BULLETIN 507
MAY 5, 1967

1966-1967 Progress Report

54th Annual LIVESTOCK FEEDERS' DAY

KANSAS AGRICULTURAL EXPERIMENT STATION
KANSAS STATE UNIVERSITY
MANHATTAN
Floyd W. Smith, director

54th ANNUAL

Livestock Feeders' Day

Friday, May 5, 1967

Animal Husbandry Department

Kansas State University, Manhattan, Kansas

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8:00 - 10:00 am - Arena - Displays-Experimental livestock and special exhibits. Coffee and donuts served.

10:00 am - Arena - Presiding - Dr. Don L. Good, Head of the Department of Animal Husbandry
Welcome - Dr. Glenn H. Beck, Vice-President for Agriculture
Report - Mr. Earl Brookover, President, Kansas Livestock Association, Garden City, Kansas

Research Reports:

Review of new Animal Research Facilities at Kansas State University - Dr. R. F. Cox, Dr. B. A. Koch, Dr. C. Drake, Dr. C. S. Menzies

Meat Research - Dr. Don H. Kropf

Supplemental Phosphorus, Vitamin A and Protein for Cattle on Grass - Dr. Ed F. Smith

Non-Protein Nitrogen, Oystershell and Other Factors in Beef Nutrition - Dr. Draytford Richardson

Forage in Beef Nutrition - Dr. Calvin Drake

Undesirable Recessive Traits in Beef Cattle - Professor Walter H. Smith

12:00 Roast Beef Lunch for men and women - Arena

1:00 pm - Arena - Entertainment-Folk Songs of the West - Professor Bill Koch, Department of English

Afternoon Session:

Modern Beef Carcass Evaluation - Dr. Harold J. Tuma

The Structure of the Beef Industry - Dr. R. A. Long, Head of the Animal Science Department, University of Georgia, Athens

2:30 pm - Arena - Question and Answer Period

6:30 pm - Banquet for visiting stockmen and ladies, by Block and Bridle Club

Distinquished Livestock Men will be honored, Kansas State Union

FOR THE LADIES

Thursday, May 4
6:30 pm - Kansas Cow Belles Dinner, Kansas State Union

Friday, May 5
10:00 am - Coffee for Visiting Ladies, Justin Hall Lounge

11:00 am - Weaving Demonstration, Justin Hall

C O N T E N T S

CATTLE

MEATS

SHEEP

SWINE

Adapting Roughages Varying in Quality and Curing Processes to the Nutrition of Beef Cattle: Urea vs Soybean Meal in Wintering and Finishing Rations for Beef Steers. (Project 370)

D. Richardson, E. F. Smith and B. E. Brent

It is generally recognized that a readily available source of energy (preferably grain) must be in the ration of ruminants for efficient synthesis of protein from nonprotein nitrogen. Therefore, nonprotein nitrogen has been used primarily in finishing (high grain) rations. Although urea is used rather extensively, there is practically no information on the minimum amount of readily available energy (grain) needed for efficient utilization. This test was designed to compare soybean meal (natural protein) and urea (nonprotein nitrogen) on an equivalent nitrogen basis in wintering and finishing rations of beef steer calves. During the wintering phase, they were fed sorghum silage (made from sorghum that produced 85 bu. grain per acre), 2 lbs. of average quality alfalfa hay, supplement and 0, 3 or 6 lbs. of added grain. In the finishing phase, 2 pounds prairie hay per head daily replaced the sorghum silage. The alfalfa hay was continued and all animals received a full feed of sorghum grain.

Results and Observations

Results are shown in Table 1. In the wintering phase, the calves receiving the urea supplement without added grain (lot 14) gained significantly less ($p<.05$) than any other lot. When 3 or 6 pounds of grain was added per head daily to urea supplemented calves (lots 16 and 17), gains were significantly greater than by calves on soybean meal without grain (lot 13) but not greater than by calves getting grain and soybean meal (lot 15).

During the finishing phase, steers receiving soybean meal (lots 13 and 15) continued to gain significantly faster ($p<.05$) than those receiving urea. They had significantly heavier carcasses and fat covering over the 12th rib. The additional fat resulted in significantly lower carcass yield grades. Carcass grades were significantly lower in lot 14, which received the urea supplement without grain during the wintering phase. Combined wintering and finishing gains were significantly higher for steers receiving the soybean meal (lots 13 and 15). There were no significant differences in ribeye areas. Thus, it is indicated that animals fed urea received enough protein for normal muscle development even though they did not gain so rapidly as those receiving soybean meal.

The results show that urea can be used as the only source of added protein nitrogen, but that gains may be lower than with natural protein. The animals receiving urea without added grain (lot 14) obtained approximately 3 pounds of grain per head daily in the silage. Since they made satisfactory gains, it is indicated that urea is partially utilized with as little as 3 pounds of grain per head daily. However, adding grain greatly improved gains (approximately 0.5 lb. daily).

Table 1
Urea Compared with Soybean Meal
Wintering phase with varying levels of grain
December 17, 1965 to April 8, 1966 - 112 days

Lot	13	14	15	16	17
No. steers per lot	14	14	14	14	14
Av. initial wt., lb.	519	525	520	518	519
Av. final wt., lb.	689	665	703	710	730
Av. daily gain, lb.	1.52	1.24	1.63	1.72	1.88
Av. daily ration, lb.					
Sorghum silage	24.8	24.1	21.1	20.7	17.1
Alfalfa hay	2.0	2.0	2.0	2.0	2.0
Soybean meal	1.0	---	1.0	---	---
Grain-Urea supplement[1]	---	1.0	---	1.0	1.0
Sorghum grain	---	---	3.0	3.0	6.0
Feed per cwt. gain, lb.					
Sorghum silage	1634	1939	1291	1205	910
Alfalfa hay	132	161	123	117	106
Soybean meal	66	--	61	--	--
Grain-Urea supplement	--	80	--	58	53
Sorghum grain	--	--	184	175	319
Feed cost per cwt. gain	$11.16	$12.17	$13.13	$11.52	$12.94
Finishing phase, April 8 to October 13, 1966 - 188 days					
Av. final wt., lb.	1186.7	1103.9	1177.5	1132.1	1126.4
Av. daily gain, lb.	2.61	2.34	2.53	2.25	2.11
Av. daily ration, lb.					
Sorghum grain	17.8	15.8	17.6	16.9	15.4
Soybean meal	1.0	--	1.0	--	--
Urea supplement[1]	--	1.0	--	1.0	1.0
Alfalfa hay	2.0	2.0	2.0	2.0	2.0
Prairie hay	2.0	2.0	2.0	2.0	2.0
Feed per cwt. gain, lb.					
Sorghum grain	680	678	698	751	729
Soybean meal	38	--	40	--	--
Urea supplement	--	43	--	45	47
Alfalfa hay	77	86	79	89	95
Prairie hay	77	86	79	89	95
Feed cost per cwt., $	17.04	16.79	17.54	18.37	18.13
Shrinkage to Market, %	2.35	3.01	2.37	2.21	0.95
Av. hot carcass wt., lb.	714.1	655.1	718.6	674.6	686.9
Av. dressing % feedlot wt.	60.18	59.35	61.03	59.58	60.98
Av. dressing % market wt.	61.67	61.19	62.51	60.93	61.56
Av. fat thickness, 12th rib, in.	0.63	0.49	0.65	0.49	0.47
Est. % Kidney Knob	2.46	2.40	2.57	2.54	2.39
Av. size ribeye, sq. in.	12.50	12.54	12.48	12.87	12.83
Av. degree marbling[2]	6.25	6.78	6.29	6.43	6.43
Av. yield grade	3.17	2.86	3.36	2.86	2.57
Carcass grades:					
Top choice	--	--	3	1	--
Av. choice	10	5	7	8	10
Low choice	2	7	4	4	4
Top good	--	2	--	1	--
Summary Wintering and Finishing-300 Days					
Av. winter gain, lb.	170	139	183	192	211
Av. Finishing gain, lb.	491	439	475	422	396
A.D.G. (300 days), lb.	2.20	1.93	2.19	2.05	2.02
Feed cost/cwt. gain (300 days) $	15.66	15.72	16.37	16.01	16.40

1. 86% sorghum grain, 14% urea.
2. 4 = slightly abundant, 5 = moderate, 6 = modest, 7 = small 8 = slight, 9 = trace.

Nutritive Value of Forages as Affected by Soil and Climatic Differences. (Project 430)

D. Richardson,[3] E. E. Banbury[1], A. B. Erhart[2]
Grady Williams[3], F. W. Boren[3] and David Stiles[3]

1. Colby Station
2. Garden City Station
3. Mound Valley Station

Opinions differ as to how livestock perform in various parts of Kansas due to location, soil, climate, rainfall and/or local feed, however, no valid information has been available to confirm the opinions.

This project was designed to measure as accurately as possible the performance of beef steers at Colby, Garden City, Manhattan and Mound Valley Experiment Stations. Similar sheds and lots were constructed at each location. Sorghum silage (FSIA), second cutting alfalfa and sorghum grain produced at each location was used. Through the cooperation of Warner's Hereford Ranch, steer calves of the same breeding have been used throughout the series of tests. Two lots of six animals each have been used at each location. The calves were fed a growing ration of alfalfa hay and silage for 112 days. Then grain was added to the ration and gradually increased until it was supplied free choice. The silage was gradually decreased and removed from the ration. The steers continued to receive five pounds of alfalfa hay per head daily. The finishing period lasted approximately 200 days. All animals were delivered to Wichita where they were sold, and slaughtered and carcass information was obtained.

Results of the first three years' tests have been reported individually in the 51st, 52nd and 53rd Livestock Feeder's Day Reports. The following observations were obtained from an analysis of the three years' results:

1. Satisfactory and economical gains were produced at all four locations every year.
2. Wintering gains were higher at Mound Valley than for the other locations two of the three years. Analysis of variance showed that, in general, greater wintering gains may be expected at Mound Valley than at the other locations.
3. Finishing gains were significantly different two of the three years. Pooled data analysis indicated significantly lower gains at Mound Valley than other locations. Gains at Garden City and Colby were significantly higher than those at Manhattan.
4. In total gains, there were no significant differences on a yearly basis, however, the pooled data indicated significantly higher total gains at Garden City over Manhattan and Mound Valley, but not Colby. In general, total gains are indicated to rank in the order of Garden City, Colby, Manhattan and Mound Valley.
5. Back fat thickness was significantly lower at Mound Valley than at other locations. Other carcass characteristics did not differ significantly among locations.

6. Feedstuff analyses revealed significant differences in protein content of sorghum grain and carotene content of alfalfa hay and sorghum silage, however, these differences did not account for differences in animal performance. Therefore, it is suggested that if any differences in nutrients are involved in animal performance, they were not detected by proximate feedstuff analysis.
7. Correlation of growth data with local rainfall, humidity and temperature suggested that only 5.6% of variability in rate of gain could be explained by the significant correlation of temperature with average daily gain. This showed little indication that differences among locations were due to climatological factors of rainfall, humidity and temperature.
8. The results of the first three tests indicate differences in animal performance at the four locations, but they do not give any explanation for the differences.

Fourth Test 1965 - 1966

The fourth test was completed under the same experimental design as the three previous ones. Feedscuff analyses are given in Table 2, and feedlot results of the wintering and finishing phases in Table 3. These results agree with the three previous tests in that Garden City again was first in total performance. Results at the other locations are quite similar.

Results of Shorthorn and Shorthorn-Hereford cross at Colby and Charolais-Hereford cross at Garden City are shown in Table 4. These animals were managed and fed in the same manner as those reported in Table 3.

Future Tests

Since we have observed differences in beef steer performance at the four locations, our big problem is to try to determine why. It is hoped that future tests can be designed to explain the differences.

At present, all locations are using feed produced at Garden City. Sorghum silage was dehydrated and pelleted. Thus, steers from the same herd are being fed the same ration ingredients at all locations.

Table 2
Feedstuff Analyses, 1965-66

	% Moisture	% Dry matter	% Protein	% Ash	% Ether extract	% Crude fiber	% N.F.E.	Carotene mgs. per lb.
Colby:								
Sorghum silage	69.50	30.50	1.43	2.57	0.81	6.97	18.72	1.0
Alfalfa hay	5.59	94.41	12.80	9.04	1.92	34.12	36.53	25.0
Sorghum grain	9.51	90.49	6.68	1.64	2.15	2.05	77.97	----
Garden City:								
Sorghum silage	68.80	31.20	1.23	3.29	0.86	7.39	18.43	1.5
Alfalfa hay	12.13	87.87	14.45	9.92	1.99	29.74	31.77	26.9
Sorghum grain	12.89	87.11	7.13	1.44	3.07	2.33	73.14	----
Manhattan:								
Sorghum silage	62.10	37.90	1.78	2.86	1.02	7.99	24.25	1.8
Alfalfa hay	11.95	88.05	11.61	7.66	1.48	26.37	40.93	21.7
Sorghum grain	14.02	85.98	7.09	1.61	1.93	2.47	72.88	----
Mound Valley:								
Sorghum silage	50.90	49.10	1.60	3.39	0.97	12.30	30.84	2.0
Alfalfa hay	6.79	93.21	16.08	7.43	1.58	32.03	36.09	18.0
Sorghum grain	13.95	86.05	6.03	1.45	2.50	2.48	73.60	----

Table 3
Feedlot results
Wintering phase
November 19, 1965 to March 11, 1966 - 112 days

Location	COLBY		GARDEN CITY		MANHATTAN		MOUND VALLEY	
Lot no.	1	2	1	2	1	2	1	2
No. steers per lot	6	6	6	6	6	6	6	6
Av. initial wt., lb.	458.3	457.5	458.3	459.2	464.2	452.5	466.7	451.7
Av. final wt., lb.	600.7	606.8	610.5	628.2	595.0	580.8	604.8	581.2
Av. daily gain, lb.	1.27	1.33	1.36	1.51	1.17	1.15	1.23	1.16
Av. daily ration, lb:								
Sorghum silage	27.7	27.1	25.2	26.4	19.2	19.2	16.9	16.6
Alfalfa hay	3.9	4.6	5.0	5.0	4.7	4.6	4.9	4.6
Feed per cwt. gain, lb:								
Sorghum silage	2177	2035	1854	1752	1648	1676	1366	1438
Alfalfa hay	308	344	368	331	403	402	396	402
Total dry matter per cwt. gain, lb.	955	946	901	838	980	989	1040	1081
Feed cost per cwt. gain[1], $	12.56	12.52	12.02	11.14	11.63	11.73	10.41	10.78
Finishing Phase, March 11 to October 1, 1966 - 204 days								
Av. final wt., lb.	1003.0	1032.0	1089.0	1123.0	1040.0	1018.0	1032.0	996.0
Av. daily gain, lb.	1.98	2.09	2.35	2.43	2.18	2.14	2.09	2.03
Av. daily ration, lb.:								
Alfalfa hay	4.4	4.6	4.8	4.9	4.1	4.0	4.9	4.8
Sorghum grain	15.1	16.8	15.9	16.7	15.4	15.3	16.6	15.7
Feed per cwt. gain:								
Alfalfa hay	225	219	206	204	190	187	234	237
Sorghum grain	783	805	677	687	707	713	794	771
Feed cost per cwt. gain[1], $	16.90	17.23	14.77	14.92	15.11	15.17	17.22	16.84
Shrink to market, %	-3.08	-2.49	-3.60	-3.56	+.24	+.41	-2.34	-1.79
Av. hot carcass wt., lb.	629.0	649.8	671.2	697.2	644.3	633.7	652.2	608.7
Dressing %, feedlot wt.	62.73	62.95	61.62	62.06	61.96	62.28	60.60	61.10
Dressing %, market wt.	64.73	64.55	63.92	64.35	61.81	62.02	62.05	62.21
Av. fat thickness 12th rib	.93	.93	1.17	1.10	1.00	.93	.98	.92
Estimate % Kidney Knob	3.20	3.50	3.83	3.66	3.33	2.83	3.25	3.17
Av. size rib eye sq. in.	10.33	10.55	10.55	11.55	10.51	10.47	10.84	10.58
Av. degree Marbling[2]	7.83	6.66	6.83	6.83	7.50	7.50	6.67	7.83
Av. yield grade	3.33	3.50	4.33	4.00	3.50	3.66	3.50	3.33
Carcass grades:								
Low prime	-	-	1	-	-	-	-	-
Top choice	-	-	-	-	-	-	1	-
Av. choice	-	2	-	1	-	-	1	-
Low choice	2	3	2	3	4	4	1	3
Top good	-	-	-	-	-	-	1	-
Av. good	1	1	1	2	1	-	-	1
Low good	3	-	2		1	2	2	2

1. Sorghum silage $8 per ton, Alfalfa hay $25 per ton, sorghum grain $1.80 per cwt.
2. 4 = Slightly abundant, 5 = moderate, 6 = modest, 7 = small, 8 = slight, 9 = trace.

Table 4
Feedlot results
Wintering phase
November 19, 1965, to March 11, 1966 - 112 days

Location	COLBY		GARDEN CITY	
Lot no.	3	4	3	4
Animals, steers	Shorthorn	Shorthorn X Hereford	Charolais X Hereford	Charolais X Hereford
No. animals per lot	6	6	6	6
Av. initial wt., lb.	478.2	464.3	454.2	458.3
Av. final wt., lb.	614.7	589.8	696.3	689.8
Av. daily gain, lb.	1.22	1.12	2.16	2.07
Av. daily ration, lb:				
Sorghum silage	31.6	29.3	34.7	34.8
Alfalfa hay	4.0	4.3	5.0	5.0
Alfalfa pellets	----	----	----	----
Feed per cwt. gain, lbs.:				
Sorghum silage	2596	2616	1607	1684
Alfalfa hay	328	379	231	---
Alfalfa pellets	---	---	---	242
Total dry matter/cwt. gain, lb.	1102	1156	704	738
Feed cost/cwt. gain[1], $	14.48	15.20	9.32	9.77
Finishing phase, March 11 to October 1, 1966 - 204 days				
Av. final wt., lb.	1054.0	1045.0	1265.0	1293.0
Av. daily gain, lb.	2.15	2.23	2.79	2.95
Av. daily ration, lb.:				
Alfalfa hay	4.8	4.8	4.4	5.0
Sorghum grain	18.0	17.0	17.9	20.6
Feed per cwt. gain, lb.:				
Alfalfa hay	221	215	157	169
Sorghum grain	837	762	642	698
Feed cost per cwt. gain[1], $	17.83	16.41	13.52	14.67
Shrink to market, %	-3.05	-3.13	-3.78	-3.42
Av. hot carcass wt., lb.	643.8	636.2	776.5	794.0
Dressing %, feedlot wt.	61.09	60.87	61.41	61.43
Dressing %, market wt.	63.02	62.83	63.82	63.60
Av. fat thickness 12th rib, in.	.82	.85	.87	1.01
Estimate % Kidney Knob	3.66	3.42	3.08	3.33
Av. size rib eye, sq. in.	10.15	10.04	12.35	11.65
Av. degree marbling[2]	7.0	6.33	7.00	6.66
Av. yield grade	3.50	3.50	2.83	3.50
Carcass grades:				
Low prime	-	-	-	-
Top choice	-	2	-	-
Av. choice	2	2	1	2
Low choice	2	1	4	3
Top good	-	-	-	-
Av. good	2	-	1	1
Low good		1	-	-

1. Sorghum silage $8 per ton, Alfalfa hay $25 per ton, sorghum grain $1.80 per cwt.
2. 4 = slightly abundant, 5 = moderate, 6 = modest, 7 = small, 8 = slight, 9 = trace.

The Value of Sorghum Grain, Corn and Wheat Fed Individually and in Varying Combinations in Beef Cattle Finishing Rations. (Project 567)

D. Richardson, E. F. Smith, B. E. Brent and F. G. Clary

Sorghum grain is the predominant grain produced in Kansas for livestock. In general, sorghum grain may be expected to produce a rate of gain similar to corn and greater than wheat when fed to beef cattle. However, it is not normally as efficient from the standpoint of pounds required per pound of gain. Two feedlot trials have been conducted to determine the value of feeding mixtures of sorghum grain and corn or wheat.

Experimental Procedure

Trial 1. Hereford steers averaging about 740 lbs. and previously used in summer pasture grazing studies were divided into six lots on the basis of weight and conformation. They were fed daily about 8 pounds sorghum silage, 3 pounds alfalfa hay and 1 pound of supplement for 159 days. Grain was fed as sorghum grain or wheat and mixtures as shown in table 5. One lot (12) received a mixture of equal parts sorghum grain, wheat and corn. The steers were fed twice daily the amount they would clean up.

Trial 2. Sixty Hereford heifers purchased on the Dodge City market were divided into six lots on the basis of purchase weight and conformation. The daily ration was composed of 2 pounds alfalfa hay, 1 pound supplement, 2 pounds prairie hay for the first 56 days and grain free choice. The grain or mixtures of grain are shown in table 6.

Results

Results are presented in tables 5 and 6. Trial 1. Wide variation within lots resulted in no significant differences in rate of gain. However, the steers on all wheat gained less and those receiving the mixture of three grains gained more. Animals receiving wheat tended to use less feed per pound of gain. Trial 2. The heifers receiving all sorghum grain gained less ($P<.10$) than the others. Mixtures of sorghum grain and corn tended to produce higher gains with greater feed efficiency, though neither difference was statistically significant.

Observations

1. Using wheat in a mixture with sorghum grain produced no change in rate of gain; however, feed efficiency tended to be increased.

2. Using corn in a mixture with sorghum grain tended to increase gains and feed efficiency.

3. Mixtures of grain seemed to be more acceptable to the animals over a longer time.

4. There were no significant differences in carcass grades or other characteristics observed.

Table 5
Feedlot results for Finishing Steers with Sorghum Grain, Sorghum Grain and Wheat or Sorghum Grain, Wheat and Corn.
December 15, 1965 to May 23, 1966 - 159 days

Lot no.	7	8	9	10	11	12
No. steers per lot	11	11	11	10	11	11
Grain, %:						
Sorghum grain	100	75	50	25	--	33
Wheat	--	25	50	75	100	33
Corn	--	--	--	--	--	33
Av. initial wt., lb.	741.4	742.7	742.7	748.0	742.3	740.9
Av. final wt., lb.	1192.7	1189.5	1183.6	1199.0	1160.5	1227.7
Av. daily gain, lb.	2.84	2.81	2.77	2.84	2.63	3.06
Av. daily ration, lb.:						
Sorghum silage	7.9	7.8	7.9	8.0	7.9	7.9
Alfalfa hay	3.0	3.0	3.0	3.0	3.0	3.0
Grain	17.8	17.6	16.1	14.0	14.4	17.8
Supplement	1.0	1.0	1.0	1.0	1.0	1.0
Feed per cwt. gain, lb.:						
Sorghum silage	278	279	284	280	300	259
Alfalfa hay	106	107	108	106	114	98
Grain	626	626	581	518	548	582
Supplement	35	36	36	36	38	33
Feed cost per cwt. gain, $	16.54	17.29	17.18	16.33	18.03	16.97
Shrink to market, %:						
Hauling	0.88	0.95	1.34	1.83	0.78	0.78
Overnight stand	2.90	2.52	2.69	2.37	2.46	2.48
Av. hot carcass wt., lb.	726.8	729.7	717.2	709.0	707.0	764.8
Dressing %, feedlot wt.	60.94	61.35	60.59	59.13	60.93	62.30
Dressing %, market wt.	63.30	63.48	63.07	61.65	62.87	64.34
Est. kidney knob, %:	3.0	2.95	2.91	2.95	2.82	2.91
Av. fat thickness 12th rib, in.	0.57	0.70	0.65	0.58	0.53	0.68
Av. size ribeye, sq. in.	11.88	11.97	11.72	12.22	12.63	12.85
Av. degree marbling[1]	7.45	7.18	7.00	7.30	7.45	7.09
Carcass grades:						
Top choice	-	1	-	-	-	1
Av. choice	-	-	6	2	1	2
Low choice	6	6	2	5	4	4
Top good	5	4	3	2	4	3
Av. good	-	-	-	-	1	1
Low good	-	-	-	1	1	

1. 4 = slightly abundant, 5 = moderate, 6 = modest, 7 = small amount, 8 = trace.

Table 6
Feedlot Results for Finishing Heifers With Sorghum Grain, Sorghum Grain and Corn or Sorghum Grain, Corn and Wheat.
June 4 - September 24, 1966 - 112 days

Lot no.	7	8	9	10	11	12
No. heifers per lot	10	10	10	10	10	10
Grain, %:						
Sorghum	100	75	50	25	-	33
Corn	-	25	50	75	100	33
Wheat	-	-	-	-	-	33
Av. initial wt., lb.	607.5	608.5	607.0	608.5	607.0	610.0
Av. final wt., lb.	897.0	936.5	945.0	946.5	935.0	936.0
Av. daily gain	2.58	2.93	3.10	3.02	2.93	2.91
Av. daily ration, lb.:						
Grain	17.0	17.6	17.5	16.2	16.2	16.6
Supplement	1.0	1.0	1.0	1.0	1.0	1.0
Alfalfa hay	2.0	2.0	2.0	2.0	2.0	2.0
Prairie hay	1.7	1.7	1.7	1.7	1.7	1.7
Feed per cwt gain, lb.:						
Grain	658	600	565	538	553	570
Supplement	39	34	32	33	34	34
Alfalfa hay	77	68	65	66	68	69
Prairie hay	67	59	56	57	59	59
Feed cost per cwt gain, $	16.55	15.42	14.96	14.86	15.69	15.77
Av. hot carcass wt., lb.	543.0	585.5	587.0	583.5	577.5	572.6
Est. Kidney Knob, %	2.15	2.35	2.45	2.22	2.32	2.17
Av. fat thickness 12th rib, in.	0.56	0.59	0.70	0.57	0.58	0.56
Av. size ribeye, sq. in.	10.54	11.37	11.17	11.13	11.12	10.74
Av. degree marbling[1]	7.5	7.2	7.7	7.7	7.1	7.8
Av. yield grade	2.3	2.4	2.9	2.1	2.5	2.3
Carcass grades:						
Top choice	-	-	-	-	1	-
Av. choice	1	4	-	1	-	1
Low choice	2	2	3	1	5	-
Top good	2	-	3	3	-	2
Av. good	5	3	4	4	4	5
Low good	-	1	-	1	-	2

1. 4 = slightly abundant, 5 = moderate, 6 = modest, 7 = small amount, 8 = trace.

The Value of Adding Graded Levels of Gelatinized Sorghum Grain to a Fattening Ration (Project 623)

C. L. Drake, B. E. Brent, C. W. Deyoe[1] and H. B. Post[1]

Reports from several experiment stations have aroused much interest in the value of "steam processing" or "flaking" grain for beef cattle. During the process, some gelatinization or cooking of the grain occurs. This trial studied the addition of various amounts of completely gelatinized sorghum grain to fattening steer rations.

Experimental Procedure

The sorghum grain was ground in a hammer mill through a $\frac{1}{16}$ inch screen, then processed through an X-50 entruder cooker.[2] The ground grain was steam heated to 300°F and approximately two tons per hour were processed through the cooker. The extruded grain, containing 18 to 20 percent moisture, was dried and placed in metal storage bins until used. Since the extruded grain left the processing machinery in rather large, hard lumps, it was run through a roller mill and crumbled before being incorporated into the ration. Protein supplement was mixed with the concentrate portion of the ration, which was fed twice daily. Hay was offered daily. Ration composition is shown in table 7.

Fifty-seven Hereford steers were randomly allotted to 12 individual pens and four group pens. Before the trial each steer was implanted with 24 milligrams of diethylstilbestrol. Three steers fed individually and one group-fed lot received one of the experimental rations. Weight gain, feed efficiency and carcass information were collected on the feedlot cattle. Four fistulated steers were used to determine digestibility, rumen volatile fatty acid concentration, ammonia and pH. Rumen fluid was obtained twice a week, 10 minutes before feeding and 1, 2, 3, 4 and 6 hours post-prandial. These data are currently being analyzed. Information concerning feed intake and steer performance is shown in table 8, chemical composition of concentrate and supplement mixtures are presented in table 9.

Results and Discussion

Feed intake was good throughout the trial in spite of the bulkiness of the gelatinized grain. Little variation was noted in feed consumption among lots. Differences in performance between individually and group fed steers receiving the same ration were not consistent. Carcasses of steers receiving high levels (50 and 75%) of gelatinized grain graded slightly higher than controls.

1. Department of Grain Science and Industry

2. The cooperation and help of the Wenger Mix Manufacturing Company, Sabetha, Kansas, in processing the grain is appreciated.

Table 7
Ration Composition

Treatment	1	2	3	4
Ration composition, lbs.	% Concentrate as gelatinized sorghum grain			
	0	25	50	75
Rolled sorghum grain	1400	1050	700	350
Gelatinized sorghum grain		350	700	1050
Supplement[1]	200	200	200	200
Prairie hay	400	400	400	400

[1]Five lbs. urea (45% N) 1 lb. trace mineral premix (% element in premix: manganese 4.4, iron 6.6, copper 1.3, cobalt .2, iodine .3, zinc 12, magnesium 20, sulfur 2.7) 10 lb. dry molasses, 10 lb. dicalcium phosphate, 0.44 lb. vitamin A (10,000 IU per gm), 163.56 lb. dehydrated alfalfa meal (17% protein).

Table 8

Weight Gains, Feed Efficiency and Carcass Data of Steers Fed Graded Levels of Gelatinized Sorghum Grain 125 days (June 22 to October 25, 1966).

Treatment	1		2		3		4	
	% Concentrate as gelatinized sorghum grain							
	0		25		50		75	
Individually or lot fed	Ind	Lot	Ind	Lot	Ind	Lot	Ind	Lot
No. of animals	3	11	3	11	3	11	3	12
Starting wt., lbs.	707	720	687	718	687	720	692	732
Final wt., lbs.	1040	1074	1030	1057	1025	1065	1043	1072
Average daily gain, lbs.	2.66	2.83	2.73	2.71	2.69	2.76	2.82	2.72
Feed per lb. gain								
Sorghum grain[1]	7.72	7.14	8.57	7.61	6.68	7.22	6.27	6.90
Prairie hay	1.90	1.73	2.11	1.85	1.65	1.76	1.51	1.67
Total	9.62	8.87	10.68	9.46	8.33	8.98	7.78	8.57
Av. Carcass grade[2]	19	18.5	18.7	18.5	17	19.2	18.0	19.3

1. Includes 10% supplement.
2. Av. good = 17; high good = 18; low choice = 19.

Table 9

Chemical Composition of the Concentrate and Supplement Mixture

Treatment	1	2	3	4
	% Concentrate as gelatinized sorghum grain			
	0	25	50	75
Moisture	11.03	10.54	10.38	9.32
Protein	11.71	11.69	12.31	11.50
Ash	2.75	2.59	2.92	2.44
Ether extract	2.68	2.72	2.10	1.73
Crude fiber	3.95	3.98	4.20	4.11
N.F.E.	67.89	69.00	68.10	71.91

Concrete and Dirt Surfaces Compared for Fattening Beef Cattle (Project 660)

C. L. Drake, E. F. Smith, H. B. Perry, R. I. Lipper[1] and G. H. Larson[1]

The Animal Husbandry and Agricultural Engineering departments cooperate in this project. The response of cattle with water applied as "artificial rain" on a concrete and a dirt surfaced lot is being studied. Ways to collect and handle feedlot runoff also are being studied. Two lots identical in size (42' x 92') were used. The dirt lot had a 16' x 24' concrete apron; both lots had fence-line bunks. Two trials are reported.

Procedure

In Trial 1, 10 steers averaging about 750 lbs. were placed in each of the lots and, in addition to normal rainfall, were subjected to 17.11 inches of artificial rainfall. The trial was from October 1, 1965, to April 15, 1966, which included about two months of wet and disagreeable weather.

In Trial 2, 10 heifers weighing about 540 pounds each were randomly allotted to each lot and fed from June 4, 1966, to January 3, 1967; 13.93 inches of artificial rain was administered, otherwise it was unusually dry.

Results and Discussion

Steers on the concrete surfaced lot (table10) gained slightly more, required less feed per lb. gain and had a lower feed cost. This is contrary to results published last years Feeder's Day Report, however, the differences are small.

Heifers (table11) showed little variation in weight gain, however, they consumed slightly less feed and had a lower feed cost on the concrete surface.

1. Department of Agricultural Engineering, Kansas State University

Table 10

Concrete and Dirt Surfaces Compared for Fattening Steers.
October 1, 1966 to April 15, 1966 - 195 days.

	Concrete	Dirt
Lot no.	24	25
Steers per lot	9	10
Av. initial wt., lb.	755	756
Av. final wt., lbs.	1231	1218
Av. daily gain, lbs.	2.44	2.37
Av. daily ration per steer, lbs.		
Rolled sorghum	17.30	18.30
Prairie hay	3.20	3.20
Supplement	1.09	1.14
Total feed	21.59	22.64
Feed per pound of gain, lbs.		
Rolled sorghum grain	7.10	7.71
Prairie hay	1.31	1.36
Supplement	0.45	0.48
Total feed per lb., gain	8.86	9.55
Feed cost per cwt. gain,	$16.96	18.34
Av. carcass data:		
Av. carcass wt., lb.	766	740
Dressing percent	62.2	60.8
Carcass grade[1]	18.3	18.2
Marbling score[2]	7.1	6.8
Ribeye area, sq. in.	12.12	12.12
Fat thickness at 12th rib	0.98	0.92
Yield grade[3]	3.6	3.1

1. 18 = good, 19 = low choice.
2. Lower score indicates higher degree of marbling.
3. 1-5, lower score indicates more trimmed retail cuts.

Table 11

Concrete and Dirt Surfaces Compared for Fattening Heifers, June 4, 1966 to January 3, 1967 - 213 days.

	Concrete	Dirt
Lot no.	24	25
No. heifers per lot	10	10
Av. initial wt., lb.	544	538
Av. final wt., lb.	982	982
Av. daily gain, lb.	2.06	2.08
Av. daily ration per heifer, lb.:		
Rolled sorghum grain	14.51	14.90
Prairie hay	3.00	3.00
Supplement[1]	1.38	1.38
Total daily feed	18.89	19.28
Feed per lb. gain, lb.:		
Rolled sorghum grain	7.04	7.16
Prairie hay	1.45	1.44
Supplement	.67	.66
Total	9.15	9.26
Feed cost per cwt, gain	$17.92	18.12

1. Supplement composition lbs.: 150 Urea (45% N) 10 trace mineral, 100 dicalcium phosphate, 4.4 vitamin A (10,000 IU/gm), 1735.6 dehydrated alfalfa meal.

Value of Chlortetracycline-Sulfamethazine Supplementation for Beef Calves After Being Weaned and Shipped. (Project 623)

C. L. Drake, E. F. Smith, H. B. Perry, D. L. Good, and D. Richardson

The number of cattle concentrated in small areas is increasing in Kansas. Conditioning new cattle is a major problem in some operations. This experiment studied effects of adding a combination of chlorotetracycline-sulfamethazine[1] on weight gain, feed efficiency and general health when fed to beef calves after they were weaned and shipped.

Experimental Procedure

Fifty-six Hereford steer calves, purchased through a sale ring in Deming, N.M., were shipped by rail to a point about 50 miles from Manhattan and trucked the remaining distance. Seventy steer calves were purchased at the Wagner ranch in Nebraska and trucked directly to Manhattan. The two groups arrived in a two-day period. They were weighed, ear tagged, tatooed and placed in experimental lots by gate cut immediately after being unloaded. Two pens of 23 head from each location were used; remaining calves from each location were placed together. All were weighed on the 28th and 35th day of the trial.

The starting ration consisted of a low level of supplement and corn silage. Prairie hay was offered free choice. The supplement was increased to 4 pounds per head daily within 7 days while silage was increased to meet consumption. Prairie hay was gradually reduced and discontinued after 12 days. Four pounds of supplement (Table 12) containing 350 mg. of chlorotetracyline-sulfamethazine was fed each steer daily.

The Nebraska calves were fresh and in good condition while the New Mexico calves were severely stressed, showed respiratory difficulty, and a large percentage required treatment. A sharp drop in temperature occurred and rain mixed with sleet fell soon after their arrival causing additional stress.

Results and Discussion

Information presented in Table 13 shows the influence of the treatment. In all but one instance the calves receiving chlorotetracycline-sulfamethazine gained more weight and all calves were more efficient. The steers receiving control rations required more medical attention, however, none of either the control or treated calves died.

1 Chlorotetracycline-Sulfamethazine and partial financial support furnished by American Cyanamid Company, Princeton, N. J.

Table 12
Supplement Composition

Ingredient, lbs.	Control	Treated
Soybean meal (43.8%)	1000	1000
Ground sorghum grain	749.5	744.5
Dehydrated alfalfa	250	250
Vitamin A Supplement (10,000 IU/gm)	0.5	0.5
Chlorotetracycline-sulfamethazine		5

Table 13
Performance of Steer Calves from Two Locations as Influenced by Chlortetracycline-sulfamethazine Supplementation.

Calf origin	Nebraska		New Mexico		Nebraska and New Mexico
Supplement[1]	Control	Treated	Control	Treated	Treated
Number of animals	23	23	23	23	24
Initial wt. lbs.	372	372	381	357	360
28 day wt. lbs.	426	434	438	410	417
Gain/animal, lbs.	54	62	57	53	57
Av. daily gain, lbs.	1.93	2.21	2.04	1.89	2.04
Feed/lb. gain,[2] lbs.	6.79	6.01	5.96	5.76	6.0
35 day wt. lbs.	440	445	447	434	450
Gain/animal, lbs.	68	73	66	77	90
Av. daily gain, lbs.	1.94	2.09	1.89	2.20	2.57
Feed/lb. gain,[2] lbs.	8.07	7.66	7.41	6.30	6.16
Number times treated, 35 days[3]	7	1	41	30	17

1. 350 mgs. of chlortetracycline-sulfamethazine was fed per head daily in the treated supplement.

2. Calculated on as-fed basis.

3. Injected with 10 cc combiotic.

Poloxalene as a Bloat Preventative for Beef Steers Grazing Immature Alfalfa (Project 623)

C. L. Drake, H. B. Perry, E. F. Smith and D. L. Good

Poloxalene has proved to be an effective agent to prevent legume bloat in cattle, however, intake of the compound at regular intervals during the day is important. Intake twice daily at approximately 12-hour intervals has been shown to control bloat. This presents a management problem with beef cattle under most grazing conditions. This trial tested the effectiveness of poloxalene administered to beef cattle grazing immature alfalfa in a molasses-salt block[1] and as "Bloat Guard"[2] mixed with rolled sorghum grain fed free choice in a self feeder.

Procedure

Three plots consisting of two acres each were fenced and four Hereford steers were placed in each area. One plot served as a control with no bloat preventative agent. Steers in the remaining plots received poloxalene, one from a molasses-salt block; the other as a mixture of "Bloat Guard" and rolled sorghum grain from a self feeder. The blocks contained 30 grams poloxalene per pound, and 10 grams of "Bloat Guard" was added per pound of rolled sorghum grain. Control and self fed lots contained molasses-salt blocks containing no poloxalene. Molasses-salt blocks provided the only source of salt.

The trial was started in June, but due to a tornado which destroyed the pens and equipment and hot dry weather which reduced alfalfa growth and made it necessary to feed all the steers; therefore, information was not recorded until August 17, 1966. The steers had been on their respective treatments some time before phase 1 (table 15) started. Both steers and treatments were switched at 14-day intervals as indicated in table 15.

The steers were checked each morning and evening for bloat and rated according to the bloat scale presented in table 14.

Results

Poloxalene in a molasses-salt block most successfully prevented bloat in this trial. As shown in phase 1, where the animals were already accustomed to the self feeder, there were no indications of bloat. The steers

1. Molasses-salt blocks containing 0 and 30 grams poloxalene per lb. were provided by A.E. Staley Mfg. Co., Decatur, Ill. Blocks contain 20% salt and 70% cane molasses impregnated with soybean mill feed.

2. "Bloat Guard" provided by Smith Kline and French Laboratories, Philadelphia, Penn. "Bloat Guard" contains 53% poloxalene.

ate large amounts of grain which apparently added to the bloat problem. Further studies attempting to limit grain intake with salt are planned.

The information in table 15 also shows variation in bloat susceptibility among steers within a lot. Some steers appeared slightly bloated most of the time while others would bloat less often but more severely.

No steer died or was treated by a veterinarian but the steers not receiving poloxalene or "Bloat Guard" often bloated enough to cause concern from a practical standpoint.

Table 14
Description of Scale Used in Assigning Bloat Scores[1]

Score	Description
0	No bloat - No distention in left paralumbar fossa
1	Slight - Slight distention in left paralumbar fossa; "puffy"
2	Mild - Marked distention in left paralumbar fossa; well rounded out between hip and rib on left side; little or no distention on right side.
3	Moderate - well rounded out on left side, drumlike; full on right side; restless
4	Severe - Both sides badly distended; left hip nearly hidden; skin tight; defecation; urination; incoordination; protruding annus; mild respiratory distress
	Terminal - Extreme abdominal distention; severe respiratory distress; cyanosis; prostration; death unless treated

[1]Subjective scale for bloat evaluation as outlined by R. H. Johnson et al. 1958. J. Animal Sci. 17:894.

Table 15

Effectiveness of Poloxalene for Controlling Bloat in Steers Grazing Immature Alfalfa. August 17 to September 28, 1966 - 42 days.

Phase 1[1] (14 days)	Alfalfa plot											
	1					2				3		
Treatment	"Bloat Guard" in feed					Poloxalene block				Control		
Steer no.	1	2	3	4	5	6	7	8	9	10	11	12
Incidence of bloat[2]	0	0	0	0	2	3	3	1	0	12	12	8
Highest bloat score[3]	0	0	0	0	2	1	1	1	0	3+	3+	3
Av. bloat score[4]	0.0	0.0	0.0	0.0	1.5	1.0	1.0	1.0	1.0	1.4	2.3	1.6

Phase 2 (14 days)												
Treatment	Control				"Bloat Guard" in feed					Poloxalene block		
Steer no.	5	6	7	8	9	10	11	12	1	2	3	4
Incidence of bloat[2]	10	4	13	8	2	10	8	0	0	4	0	0
Highest bloat score[3]	3	2	3+	2	2	2	2	0	0	1	0	0
Av. bloat score[4]	1.6	1.3	1.5	1.6	1.5	1.4	1.4	0.0	0.0	1.0	0.0	0.0

Phase 3 (14 days)												
Treatment	Poloxalene block				Control					"Bloat Guard" in feed		
Steer no.	9	10	11	12	1	2	3	4	5	6	7	8
Incidence of bloat[2]	0	0	7	0	9	12	7	3	10	0	16	2
Highest bloat score[3]	0	0	10	0	2	2	2	2	3	0	3	1
Av. bloat score[4]	0.0	0.0	1.0	0.0	1.2	1.3	1.4	1.3	1.8	0.0	1.2	1

Av. for 3 phases			
Treatment	Control	Poloxalene block	"Bloat Guard" in feed
Incidence of bloat[1]	98	20	48
Highest bloat score[2]	3+	2	3
Av. bloat score[3]	1.38	0.54	0.69

1. Steers had been on treatments prior to phase 1.
2. Checked twice daily and counted twice daily.
3. Refer to table 14 for explanation.
4. Calculated by dividing number of times bloated into sum of bloat score for each phase.

The Effect on Artery Clamp for Dehorning Cattle (a preliminary study only)

C. L. Drake and C. W. Smith[1]

Forty horned yearling heifers owned and fed by a cooperating feeder were used. Allottment was by gate cut into four groups of 10 each. Each group was weighed before being dehorned. Treatments follow:

1. Control - not dehorned.
2. Dehorned using clamp; arteries pulled.
3. Dehorned without dehorning clamp; arteries pulled.
4. Dehorned without dehorning clamp; arteries not pulled. After one hour, bleeding from several animals was so severe that dehorning clamps were used and arteries were pulled.

All cattle were placed in one large lot and fed the same ration. The trial lasted 22 days.

Results

Weight gain results are in table 15. Cattle not dehorned gained the most; those dehorned using the clamp gained more than either lot dehorned without initially using a clamp.

The clamp stopped artery spurting and appeared to reduce pain as cattle remained quieter in the chute while being dehorned and showed less distress after being released.

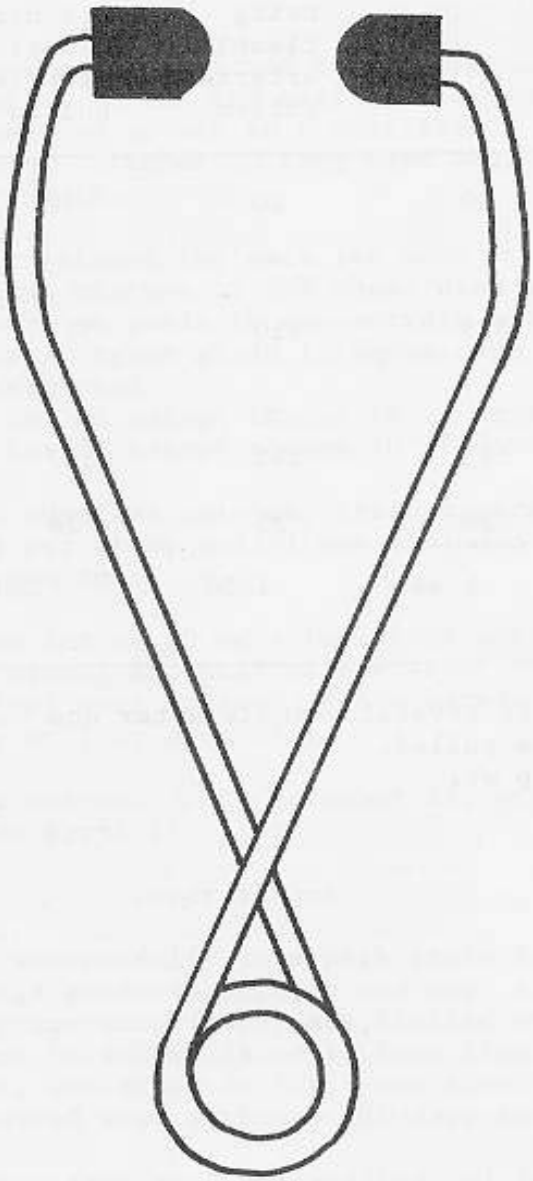
The clamp (pictured) has two blunted ends held together by spring tension. The blunted ends are pulled apart and placed just behind the temporal fossa and pulled forward into it, to help hold the clamp in place. This area is located below the horn and behind the ridge between the eye and horn. The cornual artery and nerve pass this are enroute to the horns. The clamp stops blood from spurting from the arteries when the horn is removed. The arteries are exposed and can be pulled easily.

Use of the clamp made it much easier to find the arteries and blood spurting was completely eliminated. Little time is required to apply the clamp but a close job of dehorning is necessary to adequately expose the arteries. Best results are usually obtained on thin yearling cattle.

More work will be required before definite conclusions can be drawn concerning use of such clamps.

[1]County Agricultural Agent, Winfield, Kansas

Figure 1



Artery Clamp

Table 16
Weight Gain of Heifers as Influenced by Use of an Artery Clamp in Dehorning

Treatment	Control	Dehorned using clamp; arteries pulled	Dehorned not using clamp; arteries pulled	Dehorned not using clamp or pulling arteries for 1 hour[1]
No. cattle	10	10	10	10
Av. beginning wt. lbs.[2] Jan. 5, 1967	529	510	541	530
Av. final wt. lbs.[2] Jan. 27, 1967	565	543	567	558
Total gain, lbs.	36	33	26	28
Av. daily gain	1.64	1.50	1.18	1.27

1. Bleeding was severe in several animals after one hour so the clamp was used and the arteries pulled.
2. Average of each group wt.

Time Required to Change Yearling Steers from Roughage to High Grain Ration; Using Stilbestrol as an Implant and In the Feed; Worming Yearling Steers

M. C. Hall, E. F. Smith and Sam Nelson

Sixty yearling steers were removed from bluestem pasture October 29, 1965 and trucked six miles to the KSU beef cattle research barn where they received prairie hay and had access to a self-feeder of 50% bran and 50% dry rolled sorghum grain. October 30 they were weighed and divided into three lots of 20 steers each.

The experimental treatment for each lot was:

Lot 21 - Change from mixture of 50% wheat bran and 50% dry rolled sorghum grain to concentrate mixture of 99% dry rolled sorghum grain in seven days with prairie hay unrestricted.

Lot 22 - Same as Lot 21 except change in 14 days.

Lot 23 - Same as Lot 21 except change in 21 days.

A supplement that supplied calcium, trace minerals, antibiotic, vitamin A and stilbestrol (10 mg per steer daily) was included in the concentrate mixture at 1 percent (20 lbs. per ton).

Ten steers in each lot of 20 were implanted with 15 mg. of stilbestrol. Half of the implanted steers and half of the steers not implanted in each lot (total of 10 per lot) were treated with a warming agent, thiabendazole, (3 grams per 100# body wt.) by drenching.

The test was from October 30 to November 19, after which all were fed together until marketed April 17, 1965.

Observations

All lots changed successfully to a high grain ration--in 6, 11 and 16 days. The 16-day change produced highest and most efficient gains. However, where roughage or roughage substitutes are limited or expensive, changing to a high grain ration may be accomplished in less time. No digestive difficulties were observed, however, one steer in the 6-day group and one steer in the 16-day group had foundered when marketed 170 days later.

Neither the worming treatment nor stilbestrol implants significantly effected gains.

	Wormed	Not wormed	Implanted with 15 mg. stilbestrol	Not implanted
No. of steers	30	30	30	30
Daily gain (170 days)	3.31	3.42	3.32	3.41

Table 17
Time Required to Change Cattle to High Grain Ration

Days to change from 50% bran, 50% dry rolled sorghum grain ration to 99% rolled sorghum grain, prairie hay unrestricted.	6	11	16
Lot number	21	22	23
No. steers per lot	20	20	20
Initial wt. per steer, lbs.	747	740	742
Performance first 20 days on test, October 30 to November 19, 1965			
Daily gain per steer, lbs.	4.5	4.1	5.2
Feed consumed per steer daily, lbs.			
concentrate mixture	22.	20.	22.
prairie hay	1.7	1.7	1.7
Daily gain, October 30 to April 17, 1965, 170 days total (Steers fed together after first 20 days).	3.3	3.3	3.5

Different Methods of Managing Bluestem Pasture, 1965 (Projects 253 3-5)

E. F. Smith, K. L. Anderson, C. E. Owensby and M. C. Hall

Studied are effects of different stocking rates, deferred grazing, and pasture burning on cattle performance, productivity of pastures, and range condition as determined by plant population changes. Included here are report and summary of cattle gains for the past 17 years.

Experimental Procedure

Yearling Hereford steers with an average U.S.D.A. feeder grade of choice were used in 1966. They were purchased in the spring near Cimarron, Kansas, where they had been grazed on wheat pasture and fed silage and limited grain. They were assigned to pastures on a random basis.

The experimental treatment for each pasture was:
Pasture 1 - Moderate stocking rate, 3.3 acres per steer.
Pasture 2 - Overstocked, 2.4 acres per steer.
Pasture 3 - Understock, 4.6 acres per steer.
Pastures 4, 5, 6 - Deferred grazing and burning, moderate stocking rate, 3.3 acres per steer. The steers were grazed on pastures 4 and 6 April 30 to July 2. They were then moved to pasture 5 where they remained until September 1. Then they grazed all three pastures until October 1, close of the trial. Deferred pasture 5 was burned April 29.
Pasture 9 - Burned March 21, 1966, moderate rate of stocking.
Pasture 10 - Burned April 15, 1966, moderate rate of stocking.
Pasture 11 - Burned April 29, 1966, moderate rate of stocking.

The steers were gathered in the afternoon, held overnight without feed or water and weighed at 8 a.m. Starting and final weights were obtained after putting all steers together and weighing them in random order. Each steer was implanted with 30 mg. of stilbestrol.

Observations

Results are reported in tables 18, 19, 20, and 21. Gain per steer under the various treatments ranged from 168 to 300 pounds. The burning treatments produced most gain per steer and overstocking the least gain. Total precipitation for the year was 15.5 inches, about half the average.

It was very dry for the early spring burning and the wind was 5 to 10 m.p.h. About 90 percent of the pasture burned, more than had burned for several years. The ground was moist and a 5 to 10 m.p.h. wind was blowing when the mid-spring burned pasture was burned, about 90% of it burned. Practically all of pasture 5 and 11 burned on the late spring burning date, April 29.

Table 18

A Comparison of Different Methods of Managing Bluestem Pastures, April 30, 1966, to October 1, 1966 - 154 days

Pasture no.	1	2	3	4,5,6	9	10	11
Management	Moderately stocked	Over-stocked	Under-stocked	Deferred and late spring burned	Early-spring	Mid-spring	Late-spring
Number of steers per pasture	18	25	13	54	13	13	13
Acres per pasture	60	60	60	3-60[1]	44	44	44
Acres per steer	3.3	2.4	4.6	3.3	3.4	3.4	3.4
Initial wt. per steer, lb.	522	518	533	520	513	510	523
Gain per steer, lb.	214	168	200	185	271	300	271
Daily gain per steer, lb.	1.39	1.09	1.30	1.20	1.76	1.95	1.76
Gain per acre, lb.	64.2	70.0	43.3	45.5	80.1	88.6	80.1

1. Three 60-acre pastures.

Table 19

Yearly Account of Summer Gains (Pounds per Steer) Under Different Methods of Grazing Pastures; 17-year Summary, 1950-66, Summer Season of Approximately 150 Days.

Pasture no.	1	2	3	4,5,6	9	10	11
Management	Moderately stocked	Over-stocked	Under-stocked	Deferred rotated	Early-spring burned	Mid-spring burned	Late-spring burned
Year							
1950	221	210	214	205	216	254	230
1951	242	256	290	234	243	265	254
1952	246	209	228	197	251	278	283
1953	226	194	233	197	205	217	234
1954	261	237	236	214	270	271	306
1955	270	224	253	213	282	305	307
1956	179	184	168	154	212	234	216
1957	243	236	244	209	261	256	279
1958	208	207	207	198	222	270	253
1959	252	241	262	203	254	275	295
1960	267	242	255	235	299	289	314
1961	255	217	227	187	243	245	237
1962	232	177	215	167[1]	201	205	212
1963	202	180	195	170[1]	187	200	233
1964	214	196	196	209[1]	225	231	218
1965	218	207	204	178[1]	236	231	258
1966	214	168	200	185[1]	271	300	271
Average	233	211	225	197[1]	240	255	259

1. The deferred pasture of these three pastures was burned in late spring in 1963, 1964, 1965, and 1966.

Table 20

Per Acre Production and Disappearance in Pounds of Forage, Weeds, and Mulch, Donaldson Pastures Near Manhattan, 1966. Yields Obtained From Replicated Clippings at Close of Growing Season.

Pasture no.	1	2	3	4,5,6	9	10	11
Production (lbs. per acre)							
Ordinary upland, range site							
Forage	3559	1291	3493	2581	1350	2130	1738
Weeds	73	381	108	107	281	161	57
Mulch	892	667	1491	551	----	----	----
Limestone breaks, range site							
Forage	2328	1767	3196	2195	1090	1311	1377
Weeds	198	244	104	71	178	139	48
Mulch	1070	531	1537	723	----	----	----
Disappearance (Index of amount grazed, lbs. per acre)							
Ordinary upland, range site							
Forage	1824	892	1123	1299	830	1348	828
Weeds	24	176	40	58	123	93	13
Mulch	----	183	302	----	----	----	----
Limestone breaks, range site							
Forage	806	1126	615	838	660	286	504
Weeds	73	79	29	21	----	104	18
Mulch	271	11	242	111	----	----	----
Remainder (Residue at end of season, lbs. per acre)							
Ordinary upland, range site							
Forage	1735	399	2370	1282	520	782	910
Weeds	49	205	68	49	157	68	44
Mulch	892	484	1189	551	----	----	----
Limestone breaks, range site							
Forage	1522	641	258	1357	430	1025	873
Weeds	125	165	75	50	178	35	30
Mulch	799	520	1295	612	----	----	----

Table 21
Range Condition[1] of Pastures

Pasture no.	1	2	3	4	5	6	9	10	11
	Percent 1								
Range condition (ordinary upland range site)	73.1	51.3	61.1	68.0	89.9	71.9	59.8	86.7	88.0
Range condition (limestone breaks range site)	86.5	67.5	87.3	83.8	88.8	95.9	80.0	97.6	96.9

1. 0 - 25% indicates poor condition; 25-50, fair; 50-75, good; 75-100, excellent.

Sorghum Grain as the Only Protein Source in an All-concentrate Steer Finishing Ration; Value of Oyster Shell in an All-concentrate Ration. (Project 253-6) 1966.

E. F. Smith, D. Richardson, C. L. Drake and B. E. Brent

The National Research Council (publication 1137) recommends 10% protein (90% dry matter) to finish yearling steers. Sorghum grain in Kansas usually contains about 9 to 11 percent protein, although it may vary considerably depending on the variety, soil, weather and other variables (samples have ranged from 6 to 17%). Research has shown that under certain conditions, all-concentrate rations may be practical. Since low protein roughage is not used, a 10 percent protein ration can, in many cases, be formulated from sorghum grain alone.

This experiment was to evaluate sorghum grain as the only protein source in an all concentrate yearling steer finishing ration.

Three treatments were compared with two lots of 10 steers per treatment. The three treatments were:

Sorghum grain as the only protein source.
Sorghum grain with 1% urea added.
Sorghum grain with 0.75% urea and 5% dehydrated alfalfa added.

One of the two lots of steers on each of the above treatments received 2.5 percent oyster shell (hen size) to determine its value as a roughage factor in an all-concentrate ration.

Except for the above variables all rations were formulated to be nutritionally adequate and as nearly equal as possible.

A supplement containing trace minerals, stilbestrol, vitamin A, antibiotic and other ration ingredients was mixed with the dry rolled sorghum grain; the complete ration was fed in a self-feeder.

All sorghum grain used the first half of the trial was from one source and tested 10.2% protein, the remainder, of unknown origin, was from a local elevator. The protein content of each ton of feed mixed was determined (table 22).

Steers were started on a self-feeder with a mixture of 40% bran and 60% dry rolled sorghum grain with all the prairie hay they would consume before the test. Bran and prairie hay were gradually eliminated over 20 days. The experiment started after the steers were on an all sorghum grain ration.

Results by lots are reported in table 22.

Average performance for the two lots on each treatment was as follows:

	Sorghum grain only	Sorghum grain and urea	Sorghum grain, urea and dehydrated alfalfa
Daily gain, lbs.	2.93	2.95	2.80
Daily feed intake	20.8	21.3	21.0
Feed per lb. of gain	7.1	7.2	7.5
Feed cost/100 lbs., gain	$14.59	15.16	16.20

Sorghum grain was satisfactory as the only protein source for yearling steers when average protein content of the ration was between 9.5 and 9.8 percent protein (88% dry matter).

Average performance for the three lots on oyster shell compared with three lots not receiving oyster shell follows:

	Fed 2.5% oyster shell	No oyster shell fed
Daily gain, lbs.	2.78	3.01
Daily feed intake	20.2	21.9
Feed per lb. of gain	7.3	7.3
Feed cost per 100 lbs. gain	$15.24	15.39

Oyster shell was of no benefit in this trial; feed costs and feed per lb. of gain were about the same with slightly less gain and finish with oyster shell.

Table 22

Sorghum Grain as the Only Protein Source in a Steer Finishing Ration; Value of Oyster Shell in an All-concentrate Ration. June 21 to October 8, 1966 - 109 days

Protein source	Sorghum grain only		Sorghum grain and urea		Sorghum grain, urea dehydrated alfalfa	
Fed 2.5% oyster shell	No	Yes	No	Yes	No	Yes
Lot number	18	19	20	21	22	23
No. of steers per lot	10	10	10	10	10	10
Av. initial wt. lbs.	741	749	748	735	730	759
Av. daily gain, lbs.	3.02	2.83	3.01	2.89	2.99	2.61
Av. daily feed intake, lbs.	21.1	20.5	21.7	20.9	22.9	19.3
Feed per lb. of gain, lbs.	7.0	7.2	7.2	7.2	7.7	7.4
Feed cost per cwt. of gain[5], $	14.42	14.76	15.19	15.12	16.56	15.84
Carcass data:						
Av. carcass wt.	650	644	657	637	641	626
Dressing percent	63.3	63.4	63.6	63.2	63.2	62.5
Carcass grade[1]	19	20	19	19	19	19
Marbling score[2]	6	6	6	7	6	7
Rib eye area, sq. in.	12.10	12.17	12.00	12.05	12.44	12.04
Fat thickness, inches	.6	.5	.6	.5	.6	.5
Yield grade[3]	3	3	3	3	3	3
Composition of self fed concentrate mixture, %:						
Dry rolled sorghum grain	97.5	95.0	97.5	95.0	92.5	90.0
Oyster shell		2.5		2.5		2.5
Dehydrated alfalfa					5.0	5.0
Supplement	2.5	2.5	2.5	2.5	2.5	2.5
Composition of supplement, %.						
Trace mineral premix[4]	2.0	2.0	2.0	2.0	2.0	2.0
Stilbestrol premix (1 gm/lb.)	2.0	2.0	2.0	2.0	2.0	2.0
Vitamin A premix (10,000 IU/gm)	.6	.6	.6	.6	.6	.6
Chlortetracycline premix (10 gms./lb.)	1.4	1.4	1.4	1.4	1.4	1.4
Ground limestone	30.0	30.0	30.0	30.0	20.0	20.0
Urea, 42 percent nitrogen			40.0	40.0	30.0	30.0
Dry rolled sorghum grain	64.0	64.0	24.0	24.0	44.0	44.0
% protein in concentrate mixture (88% dry matter basis)	9.81	9.49	11.14	10.77	11.39	10.89
Cost, concentrate mixture/ton	$41.24	41.04	42.24	42.04	43.07	42.87

1. Carcass grade score: Low choice, 19; Average choice, 20.
2. Marbling score: Lower score indicates greater degree of marbling.
3. Yield grade: Ranges from 1 to 5, 1 is most desirable.
4. Percent element in trace mineral premix: Manganese - 4.4; iron - 6.6; copper - 1.3; Cobalt - .2; Iodine - .3; Zinc - 12; Magnesium - 20; Sulfur - 2.7.
5. Cost of ingredient prices are on inside back cover.

Improving Beef Cattle Through Breeding (Project 286)

W. H. Smith and Robert Schalles

The purebred Shorthorn cattle breeding project was continued during 1966 according to the original breeding program. Two inbred lines were established in 1949. The Wernacre Premier line is now in the fifth generation of inbreeding and the Mercury line, in the third generation.

Inheritance of production traits in beef cattle are studied to evaluate effects of inbreeding and to explore the feasibility of using inbred lines to improve production traits of beef cattle.

Because the generation interval for beef cattle is long, progress with increasing levels of inbreeding is slow. Amount of inbreeding now achieved in both lines exceed one-half that aimed for in the study.

Preliminary summaries and analyses of production data taken on cattle produced in this project have been reported previously. Though still inconclusive, complete summaries and analyses for all preweaning and postweaning production data collected to date have been summarized and will be analyzed this year. With relatively low inbreeding prevailing in the two lines, no extensive line crossing has yet been attempted.

The weight of each calf and each cow is taken immediately after calving. Calves are born in the spring; creep feeding is not practiced. All calves are weaned, weighed and scored for type at approximately six months old. Soon after being weaned, they are placed on 182-day individual feeding trials for record-of-performance tests. Individual weight gain and feed consumption records are maintained. Yearling weights and type scores are taken when the feeding trials end.

The full-feed ration bulls consist of 75% cracked corn and 25% chopped alfalfa hay; that for the heifers, 55% cracked corn and 45% chopped alfalfa hay.

Production data for the 1965 calves are summarized in table 23.

Table 23 1965 Shorthorn Calves

Tattoo	Coefficient inbreed	Birth wt.	Wean wt.	Wean Score	Days fed	Initial wt.	Final wt.	Total gain	Average daily gain	Final score	TDN per cwt gain
					Wernacre Premier Line						
					Bulls						
508	33.05	72	448	3+	182	456	920	464	2.51	3+	428
502	29.81	81	406	3	182	447	925	478	2.63	2-	554
516	34.05	91	417	2-	182	435	935	500	2.75	3	422
523	33.48	67	323	2-	182	345	775	430	2.36	3+	358
504	27.35	76	443	2-	182	450	840	390	2.14	3-	432
509	34.05	67	395	3+	182	410	825	415	2.28	3+	533
511	33.05	76	405	2-	182	420	890	470	2.58	3	442
521	28.27	78	365	2-	182	382	890	508	2.79	2-	385
Av.	31.64	76	400	2-	--	418	875	457	2.51	3+	444
					Heifers						
517	33.89	55	275	3	182	285	620	335	1.84	3+	526
522	34.05	70	370	1	182	394	740	346	1.90	2+	511
524	33.05	66	330	3+	182	345	695	350	1.92	2+	416
Av.	33.66	64	325	2-	--	341	685	344	1.89	2	484
					Mercury Line						
					Bulls						
506	7.18	62	370	1	182	385	804	419	2.30	2+	480
531	20.30	64	350	1	182	385	825	440	2.42	2-	420
530	18.75	67	338	1-	182	365	782	417	2.29	2	457
51	16.24	72	392	1-	182	430	900	470	2.58	2+	469
547	20.05	70	385	1-	182	420	900	480	2.64	2	456
513	15.50	73	352	2	182	360	855	495	2.72	1-	435
54	20.50	72	435	2+	182	421	910	489	2.69	2	445
503	14.69	77	360	1-	182	370	812	442	2.43	2+	485
501	10.05	62	375	2	182	415	850	435	2.39	2-	541
515	12.50	69	416	1	182	436	830	394	2.16	3+	525
Av.	15.58	69	377	1-	--	399	847	448	2.46	2	471
					Heifers						
519	20.50	56	290	2	182	320	630	310	1.70	2	626
512	16.50	68	365	1	182	350	650	300	1.65	2-	567
56	18.75	63	280	2	182	270	620	350	1.92	2-	489
514	22.75	57	326	1-	182	335	715	380	2.09	2+	603
505	7.25	68	331	2	182	334	691	357	1.96	2	484
52	18.75	69	413	1-	182	410	740	330	1.81	1-	541
534	14.35	67	337	2+	182	345	725	380	2.09	2-	528
507	15.50	52	295	2-	182	310	655	345	1.90	2-	546
510	19.75	51	330	2+	182	340	680	340	1.87	2+	502
528	16.75	78	262	2-	182	285	607	322	1.77	3+	567
Av.	17.09	63	323	2+	--	330	671	341	1.87	2-	545

Changes in Beef Carcass Composition with Changes in Animal Weight and Finish (Project 639)

H. J. Tuma, D. H. Kropf, S. P. Kolstad and D. L. Mackintosh

Information on animal growth and development, although complex and not fully understood, is necessary to determine the stage at which a beef animal will produce the most desirable carcass. True growth involves an increase in the structural tissues (muscle, bone and organs) and should be distinquished from increases by fat deposition. Optimum time to slaughter animals is when muscle growth and quality are at their most desirable combination .

Procedure

Sixty-four half-sib Angus steers were placed on full feed immediately after weaning, then groups of eight were slaughtered periodically from 0 to 224 days later. Table 24 shows all slaughter and carcass data. The trial ended with the last two groups of animals grading choice at live weights of 785 and 835 pounds each. The yield grade (cutability) indicates the percent of boneless, closely trimmed retail cuts from the wholesale round, loin, rib and chuck from the beef carcass.

Skeletal, organ and muscle weights and muscle areas were obtained as measures of animal growth. Ether extract (fat) within the muscle was determined as a measure of quality. Ether extract indicates the amount of marbling found in a beef carcass; hence, it should correlate with grade and eating characteristics.

Results and Discussion

Bone circumference, length and weight data in table 25 are all indicators of skeletal growth. The general pattern for all of these traits is to increase or growth up to group 7, then to level off. Undoubtedly, there would have been additional skeletal growth, at a very decreased rate. The kidney, heart, liver and hide all show growth patterns similar to skeletal component growth. Leveling-off of skeletal and organ growth at about 700 pounds appears early but it is well recognized that animals vary greatly in maturity.

Meat animals are bred and fed for the quantity of consumer-acceptable muscle they produce. Table 26 shows weight changes in some of the larger, more economically important muscles in the beef carcass. The three muscles of the round increased to group 7, then changed very little, the same pattern established by skeletal and organ components. The longissimus dorsi increased considerably during the last feeding period, again indicating that growth was not complete for that one muscle. Muscle cross sectional area growth patterns paralleled muscle weights.

The ether extract or fat within muscles, as shown in table 27, gave anticipated results, that is, as skeletal and muscle growth tended to slow

down, fat deposition within the muscle rapidly increased. Total fat deposition includes intramuscular or marbling fat and also subcutaneous, intermuscular and internal fats. All four of these fats are being deposited during growth of other carcass components. The rate of which each grows and develops is all that changes. The edible portion of the carcass decreases with fat deposition, as shown in table 1, which indicates that fat deposition occurs throughout the animal's growth.

Optimum slaughter time for this group of animals would have been after 196 days of feed and at 785 pounds. Muscle growth was at a maximum and carcasses graded choice. Animals of different genetic background, feeding, management and rate of maturity would be expected to react differently.

Table 24

Slaughter and Carcass Data For Animals Differing in Weight and Finish

Group	Days in feedlot	Av. daily gain lbs.	Slaughter age, days	Slaughter weight lbs.	Carcass weight lbs.	Carcass quality, grade	Yield[1] grade cutability	Carcass %[2]
1	0	0	240	351	188	Good	2.25	51.7
2	56	2.35	296	447	255	Good	2.28	51.6
3	84	2.42	324	493	298	Good	2.35	51.4
4	112	2.28	352	525	328	Good	3.02	50.0
5	140	2.37	380	631	391	Good	3.24	49.5
6	168	2.38	408	682	431	Good	3.12	49.8
7	196	2.50	436	785	488	Choice	3.70	48.4
8	224	2.32	464	835	522	Choice	3.84	48.1

1. Cutability score of the carcasses was determined on the basis of this U.S.D.A. equation: Cutability score = 2.50 + (2.50 X adjusted fat thickness, in.) + (0.20 X percent kidney, pelvic and heart fat) + (0.0038 X hot carcass weight, pounds) - (0.32 X area ribeye, sq. in.)

2. Estimated percent of carcass weight in boneless, closely trimmed retail cuts from the round, loin, rib and chuck.

Table 25

Skeletal Changes in the Beef Animal With Advancing Weight and Finish

Group	Cannon bone, circum. in.	Lenght of carcass, in.	Lenght hind leg, in.	Fore shank bone lb.	Total bone lb.
1	-	35.00	22.19	2.06	--
2	6.00	37.14	23.05	2.24	21.30
3	6.14	38.91	23.41	2.43	23.34
4	6.09	39.20	24.63	2.64	25.54
5	6.49	41.09	24.99	2.90	29.53
6	6.54	41.61	25.73	3.10	30.70
7	6.73	43.06	26.19	3.14	32.69
8	6.71	43.16	26.38	3.13	31.89

Table 26

Muscle Weight Changes in Animal Weight and Finish (All Weights in Pounds)

Group	Round muscles			(Loin muscle)
	Semimembranosus	Semitendinosus	Biceps femoris	Longissimus dorsi
1	3.15	1.40	2.85	3.03
2	3.95	1.88	3.83	4.05
3	4.60	2.20	4.35	4.95
4	4.61	2.36	4.26	4.51
5	5.09	2.53	4.41	5.46
6	5.95	2.86	5.03	5.96
7	6.20	2.93	5.53	6.43
8	5.94	2.99	5.50	6.85

Table 27

Ether Extract (Fat) Changes With Changes in Animal Weight and Finish (Percent Ether Extract on Dry Tissue Basis).

	Round muscles		Loin muscle		Chuck muscles	
Group	Semi-membranosus	Semi-tendinosus	Biceps femoris	Longissimus dorsi	Triceps brachei	Infra spinatus
1	5.75	6.81	5.82	5.60	5.25	6.80
2	5.77	7.00	6.55	6.80	6.93	11.92
3	6.70	7.57	7.27	7.90	7.97	11.22
4	7.67	8.68	9.22	11.50	10.73	18.14
5	9.45	10.13	10.72	13.35	11.79	19.66
6	8.95	9.62	9.77	13.80	10.92	21.30
7	13.00	12.62	14.14	20.10	15.48	27.41
8	16.10	17.25	18.31	23.95	17.50	29.80

Comparison of Ram, Wether and Ewe Market Lamb Slaughter and Carcass Characteristics (3 year preliminary report)

D. H. Kropf, C. S. Menzies, Dorothy L. Harrison and Lois Anderson

Lambs used were sired by Hampshire rams the first two years; by Hampshire, Suffolk, Southdown, Dorset, and Rambouillet rams the third year. All lambs were from western ewes and were individually slaughtered as they reached 95 lbs. Carcasses were graded and chilled carcass weights were obtained after a 48-hour chill. Fat thickness measurements were taken over the loin eye muscle at the 1/4, 1/2, and 3/4 points and loin eye cross-sectional area was determined.

Kidney and pelvic fat were removed and weighed. The wholesale leg and loin were trimmed to a fat thickness of approximately 1/4 inches.

Rams had heavier pelt weights than wethers or ewes. Rams also had lower warm and chilled carcass weights and consequently lower dressing percentages. Rams had lower carcass grades; whereas, wethers and ewes graded similarly. However, ram carcasses graded only 1/3 grade lower than ewe carcasses. In terms of fat thickness over the loin eye and pounds of kidney and pelvic fat, ewe carcasses were fattest, wethers were intermediate and rams carried the least finish. No sex difference was found in carcass cooler shrink, rib eye area or pounds trimmed leg plus loin.

*Contribution No. 214, Department of Foods and Nutrition, Kansas State University.

Table 28
Comparison of Ram, Wether and Ewe Market Lamb
Slaughter and Carcass Characteristics

	Group averages[1]		
	Ram	Wether	Ewe
Number of animals	58	48	113
Slaughter wt., lbs.	89.8	88.6	87.7
Pelt wt., lbs.	10.6	9.4	9.2
Hot dressed carcass wt., lbs.	47.9	49.7	50.2
Cold dressed carcass wt., lbs.	47.8	48.5	49.1
Cooler shrink, lbs.	1.1	1.2	1.1
Hot dressing, %	53.4	56.0	56.1
U.S.D.A. carcass grade[2]	8.5	9.1	9.4
Rib eye area, sq. in.	2.26	2.28	2.17
Fat thickness over loin eye[3]	0.15	0.25	0.22
Trimmed leg + loin, lbs.	18.9	19.3	18.8
Kidney & pelvic fat, lbs.	0.7	1.1	1.5

1. Lot averages underlined with same line are not significantly different at 5% level of probability.
2. U.S.D.A. Carcass Grade - Av. Prime = 10, Low Prime = 9, High Choice = 8.
3. Fat Thickness - average of 6 measurements.

Lamb Feeding Experiments, Garden City, 1966-67

C. S. Menzies, K.S.U., and A. B. Erhart, Garden City

Lambs and Pretest Treatment

Lambs used were finewool wethers purchased from Phelps White, Roswell, New Mexico. Average purchase weight of 648 head was 75.8 lbs.; cost was $23.50 per cwt. Lambs were trucked to Garden City, arriving October 25. They sheared an average of 4.6 lbs. wool each October 27 and 28. Alfalfa hay and field chopped corn and sorghum forages were fed until lambs went on test. Total cost of lambs on test (initial cost, trucking, feed cost, and shearing charges minus estimated wool value) was $22.30 per cwt.

Experimental Procedure

November 18, 1966, lambs were randomly divided into 12 lots of 50 lambs each and started on these treatments:

Lot No.	Treatment	How fed
1	Sorghum silage, whole sorghum grain, .75 lb. alfalfa hay, and .10 lb. C.S.M. (cottonseed meal)	hand
2	Corn silage, whole sorghum grain, .75 lb. alfalfa hay, and .10 lb. C.S.M.	hand
3.	Pelleted dehydrated sorghum grain, whole sorghum grain, .75 lb. alfalfa hay, and .10 lb. C.S.M.	hand
4	Pelleted dehydrated corn silage, whole sorghum grain, .75 lb. alfalfa hay and .10 lb. C.S.M.	hand
5	Mixture of 25% whole sorghum grain 10% dehydrated alfalfa pellets and 65% dehydrated sorghum silage pellets	self
6	Mixture of 25% whole sorghum grain, 10% dehydrated alfalfa pellets and 65% dehydrated corn silage pellets	self
7	Mixture of 90% dehydrated sorghum silage pellets and 10% dehydrated alfalfa pellets. Changed 1-3-67 to 35% whole sorghum grain, 10% dehydrated alfalfa pellets and 55% dehydrated corn silage pellets.	self

8	Mixture of 90% dehydrated corn silage pellets and 15% dehydrated alfalfa pellets. Changed 1-3-67 to 35% whole sorghum grain, 10% dehydrated alfalfa pellets and 55% dehydrated corn silage pellets. Drenched with Teniatol on 1-5-67.	self
9	All-concentrate rations of 98% rolled sorghum grain, 1% ground limestone, 1% trace mineralized salt, and vitamin A (1,000,000 I.U./ton).	self
10	All-concentrate ration plus 50 gms. terramycin per ton.	self
11	All-concentrate ration plus 100 gms. terramycin per ton.	self
12	Alfalfa pasture.	self

All lambs were implanted with a 3 mg. stilbestrol each. Approximately half in each lot were vaccinated for enterotoxemia by Dr. J. E. Dale with Clostridium perfringens Type D Baceterin (Corvel Laboratories) November 8 and revaccinated November 22. Half the lambs vaccinated and half those not vaccinated were drenched with 1 oz. of thibenzole November 18. Fecal samples, taken before lambs were placed on test, indicated infestations of these internal parasites; Haemonchus, Nematodirus, Marshallagia, Strongyloides, and 3 parasite infestation. The original owner indicated they had not been previously treated for internal parasites.

Handfed lots (1,2,3,4) were started at a low level of grain and gradually increased to about 1.5 lbs. per head daily by the end of 3 weeks. Silage or silage pellets from the same silage were adjusted to appetite. Alfalfa hay and cottonseed meal were fed at constant levels.

Lots 5 and 6 were started and kept on their 25% sorghum grain, 10% dehydrated alfalfa pellets, and 65% silage pellets mixture throughout the test.

Lots 7 and 8 started the experiment on mixed rations of 90% silage pellets (corn or sorghum) and 10% dehydrated alfalfa pellets. They became unthrifty and lost weight, even though they were consuming about 3.5 lbs. of feed per head daily. January 3, (after 46 days on test) they were changed to a uniform mixed ration consisting 25% whole sorghum grain, 65% dehydrated corn silage pellets and 10% dehydrated alfalfa pellets. After one week this was changed to a 35%-55%-10% mix. Since many lambs examined post mortem had been infested with fringed tapeworms, lambs in lot 8 were drenched with Teniatol January 5.

A mixture of 50% wheat bran and 50% concentrate mix was used when lambs in lot 9, 10, and 11 were placed on feed. The wheat bran was grad-

ually removed over a 30-day period. They were fed hay the first 14 days. No roughage was fed the last 40 days of the test. The grain sorghum used tested 10.75% crude protein.

The 50 lambs in lot 12 had access to about 60 acres (in 3 different fields) of alfalfa pasture. About half was new seeding with a fall growth of approximately 4 inches. The remainder was alfalfa from which the fifth cutting had been removed in September. Alfalfa hay was fed 3 days when snow cover reduced grazing. Thirty pounds of sorghum grain per lot was fed daily for the last 15 days on test.

Because of heavy death losses from urinary calculi, ammonium chloride was added January 11 to the rations fed lots 1, 2, 3, 4, 9, 10 and 11. One half pound ammonium chloride was mixed with the cottonseed meal for lots 1, 2, 3, and 4 at evening feeding. Since that seemed to lower palatability, one fourth pound was mixed with the meal and fed both morning and evening. Four pounds ammonium chloride was added to 600 lbs. of feed fed lots 9, 10 and 11. That amounted to about 1/2 of 1% and supplied about 1/4 oz. per lamb per day.

A total of 365 of the heavier and fatter lambs was sold at St. Joseph, Mo., February 13. The number of livers condemned due to fringed tapeworms and abscesses was recorded along with grades.

Table 29

Feed, Prices, Processing Charges, and Miscellaneous Costs for Tests:

	per ton
Sorghum grain	$ 40.00
41% Cottonseed meal	74.00
Salt	22.00
Trace mineral mix (Co-op No. 1)	$ 76.00
Limestone	20.00
Wheat bran	58.00
Alfalfa hay	$ 25.00
Dehydrated alfalfa pellets	43.00
Sorghum silage	6.50
Corn silage	$ 7.00
Dehydrated sorghum silage pellets	40.00
Dehydrated corn silage pellets	41.50
Concentrate mix, no terramycin	$ 45.23
Concentrate mix + 50 gms. terramycin	49.23
Concentrate mix + 100 gms. terramycin	53.23
Chopping hay	$ 2.00
Grinding and mixing	5.00
	per pound
Vitamin A (30,000 I.U./gm)	$ 1.00
T.M. 10 - (10 gms. Terramycin/lb.)	.80
	per lamb
Alfalfa pasture	.50/month
Enterotoxemia vaccination	.13
Thibenzole drench	.20
3 mg. stilbestrol implant	.10

Table 30

Value of Dehydrated Corn and Sorghum Silage
in Hand-fed Lamb Rations

November 18, 1966, to February 19, 1967 -- 84 days

Lot no.	1	2	3	4
Treatment	Sorghum silage	Corn silage	Dehydrated sorghum silage	Dehydrated corn silage
No. lambs	46	45	44	41
Av. initial wt., lbs.	78.0	77.7	77.7	78.3
Av. final wt., lbs.	109.3	117.3	110.5	111.9
Av. total gain, lbs.	31.3	39.6	32.8	33.6
Av. daily gain, lbs.	.37	.47	.39	.40
Daily feed/lamb, lbs.				
Sorghum grain	1.32	1.32	1.32	1.32
Silage	4.42	5.04		
Dehy. silage pellets			1.81	1.53
Alfalfa hay	.72	.72	.72	.72
41% C.S.M.	.10	.10	.10	.10
Salt	.018	.020	.017	.016
Total est. D.M. basis[1]	3.16	3.33	3.64	3.35
Feed/cwt. gain, lbs.				
Sorghum grain	356.8	280.8	338.5	330.0
Silage	1194.6	1072.3		
Dehy. silage pellets			464.1	382.5
Alfalfa hay	194.6	153.2	184.6	180.0
41% C.S.M.	27.0	21.3	25.6	25.0
Salt	4.9	4.2	4.4	4.0
Total est. D.M. basis[1]	854.0	708.5	933.3	837.5
Av. feed cost/ cwt. gain	14.70	12.27	19.54	17.94
Av. feed cost/lamb	4.60	4.86	6.41	6.03
Av. cost/lamb on test[2]	17.49	17.43	17.43	17.56
Av. total cost/lamb[2]	22.09	22.29	23.84	23.59
Av. total cost/cwt.[2]	20.21	19.00	21.57	21.08
Enterotoxemia deaths	4	5	3	3
Urinary calculi deaths	0	0	3	5

[1]Based on actual dry matter content of grain, silage and silage pellets and Morrison's value for other ingredients.
[2]Includes cost of stilbestrol implants at 10¢ each, but does not include cost of enterotoxemia vaccination, drench or death losses.

Table 31

Value of Dehydrated Sorghum and Corn Silage Pellets in Self-fed Lamb Rations

November 18, 1966, to February 10, 1967 - 84 days

Lot no.	5	6	7	8
Treatment	Mix: 25% sorghum grain, 10% dehy. alf. pellets, 65% dehy. sorghum silage pellets	Mix: 25% sorghum grain, 10% dehy. alf. pellets, 65% dehy. corn silage pellets	Mix:[1] 90% dehydrated sorghum silage pellets and 10% dehy. alf. pellets	Mix:[1] 90% dehydrated corn silage pellets and 10% dehy. alf. pellets
No. lambs	46	42	45	46
Av. initial wt., lbs.	76.8	78.4	77.2	79.3
Av. final wt., lbs.	96.2	103.4	91.8	96.4
Av. total gain, lbs.	19.4	25.0	14.6	17.1
Av. daily gain, lbs.	.23	.30	.17	.20
Daily feed/lamb, lbs.				
mixed ration	3.76	3.27	3.48	3.21
salt	.032	.033	.024	.028
Feed/cwt. gain, lbs.				
mixed ration	1634.8	1090.0	2047.0	1605.0
salt	13.9	11.0	14.1	14.0
Av. feed cost/ cwt. gain	$ 33.09	$ 22.62	$ 41.35	$ 33.27
Av. feed cost/ lamb	$ 6.42	$ 5.66	$ 6.04	$ 5.69
Av. cost/lamb on test[2]	$ 17.23	$ 17.58	$ 17.32	$ 17.78
Av. total cost/ lamb[2]	$ 23.65	$ 23.24	$ 23.36	$ 23.47
Av. total cost/ cwt.[2]	$ 24.58	$ 22.48	$ 25.45	$ 24.35
Enterotoxemia deaths	1	3	4	1
Urinary calculi deaths	1	5	0	1

[1]Ration changed to 35% whole sorghum grain, 65% dehydrated sorghum silage pellets and 10% dehydrated alfalfa pellets after 46 days on test. Lambs in lot 8 drenched with Teniatol after 48 days on test.

[2]Includes cost of stilbestrol implants at 10¢, but does not include cost of enterotexemia vaccination, drench, or death losses.

Table 32

Value of Terramycin in an All-concentrate Ration and Alfalfa Pasture for Lambs

November 18, 1966, to February 10, 1967 -- 84 days

Lot no.	9	10	11	12
Treatment	No terramycin	50 grams terramycin per ton	100 grams terramycin per ton	Alfalfa pasture
No. lambs	37	45	43	49
Av. initial wt., lbs.	79.5	78.9	79.2	79.6
Av. final wt., lbs.	116.2	114.0	117.0	115.4
Av. total gain, lbs.	36.7	35.1	37.8	35.8
Av. daily gain, lbs.	.44	.42	.45	.43
Daily feed/lamb, lbs.				
Concentrate mix	2.58	2.49	2.68	
Wheat bran[1]	.81	.72	.74	
Hay[1]	1.07	1.07	1.07	1.25
Sorghum grain[1]				.61
Salt	.014	.014	.014	
Feed/cwt. gain, lbs.				
Concentrate mix	586.4	592.8	595.6	
Wheat bran	65.5	61.5	58.7	
Hay	128.3	134.1	124.6	
Sorghum grain				
Salt	3.2	3.3	3.1	
Total	783.4	791.7	782.0	
Av. feed cost/cwt. gain	$16.79	$18.08	$19.14	$ 5.84
Av. feed cost/lamb	$ 6.16	$ 6.35	$ 7.23	$ 1.63
Av. cost/lamb on test[2]	$17.83	$17.69	$17.76	$17.85
Av. total cost/lamb[2]	$23.99	$24.04	$24.99	$19.48
Av. total cost/cwt.[2]	$20.64	$21.09	$21.36	$16.88
Enterotoxemia deaths	8	2	5	1
Urinary calculi deaths	3	3	2	0

[1]Feed consumed per day is for period fed and not for entire test (lots 9, 10, and 11: wheat bran - 30 days, hay - 44 days, lot 12: hay - 3 days and grain - 15 days.

[2]Includes cost of stilbestrol implants at 10¢, but does not include cost of enterotoxemia vaccination, drench or death losses.

Table 33

Effect of Enterotoxemia Vaccination
and Drenching on Gains and Death Losses

Treatment[1]	Drenched	Not drenched	Vaccinated	Not vaccinated	Total
No. lambs	314	286	295	305	600
Av. daily gain, lbs.	.361	.347	.352	.358	
No. died during test					
Enterotoxemia	21	19	5	35	40
Urinary calculi	10	13	13	10	23
Pneumonia	0	3	0	3	3
Bloat	0	1	0	1	1
Other or undetermined	2	2	1	3	4
Total	33	38	19	52	71

[1]Approximately one-half the lambs in each lot were drenched with thibenzole and vaccinated for enterotoxemia (1/4 drenched, 1/4 vaccinated, 1/4 both vaccinated and drenched, and 1/4 not treated.)

Table 34

Proximate Analyses of Feeds
Used in Tests on as-fed Basis:

	% Dry matter	% Crude protein	% Ether extract	% Crude fiber	% Ash
Sorghum grain	86.84	10.75	2.75	1.55	1.47
Dehydrated alfalfa	93.65	19.11	3.65	22.23	11.29
Sorghum silage	28.20	2.07	0.52	7.47	2.76
Dehydrated sorghum silage	95.70	4.69	1.49	21.58	11.77
Corn silage	28.20	2.24	0.75	6.36	1.91
Dehydrated corn silage	93.90	7.13	2.63	19.67	8.21

Observations

Corn silage was more palatable than sorghum silage and produced more efficient, faster, and cheaper gains. Dehydrating and pelleting sorghum silage increased feed consumption (dry matter basis) but only slightly improved gains. Dehydrating and pelleting corn silage did not affect consumption but resulted in slower, less efficient gains. Cost involved in dehydrating and pelleting resulted in expensive gains.

Dehydrated corn silage pellets produced faster, more efficient gains than dehydrated sorghum silage pellets when used in a self-fed, mixed ration. Both rations produced slower gains than expected, probably because both were slightly deficient in protein. The dehydrated sorghum silage ration fed lot 5 contained 7.65% crude protein and the lot fed dehydrated corn silage ration (lot 6) contained 9.23% crude protein. Proximate analyses showed that dehydrated sorghum silage pellets contained 2.44% less crude protein (dry matter basis) than the same sorghum silage not dehydrated. Dehydrated corn and corn silage not dehydrated tested about the same. Repeat samplings gave similar results.

Lambs fed the 90% dehydrated sorghum or corn silage and 10% dehydrated alfalfa rations (lots 7 and 8) lost an average of 9.6 and 2.4 lbs., respectively, during the first 46 days on feed, even though they consumed about 3.5 lbs. feed per day. (These rations were both low in protein only 6.13% and 8.33% crude protein, respectively). The lambs made good gains after being placed on a ration of 35% sorghum grain, 55% dehydrated corn silage pellets and 10% dehydrated alfalfa pellets.

The all-concentrate rations fed to lots 9, 10, and 11 produced fast and efficient gains. Cost per cwt. gain was somewhat higher than for hand-fed silage rations. The results indicate that lambs can be successfully fattened on an all-concentrate ration, even without additional protein supplement, if the grain used supplies adequate protein. Adding terramycin did not improve efficiency or rate of gain, however, it helped prevent enterotoxemia in unvaccinated lambs. No livers were condemned in any of the three lots because of abscesses, however, rumens from these lambs contained areas where rumen papillae were clumped, dark, and were becoming encrusted.

Lambs marketed February 13 from these 3 lots had an average in-transit shrink from Garden City to St. Joseph (approximately 400 miles) of 3.76% compared with 4.35% for lambs from other lots. The average dressing percentage for the all-concentrate lambs was 50.9% compared with 47.7% for lambs from the other lots. Carcasses from the lambs fed all-concentrate rations also graded about 1/3 U.S.D.A. grade higher.

Alfalfa pasture produced gains equally as rapid and considerably cheaper than dry lot rations. Obviously very little labor is required in caring for lambs on pasture.

Treatment for internal parasites did not improve rate of gain among the 1966-67 lambs.

Vaccination for enterotoxemia did not improve gains, but it dramatically reduced death losses from the disease (see table 4). Only 5 of 40 lambs that died from enterotoxemia had been vaccinated.

Twenty-six of the 40 lambs that died from enterotoxemia (post mortem examination) during the test had infestations of fringed tapeworms. However, only 8.4% of the livers of the 265 lambs marketed February 13 were condemned because of fringed tapeworm infestation. Three of 43 lambs (about 7%) slaughtered from lot 8, drenched with Teniatol, had fringed tapeworms.

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Investigations of Milk-fat Lamb Production Practices for Western Kansas, Colby.

Results of 1965-66 Creep-feeding Tests, 1966 Ewe Flushing Tests and Progress of Accelerated Lambing Flock, 1967 Report[1].

C. S. Menzies, Animal Husbandry Department, Kansas State University
Evans Banbury, Superintendent, Colby Branch Station
Clifford W. Spaeth, Livestock Project Leader, Colby Branch Station

Experimental Sheep

A flock of approximately 450 commercial finewool ewes is maintained at the Colby Branch Experiment Station. Ewes are purchased in early spring in Southwest Texas as yearlings and replaced after producing six lamb crops. The current flock consists of ewes that produced first, second, and fourth lamb crops. Purebred Hampshire rams are used. All lambs are sold for slaughter.

General Procedure

Approximately 350 ewes are handled in an early lambing program with the breeding season beginning June 1 and ending September 1. Lambs from this flock are sold as milk-fat spring lambs during spring and early summer. Last spring (1966) a flock of 100 ewes was assigned to an accelerated lambing program. Lambs produced by this flock will be sold when they reach market weight.

Lamb Feeding Tests, 1965-66

Procedure: To study the value of various creep-feeding rations for producing slaughter lambs for a spring market, ewes and lambs were divided into 8 test groups. They were allotted on type of lamb birth (multiple or single) and age. Lambs were docked, male lambs castrated and ewes adjusted to feed during a 7 to 10 day adjustment period before going on test.

Than all ewes were fed a uniform daily nursing ration (except those in lot 2, which received only rye pasture) consisting of 1 pound whole sorghum grain, 1.25 pounds of alfalfa hay and all the sorghum silage they would consume. Lambs, except those in lot 2, had access to self-fed creep rations (shown in table 1) as soon as assigned to test groups. Lambs in lot 2 were weaned at 8 to 10 weeks of age. Lambs in other lots not marketed before April 3 were weaned than. After lambs were weaned, ewes were fed a daily maintenance ration of 1 pound alfalfa hay and 6 pounds sorghum silage each.

[1] Contribution No. 354, Department of Animal Husbandry, Kansas State University, Kansas Agricultural Experiment Station, and No. 29, Colby Branch Agricultural Experiment Station.

Lambs were marketed at Denver, Colo., and Omaha, Nebr., when they weighed at least 95 pounds.

Results and Discussion: Performance and cost of gains are reported in table 2; table 3 gives complications that occurred; table 4, weaning weights and ages for early weaned lambs; table 5 contains carcass data; and table 6, feed costs and processing charges.

Replacing 5% sorghum grain with molasses in a ground and mixed creep ration neither increased feed consumption nor improved rate or efficiency of gain. It increased feed cost per cwt. gain. However, replacing 5% of the grain with soybean oil meal improved both rate and efficiency of gain. The improved efficiency was enough to offset the additional cost of the soybean oil meal. However, replacing 10% of the grain with soybean meal failed to further improve rate of gain and only slightly improved feed efficiency, but increased cost of gains. Replacing sorghum grain with wheat did not affect rate of gain, improved feed efficiency, but produced more expensive gains.

Lambs given free access to ground sorghum grain and alfalfa hay in separate troughs made slower, but just as efficient and slightly cheaper gains than lambs fed ground mixed rations of alfalfa hay and sorghum grain. However, as in past years, several lambs on that ration developed urinary calculi. Adding ammonium chloride to the ration effectively prevented urinary calculi. It should be stressed, however, that no calculi cases developed in other lots fed ground-mixed rations containing 55% alfalfa hay. Not a single case of calculi has been noticed in the past 6 years at this station with lambs fed a ration containing at least 55% alfalfa.

Rye pasture (no creep and early weaned) produced the slowest but cheapest gains as no charge was made for the pasture. The fall planted, preirrigated rye pasture produced an average of 782 lamb grazing days per acre (lambs from approximately 2 1/2 months to market age). Multiplying average daily gain of .47 lb. by 782 equals 367.5 lb. of lamb produced per acre, at $25 per cwt. That is $91.87 per acre of rye pasture.

Lambs fed the sorghum grain and alfalfa hay in separate troughs (lots 5 and 6) had higher dressing percentages than lambs fed other rations. The rye pasture produced considerably lower grading and lower yielding lambs than the other rations. Grade data also show that ewe lambs produced higher grading, and probably fatter, carcasses than wethers.

Table 1. Lamb creep rations and ewe nursing lot treatments - 1965-66

Lot no.	Lamb creep ration	Ewe nursing ration
1	55% ground alfalfa hay) 40% ground sorghum grain) mixture 5% molasses	Standard ration[1]
2	Rye pasture[3] weaned 8 to 10 weeks of age	Rye pasture until lambs weaned, then maintenance ration[2]
3	55% ground alfalfa hay) 40% ground sorghum grain) mixture 5% soybean meal	Standard ration
4	55% ground alfalfa hay) 35% ground sorghum grain) mixture 10% soybean meal	Standard ration
5	Free choice: Alfalfa hay Ground sorghum grain	Standard ration
6	Free choice: Alfalfa hay Ground sorghum grain containing 1 1/2% ammonium chloride until oldest lamb was 80 days - then reduced to 1% ammonium chloride	Standard ration
7	55% ground alfalfa hay) 45% ground sorghum grain) mixture	Standard ration
8	55% ground alfalfa hay) 45% ground wheat) mixture	Standard ration

1. Standard nursing ration - 1 lb. whole sorghum grain, 1.25 lb. alfalfa hay, and sorghum silage fed to limit of appetite (approximately 10 lb.) per ewe daily.

2. Maintenance ration - 1 lb. alfalfa hay, 6 lb. sorghum silage per ewe daily.

3. Starting June 1 a mixture of 55% ground alfalfa hay, 40% ground sorghum grain, and 5% soybean meal.

Table 2 Lamb performance and feed cost by indicated treatments, 1965-1966

Lot no.	1 Ground mixture: 55% alf. hay 40% sorg. gr. 5% molasses	2 Rye pasture[1] weaned 8 to 10 wks. of age	3 Ground mixture: 55% alf. hay 40% sorg. gr. 5% S.B.M.	4 Ground mixture: 55% alf. hay 35% sorg. gr. 10% S.B.M.	5 Free choice: alf. hay gr'd sorg. gr.	6 Free choice: alf. hay gr'd sorg gr. containing NH_4Cl[2]	7 Ground mixture: 55% alf. hay 45% sorg gr	8 Ground mixture: 55% alf. hay 45% wheat
No. lambs	65	64	60	59	54	61	60	58
Av. mkt. wt., lb.[3]	103.8	102.2	103.8	104.9	98.3	101.1	103.8	102.4
Av. daily gain, lb.	0.56	0.47	0.60	0.61	0.49	0.50	0.56	0.55
single wethers	0.59	0.51	0.66	0.66	0.56	0.52	0.62	0.61
single ewes	0.59	0.47	0.60	0.62	0.50	0.52	0.56	0.55
twins	0.52	0.44	0.56	0.55	0.42	0.46	0.51	0.51
Av. market age, days	169	197	156	158	187	187	170	171
Av. daily feed/lamb, lb.								
mixture	2.15	0.25[1]	2.10	2.09	-	-	2.14	2.00
sorghum grain	-	-	-	-	1.20	1.09[4]	-	-
alfalfa hay	-	-	-	-	0.70	0.85	-	-
Av. feed/cwt. gain, lb.								
mixture	399.9	53.6	360.6	347.4	-	-	385.4	366.4
sorghum grain	-	-	-	-	248.0	221.5	-	-
alfalfa hay	-	-	-	-	144.7	172.4	-	-
Total	399.9	53.6	360.6	347.4	392.7	393.9	385.4	366.4
Lamb feed cost/cwt. gain	$ 7.84	1.10[6]	7.43	7.64	7.38	7.72	7.44	7.88
Ewe feed cost/cwt. gain[5]	8.41	3.45[6]	8.59	8.40	9.06	8.62	8.47	8.69
Total feed cost/cwt. gain[5]	16.25	4.55[6]	16.02	16.04	16.44	16.34	15.91	16.57

1. Starting June 1, lambs were fed a mixture of 55% ground alfalfa hay, 40% ground sorghum grain, and 5% soybean meal in addition to rye pasture. Feed consumed averaged over entire period.
2. 1 1/2% ammonium chloride (NH_4Cl) until oldest lamb was 80 days, then reduced to 1% ammonium chloride.
3. Weight prior to shipping.
4. Includes ammonium chloride.
5. Includes cost of feed for ewes nursing lambs and ewes having lambs weaned up to April 3, 1966, when all lambs were weaned.
6. Value of rye pasture not included.

Table 3. Complications developing in each lot

Lot no.	Urinary Calculi	Founder & enterotoxemia	Lameness & stiffness	Scours	Rectal prolapse[1]	Other causes	Total treated	Death loss
1	-	-	-	-	-	-	-	-
2	-	1	4	-	-	-	5	1[2]
3	-	-	-	1	4	-	1	-
4	-	-	-	-	1	-	-	1[3]
5	4	1	8	-	1	2	15	2[4]
6	-	1	1	-	-	-	2	-
7	-	-	-	-	-	2	2	1[5]
8	-	-	2	1	-	-	3	1[6]

1. Only ewe lambs prolapsed. All prolapse lambs were slaughtered and, except for the lamb in lot 4, all prolapse lambs were included in the summary (Table 2).
2. Pneumonia.
3. Ewe refused to nurse lamb which became too weak before being removed from lot.
4. Enterotoxemia and urinary calculi.
5. Pneumonia.
6. Run over by tractor in cleaning lots.

Table 4. Weaning weights for lambs weaned at 8 to 10 weeks of age (lot 2)

	No. lambs	Avg. weaning age, days	Avg. weaning wt., lbs.
Single wethers	22	68.2	56.8
Single ewes	15	67.4	52.1
Twins	27	68.7	39.3
Overall	64	68.2	48.3

Table 5. Dressing percentage and U.S.D.A. carcass grades

Lot no.	No. lambs[1]	Shrink to market %	Av. Dressing %[2]	% U.S.D.A. Prime Carcasses[3]			
				Overall	Single wethers	Single ewes	twins
1	55	4.8	51.6	41.8	33.3	75.0	25.9
2	27	4.0	47.3	3.2	0.0	13.3	0.0
3	39	5.3	51.7	33.3	33.3	54.5	22.7
4	38	6.0	51.5	28.9	22.2	71.4	18.2
5	41	3.4	52.8	41.5	37.5	40.0	46.7
6	51	5.5	52.9	43.1	35.7	40.0	50.0
7	46	4.8	51.3	41.3	30.0	45.5	44.0
8	46	5.3	51.0	34.8	25.0	53.3	26.1

1. Carcass information was obtained on only number of lambs indicated in each lot.
2. Based on average lamb weights by lots at Denver and chilled carcass weight.
3. Carcasses not grading prime, graded choice.

Table 6. Feed costs and processing charges were based on these prices:

Feed charges	Dollars
Molasses	2.75/cwt
Sorghum grain	2.00/cwt
Wheat	1.50/bushel
Alfalfa hay	30.00/ton
Soybean oil meal	95.00/ton
Ammonium chloride	13.00/cwt
Grinding	.10/cwt
Mixing	.10/cwt

Table 7. Market information on lambs sold during 1965.

Number of lambs	501
Market dates and number sold:	
April 4, 1966	88
April 18, 1966	121
May 9, 1966	129
May 23, 1966	62
May 27, 1966	101
Avg. feedlot wt. at market date, lbs.	103.0
Avg. sale wt., lbs.	98.0
Avg. shrink to market (feedlot wt. to market wt.), %	4.83
Avg. selling price/cwt., $	26.16
Trucking cost/cwt., $	0.65
Other marketing costs/cwt., $	0.86
Total marketing costs/cwt., $	1.51
Avg. return/lamb after marketing costs, $	24.16
Net lamb sales after market expense, $	12,105.11

Ewe Flushing Tests, Spring 1966

Procedure: Three hundred sixty-four ewes were divided into five lots for the flushing treatments on the basis of previous ewe lambing record (multiple or single birth) and age. All 5 lots were fed the same daily rations per ewe from May 1 through May 15 (15 days). .5 lb. sorghum grain, 1 lb. alfalfa hay and 6 lb. sorghum silage. May 16 through June 18 (30 days) 2 lb. sorghum grain and 2 lb. alfalfa hay. The lot treatments were:

Lot no.	Treatment
1	Synchronized by feeding 60 mg. Medroxyprogesterone acetate (repromix) per ewe per day for 15 days prior to flushing. (May 1 - May 15). Bred 2nd estrus.
2	Synchronized by feeding 60 mg. Medroxyprogesterone acetate (repromix) per ewe per day for 15 days (May 16 - May 31) bred 1st estrus.
3	Synchronized by feeding .2 mg. Melengestrol Acetate (MGA) per ewe per day for 15 days (May 16 - May 31) Bred 1st estrus.
4	Control - ewes not synchronized.
5	Ewes exposed to 4 vasectomized teaser rams for 15 days (May 15 - May 31) prior to breeding.

Repromix and MGA are orally active synthetic progesterone-like hormone compounds manufactured by Upjohn Company, Kalamazoo, Michigan. The compounds were mixed with ground sorghum grain in a proportion so .5 lb. fed once daily would supply hormone to each ewe.

The breeding season for the five flushing lots began June 1, 1966. Ewes' weights were recorded prior to (May 16) and immediately following (June 18) flushing treatments for all lots except lot 1. Initial weights in lot 1 were taken April 30 and final weights June 18. Fifteen purebred Hampshire rams were used during the breeding season. The rams were divided into groups of 3, and the various groups were rotated among the five flushing lots twice each week. Following the flushing tests, all ewes were turned together and all rams turned with the entire flock. Marking harnesses were used to determine approximate dates ewes were serviced. The rams were removed September 1.

Results and Discussion: Results of gains and lambing performance of ewes are reported in table 8. Cumulative percentage of ewes lambing after first lamb birth is shown in table 9 and the breeding dates and lambing dates by periods are reported in table 10.

Ewes on all treatments were fed the same flushing ration and subsequent gains made during the 30 day flushing period were about the same for all lots. Unfortunately, beginning weights for ewes in lot 1 were not obtained on the same date as for the other lots. Consequently, results in table 8 show lot 1 ewes gaining more weight than those in other lots. The older ewes (2nd and 4th lamb crop) tended to gain slightly more than yearling ewes.

There was no consistent treatment effect on percentage ewes lambing or on number of multiple births. However, yearling ewes (as always in past tests) produced fewer multiple births than older ewes.

Ewes exposed to teaser rams for 15 days prior to breeding, bred and lambed considerably earlier than ewes in the other lots, which confirms earlier data reported at this station. There was little difference among the other 4 lots in earliness of lambing as indicated by cumulative data in table 9. However, ewes in lot 1 synchronized before flushing and about 15 days before breeding, were behind other lots in percentage ewes lambed during the first 20 days.

The effects of treatments on breeding and lambing dates is best explained in table 10. Ewes in the three synchronized groups (lots 1, 2 and 3), were synchronized fairly well as they bred and lambed by periods. Those in lot 1 (synchronized before flushing and 15 days before breeding) were not so grouped in breeding as the other two lots of ewes. For some reason, only about one third to one half of the ewes in each of those three synchronized lots bred the first 10 days of the breeding season. Most of the ewes not bred (marked) during the first ten days of the breeding season were bred one cycle later. Whether these ewes exhibited estrus during the first 10 days is unknown. Each lot of from 71 to 75 ewes had 3 rams turned in at nights. Rams were rotated among lots every 3 days. However, conception rates apparently were high as most of those breeding by periods also lambed after the first breeding except those fed M.G.A. in lot 3 hwere several repeat breedings were recorded. Lot 2, ewes synchronized with repromix before breeding, had 23 of 28 breed the first 10 days of the season and lamb in the first 9 days of lambing season. Also 41 of 75 ewes in lot 5 bred during the first 10 days.

From the flushing treatments these observations can be made:

1. Exposure of ewes to teaser rams accelerated lambing, but did not increase multiple births.
2. Synchronization treatments somewhat grouped lambing by periods, but did not accelerate lambing or improve lambing performance.
3. No advantage was observed for delaying breeding until the second estrus following synchronization.
4. M.G.A., at the level used, seemed to result in somewhat lower conception rates.

Table 8. Gains and lambing performance of ewes for each flushing treatment, spring 1966

Lot no.	No. of ewes	Total gain[1]	No. of ewes lambing	No. of lambs born	% lamb crop	Number sets twins
			First lamb crop ewes			
1 (Repromix prior to flushing)	40	22.1	36	37	92.5	1
2 (Repromix)	40	9.6	38	41	102.5	4
3 (MGA)	40	12.3	36	38	95.0	2
4 (Control)	40	11.6	37	41	102.5	4
5 (Teaser rams)	40	11.3	39	43	107.5	4
			Second and fourth lamb crop ewes			
1 (Repromix prior to flushing)	30	18.5	29	34	113.3	5
2 (Repromix)	31	12.4	29	38	122.6	9
3 (MGA)	34	14.6	33	41	120.6	8
4 (Control)	34	14.0	33	41	120.6	8
5 (Teaser rams)	35	17.0	32	40	114.3	8
			All ewes			
1 (Repromix prior to flushing)	70	20.6	65	71	101.4	6
2 (Repromix)	71	10.8	67	79	111.3	13
3 (MGA)	74	13.5	69	79	106.8	10
4 (Control)	74	12.7	70	82	110.8	12
5 (Teaser rams)	75	13.9	71	83	110.7	12

1. Total gain for lot 1 was from May 1 thru June 18 (48 days) and total gain for lots 2, 3, 4 and 5 from May 16 thru June 18 (34 days).

Table 9. Effect of flushing treatment on cumulative percentage of ewes lambing. Spring, 1966.

Lot no.	Days after first lamb birth: 10	20	30	40	90	Total lambing
	First lamb crop ewes					
1 (Repromix prior to flushing)	30.0	37.5	77.5	85.0	90.0	90.0
2 (Repromix)	35.0	40.0	75.0	80.0	92.5	95.0
3 (MGA)	27.5	47.5	70.0	75.0	90.0	90.0
4 (Control)	32.5	52.5	80.0	85.0	92.5	92.5
5 (Teaser rams)	45.0	72.5	87.5	90.0	95.0	97.5
	Second and fourth lamb crop ewes					
1 (Repromix prior to flushing)	13.3	26.7	90.0	93.3	96.7	96.7
2 (Repromix)	29.0	41.9	87.1	87.1	93.5	93.5
3 (MGA)	23.5	38.2	82.4	88.2	94.1	97.1
4 (Control)	29.4	44.1	94.1	94.1	97.1	97.1
5 (Teaser rams)	40.0	62.9	82.9	88.6	91.4	91.4
	Ewes of all ages					
1 (Repromix prior to flushing)	22.9	32.9	82.9	88.6	92.9	92.9
2 (Repromix)	32.4	40.8	80.3	83.1	92.9	94.3
3 (MGA)	25.7	43.2	75.7	81.1	91.9	93.2
4 (Control)	31.1	48.6	86.5	89.2	94.6	94.6
5 (Teaser rams)	42.7	68.0	85.3	89.3	93.3	94.7

Table 10. