two-way" calves.

Winter treatment of dams	Lot 1 Native grass + Supplement	Lot 2 Native grass, Silage + Supplement	Lot 3 Rye-vetch pasture
Av. results if all calves had sold as feeders:			
Market weight (3% shrink), lbs.			
Steers	563	579	560
Heifers	507	534	488
Appraised feeder value/cwt. ($)			
Steers	20.50	20.50	20.50
Heifers	17.50	17.50	17.50
Av. value per calf ($)	102.07	106.07	100.10
Net return/calf over total feed cost ($)[1]	34.77	28.15	44.87
Steers sold as feeders, heifers as slaughter calves:			
Market weight (lbs.)[2]			
Steers as feeders	563	579	560
Heifers as slaughter calves	523	551	503
Value/cwt. ($)			
Steers	20.50	20.50	20.50
Heifers	19.46	19.87	18.59
Av. value/calf ($)	108.59	114.09	104.17
Net return/calf over total feed cost ($)[1]	41.29	36.17	48.94

[1]For total feed cost per cow-calf unit see Table 2.
[2]Weights of steers shrunk 3%.

The price for feeder steers was relatively advantageous at the time the calves were sold—one reason why many commercial producers prefer an early calving program. Financial returns would not have changed relative to the systems of management had the calves sold as feeders. Again, the most profitable group would have been the lot wintered on rye-vetch pasture, with native grass and supplement intermediate, and silage and supplemental feed the least profitable. Considering two alternatives—selling all calves as feeders vs. selling as fat slaughter calves—the latter method would have been slightly more profitable due to the higher selling price of the heifer calves.

A comparison was made of selling the calves to the highest bidder (either packer or feeder) vs. selling all calves as feeders. If this method had been followed, taking the appraised value of the steer calves as feeders and the actual on-foot value of the heifers based on their carcass merit, the results shown in Table 3 would indicate that the "two way" method was most profitable. The returns from handling the cow herd under the three systems of management would still be in the same order —with the rye-vetch pasture group the most, and the silage-fed group the least, profitable. Selling the calves on a "two-way" basis would have resulted in about $2.00 per head more return than to have sold them as fat slaughter calves. Least profitable would have been to sell all calves as feeders due to the low market value of heifers.

Adding Stilbestrol or Stilbestrol + Terramycin to Creep-Feed

Following the wintering phase and during the last 47 days before marketing, the effect of 5 mg. stilbestrol, or 5 mg. stilbestrol plus 40 mg. terramycin, added to the daily creep-feed per calf was studied.* Previous tests have indicated that stilbestrol might increase the gains of suckling calves during the latter part of the finishing period. Results from other stations indicate that an antibiotic may speed up calf gains.

Fifteen calves (9 steers and 6 heifers) from each of the winter treatment lots were reallotted to form three new groups, each containing 15 head. The control calves were continued on the basal creep mixture; while 5 mg. stilbestrol per calf per day was added to the creep-feed of a second group, and 5 mg. stilbestrol and 40 mg. terramycin to a third. The results are shown in Table 4.

Weight gains of calves were increased slightly over the 47-day period by the addition of 5 mg. stilbestrol to the creep-feed. This increase was only 6 percent, and was much smaller than had been observed in a previous trial. The combination of 5 mg. stilbestrol and 40 mg. terramycin markedly increased weight gains (16% over the controls). Whether or not this apparent additive effect of the hormone and antibiotic is real will depend on further studies. Calves of this age and weight may respond to an antibiotic in the ration. Both groups fed silbestrol or stilbestrol plus antibiotic consumed less creep-feed per calf than those fed the control mixture. Generally, stilbestrol has been shown to increase feed intake slightly; however, this effect did not occur in this trial for unknown reasons.

*Terramycin was supplied by Chas. Pfizer & Co., Terre Haute, Indiana.

Table 4.—Effect of adding 5 mg. stilbestrol or 5 mg. stilbestrol + 40 mg. terramycin to creep-feed of beef calves (last 47 days on test).

