Table 50

Summary of the Average Initial Weights, Coefficients of Inbreeding, Average Daily Gains, and Total Digestible Nutrients Required per 100 Pounds of Gain for the Bulls, Steers, and Heifers Produced in the Wernacre Premier and Mercury Lines from 1950 through 1955.

Line	Sex	Initial weight	Coefficient of inbreeding	Average daily gain	TDN per 100 lbs. gain[1]
Wernacre Premier					
	Bulls	489	13.21	2.52	499
	Steers	434	12.26	2.11	538
	Heifers	392	15.58	1.65	547
Mercury					
	Bulls	407	5.63	2.41	422
	Steers	385	6.00	2.13	480
	Heifers	355	4.59	1.60	532

1. The TDN values represent the pounds of total digestible nutrients, in both the cracked corn and alfalfa hay of the rations used for 100 pounds of live bodyweight gain.

The summary presented in Table 50 includes averages for the four variables, initial weight, coefficient of inbreeding, average daily gain, and TDN per 100 pounds of gain, for all of the calves that have completed individual feeding trials to date in each of the two lines. Analyses of variance have been computed on the complete data for each of these variables. These analyses were computed within each of the three sexes, bulls, steers, and heifers. The between-lines, within-years source of variance and the between-years source of variance were tested statistically for significance.

The average initial weight of the Wernacre Premier calves is higher than that of the Mercury calves; however, analyses of variance revealed that the two lines differed significantly within years only in the case of the steers. The between-years source of variance was highly significant in the data on the bulls, indicating that year effects may be of appreciable importance.

The between-lines, within-years source of variance was highly significant for coefficients of inbreeding in all three of the sexes. This was to be expected because inbreeding has been approximately one generation in advance in the Wernacre Premier line compared with the Mercury line.

Considerable variation existed among the average daily gains of the individual calves within each sex in all years. Analyses of variance did not indicate that either the between-years or the between-lines, within-years source of variance was significant for any one of the three sexes. Except for the steers, which were approximately the same, the Wernacre Premier calves had a higher average daily gain than the Mercury calves, although the differences in the average daily gains of the bulls and heifers of the two lines were not significant.

Averages in Table 50 show that the Mercury calves tended to make the most efficient gains; however, the between-lines, within-years source of variance was not significant in any of the three sexes in regard to this variable. The between-years source of variance was highly significant for the bulls and heifers, indicating that year effects may have an important influence on this variable.

The relationships between initial weight, coefficient of inbreeding, average daily gain, and feed efficiency, or TDN requirement per 100 pounds of gain, were studied by methods of correlation analyses within each of the three sexes of calves. These analyses revealed that initial weight and average daily rate of gain were highly significantly related to feed efficiency in the data on the heifers. These relationships were not significant in the data on the bull and steer calves.

These data are limited in regard to the number of animals used for the study, and these findings should not be regarded as conclusive; however, it appears that initial weight influences feeding efficiency to about the same extent as does average daily gain. In general, the lighter calves at the start and the faster-gaining calves during the feeding period make the most economical gains.

Inbreeding did not appear to be related to feed efficiency, although it was highly significantly related to initial weight in the bulls and heifers. The more highly inbred calves tended to weigh less at the start of the feeding trials compared with noninbred calves of approximately the same age. Inbreeding did not appear to be related to average daily gain in any of the three sexes.

Fundamental Studies of Sorghum Roughages and Grains. I. A Study of the Value of Pelleting Milo Grain. II. A Study of the Value of Levels of Hormone and Synthetic Hormonelike Substances (Project 222).

D. Richardson, E. F. Smith, B. A. Koch, and R. F. Cox

Previous work has shown that rate of gain and carcass quality are essentially the same with milo grain and corn when self-fed in a beef-fattening ration (Kansas Agricultural Experiment Station Circulars 308, 320, and 335). However, the animals eat more milo grain than corn per pound of gain. Because of its relatively small size, the milo grain is more difficult to prepare than the larger grain of corn.

This is a progress report of a preliminary test to evaluate grinding milo grain to a meal and then making it into a pellet. Source and level of hormones and synthetic hormonelike substances used as implants are also being studied. The reader should keep in mind that this test is still in progress and results given here are incomplete.

Experimental Procedure

Thirty-six of the heaviest Hereford steer calves purchased for experimental work were assigned to this test. Since lot space was not available, they were fed together in a group until the test started. They were divided on the basis of weight and conformation into three lots of 12 animals each, January 15. At that time they were consuming 5 pounds of grain per day and their average weight was about 540 pounds.

The daily ration for all animals consisted of grain, 1 pound soybean oil meal, 2 pounds alfalfa hay and all of the sorghum silage they would clean up. Equal quantities of grain were fed as follows: Lot 4, rolled corn; lot 5, finely ground pelleted milo grain; and lot 6, rolled milo grain. It should be observed that silage was the only ingredient not kept on an equal weight basis between lots. The calves are hand fed in the morning and afternoon.

The animals in each lot were assigned to four groups of three animals each on the basis of weight. One group served as the control, one group had 24 mgs. of stilbestrol implanted under the skin of the ear, and another group received 36 mgs. The fourth group received the Synovex implant (1000 mgs. progesterone and 20 mgs. estradiol benzoate). This gave three animals in each lot per treatment or a total of nine on each treatment. The calves were implanted 28 days after starting the test. They had been on a full feed of grain (10 pounds daily) for several days at that time.

Results and Observations

The results of this test to date are shown in Tables 51 and 52. The calves receiving corn were the first to reach a full feed of grain followed by those receiving pelleted milo. Lot 6 calves (rolled milo) would consume more grain than the others; however, grain consumption is being kept the same in all lots. Lot 6 calves are consuming more silage. After about 60 days on test, the calves on pelleted milo grain seemed reluctant to eat for a few days. No apparent reason for this was observed and normal feed consumption has been resumed.

All of the hormone and hormonelike substances have increased the rate of gain.

Table 51

Comparative Results with Rolled Corn, Pelleted Milo Grain, and Rolled Milo Grain in Beef Steer Calf Fattening Ration.

January 15, 1957, to April 19, 1957—84 days.

Lot number	4	5	6
Number calves per lot	12	11[1]	12
Av. initial wt., lbs.	541.3	537.3	538.8
Av. final wt., lbs.	763.3	747.3	741.7
Av. daily gain per calf, lbs.	2.64	2.50	2.42
Av. daily ration, lbs.:			
Sorghum silage	14.8	14.0	16.7
Alfalfa hay	2.0	2.0	2.0
Soybean oil meal	1.0	1.0	1.0
Rolled corn	10.3		
Pelleted milo grain		10.3	
Rolled milo grain			10.3
Lbs. feed per 100 lbs. gain:			
Sorghum silage	559.0	560.0	692.0
Alfalfa hay	74.7	79.0	81.8
Soybean oil meal	37.3	40.0	40.9
Rolled corn	388.1		
Pelleted milo grain		409.6	
Rolled milo grain			424.8
Feed cost per 100 lbs. gain[2]	$16.86	$17.67	$18.14

1. One animal removed because of urinary calculi.

2. Grain was prepared by Department of Flour and Feed Milling Industries, Kansas State College. Cost per 100 lbs.: rolled corn, $3; rolled milo, $2.85; and pelleted milo, $2.99.

Table 52

Results of Implanting 24 and 36 Milligrams Stilbestrol and Synovex Pellets with Beef Steer Calves on a Fattening Ration.

February 12, 1957, to April 9, 1957—56 days.

Treatment	Control	24 mgs. stilbestrol	36 mgs. stilbestrol	Synovex[2]
Number calves per treatment	9	9	8[1]	9
Av. initial wt., lbs.	618.9	614.4	611.3	610.0
Av. final wt., lbs.	737.8	755.6	757.5	745.0
Av. daily gain per calf, lbs.	2.12	2.52	2.61	2.41

1. One calf removed because of urinary calculi.

2. Contains 1000 mgs. progesterone and 20 mgs. estradiol benzoate.

The Use of a Pelleted Ration for Fattening Beef Heifers (Project 222).

F. H. Baker, E. F. Smith, D. Richardson, and R. F. Cox

An experiment previously conducted at this station demonstrated that beef heifers fed a completely pelleted ration made inferior gains, and had significantly lower carcass grades and dressing percentages than heifers fed the same balanced fattening ration in a natural state. However, these heifers consumed materially less of the pelleted ration and converted the feed to flesh as efficiently as the more rapidly gaining control group of heifers. There was definite evidence that the heifers consuming the pelleted ration ruminated less and craved coarse roughage. The experiment reported here was designed to determine if feeding limited quantities of natural roughage would stimulate feed consumption and permit normal rumination and normal gains of heifers fed pelleted rations.

Procedure

Twenty yearling heifers of good to choice quality were used. The heifers were purchased in the fall of 1954, used in wintering experiments until May 7, 1955, and continued on a growing ration in dry lot until June 15. Assignment of the heifers to lots in this experiment was on the basis of weight, feeder grade, and winter treatment.

The experimental rations were prepared in the following manner:

Lot 1—Coarsely cracked corn, cottonseed meal, and blackstrap molasses were commercially mixed together. The alfalfa hay was chopped as coarsely as possible in a forage chopper and blended with the other ingredients as the ration was self-fed to the heifers.

Lot 2—This ration was prepared by finely grinding, mixing, and pelleting the ingredients into pellets ⅜ inch in diameter. In addition to these pellets, 10 pounds of long alfalfa hay was fed per heifer daily for the first 3 days of the experiment. The hay intake was gradually decreased until a level of 1½ pounds per head daily was reached at the end of 12 days. This amount of hay was hand-fed daily while the pellets were self-fed during the remainder of the trial. For the first 43 days of the study the composition of the pellets was corn, 65 percent; molasses, 5 percent; cottonseed meal, 5 percent; and alfalfa hay, 25 percent. During the last 70 days the corn content of the pellets was increased to 70 percent and the alfalfa decreased to 20 percent. This change permitted the concentrate intake to be maintained at a higher level during the latter phase of the full-feeding period. The concentrate-to-hay ratio was equalized as nearly as possible between lots throughout the experiment.

It is recognized that these rations in the quantities consumed by the heifers provided more protein than is normally fed to fattening cattle. The cottonseed meal was included in the mixture to insure that the daily protein intake would be adequate for maximum gains in both lots even though the total feed consumption might be lower in one of the lots. Molasses was included in the rations to improve the consistency of the mixture and to facilitate the pelleting process.

Observations

1. Feed consumption was materially higher for the cattle fed the coarsely ground grain and chopped hay ration.

2. Feed efficiency was significantly improved by pelleting the ration.

3. Rate of gain, rumination, and the general feed-lot performance were normal for the heifers fed the pelleted ration and a small quantity of alfalfa hay. This small quantity of coarse roughage appears to be essential in obtaining a normal rate of gain and feed-lot performance from cattle fed pelleted rations. This observation is based on a comparison of these results with those of the previous experiment as well as results of tests conducted at other experiment stations.

Table 53

A Study of the Preparation of Rations for Fattening Beef Heifers.

Management	Chopped hay and coarsely ground grain ration	Pelleted ration
Lot number	1	2
Number heifers per lot	10	10
Initial wt., lbs.	710	710
Final wt., lbs.	1011	1000
Gain per heifer, lbs.	301	290
Daily gain per heifer, lbs.	2.66	2.57
Daily ration per heifer, lbs.:		
Corn	14.74	
Cottonseed meal	1.13	
Molasses	1.13	
Alfalfa hay	7.13	2.01
Salt	.02	.02
Pellets		17.58
% concentrate	70.5	70.0