	Basal creep-feed	Basal + 5 mg. Stilbestrol per calf	Basal + 5 mg. Stilbestrol + 40 mg. Terramycin
No. of calves per group[1]	15	15	15
Av. calf weights (lbs.)			
Initial, 4/19	470	473	470
Final, 5/5	563	572	578
Av. daily gain	1.97	2.10	2.30
Creep-feed consumed/calf (lbs.)[2]	254	207	229
Creep-feed/cwt. gain (lbs.)	273	209	212
Slaughter data:[3]			
Yield, %	57.9	57.7	57.1
Carcass grade	Good+	Good+to Choice—	Good+to Choice—
Marbling score	3.47	2.97	3.32
Financial results ($)			
Av. cow and calf feed cost[4]	67.28	66.36	66.82
Market value/cwt.[5]	19.54	19.57	19.23
Total value per calf	110.01	111.92	111.15
Net return/calf	42.73	45.56	44.33
Difference over controls		+ 2.83	+ 1.60

[1]Nine steer calves and six heifers per group, 5 calves in each group from each lot of the original treatment.
[2]Concerns only the amount during this phase.
[3]Yield based on hot carcass weight shrunk 2½% (hide off).
Marbling score: 1= abundant, 3= moderate, 5= very slight.
[4]Costs prior to this phase based on average for original lots (see Tables 1 and 2).
[5]Based on current value of carcass according to grade and final Ft. Reno weight.

Slaughter data indicated that calves of the basal group were similar in yield to those receiving the hormone, or the hormone plus antibiotic, although carcass grades favored the latter groups. Marbling scores differed only slightly, but tended to indicate more marbling in the hormone-fed calves.

The results would indicate a financial advantage from adding either 5 mg. stilbestrol, or 5 mg. of stilbestrol plus 40 mg. terramycin, to the creep-fed mixture. During the short experiment, an increase of $2.83 for those calves fed stilbestrol over the controls, and $1.60 for those calves fed the hormone-antibiotic combination, was obtained. It seems possible that had the hormone been fed for a longer period the increase in weight gains would have been greater. Research is in progress in which stilbestrol is being added over a 5 to 6 month period prior to slaughter.

Summary

The third trial in a study of different systems of management for fall calving cows has been reported. Three treatments, i.e., year-long grazing on native grass with winter supplementation, year-long grazing with silage plus supplement during the winter, and native grass during

the summer and rye-vetch winter pasture, have been compared. As in the past, the low cost of the winter pasture system has resulted in the most profit. Under this system, cow cost has been held to a minimum and although the calves have weighed slightly less and have not been as well finished, they have returned more for this system of production. Most costly has been the system featuring silage during the winter plus supplemental protein. However, under the silage program a maximum amount of feed could be produced on limited acreage. Intermediate in profit was year-long grazing on native grass plus supplemental winter feed.

Calves produced from each system have yielded from 56 to 57 percent and graded good-to-choice. They have been of good enough quality and finish to sell either as slaughter calves or to the feeder. The marketing system in which the steer calves sell as feeders and the heifers as slaughter calves has proven to be most profitable.

The addition of a small amount of stilbestrol to the creep-feed of calves during the last 47 days before marketing increased profits slightly and might be more beneficial if continued over a longer period.

Over all, the most profitable system of management would appear to be the use of rye-vetch winter pasture with supplemental roughage as needed. Calves should be creep-fed and the steers sold as feeders and the heifers as slaughter calves. The addition of 5 mg. stilbestrol to the creep-feed may further increase the rate of gain and profit.

Fattening Steers and Heifers on Rations Containing Different Levels of Concentrate.

L. S. POPE, R. D. HUMPHREY, LOWELL WALTERS and GEORGE WALLER

The majority of the cattle fattened in the southwest are fed in large commercial feed lots. Generally, ground or rolled milo is the principal grain fed, and alfalfa hay, silage and cottonseed hulls are the chief roughages. There is considerable difference from one feed lot to another in the proportion of concentrate (grain and protein supplement) to roughage in the ration. Opinions vary as to which ratio is best in terms of maximum feed consumption, rate of gain and time required to reach a slaughter grade.

This report deals with the second trial in a project designed to study the performance of steers and heifers self-fed mixed rations in which the amount of concentrate varied from 35 to 80 percent.

Procedure

Eighty-eight, choice, Hereford calves were obtained in July, 1956, from the Harding Ranch, northeast of Stillwater. The calves had been dropped in the fall of 1955, and had been creeped during the summer. In the interval between purchase and the start of the feeding trial, they were fed supplements on native grass in order to maintain condition.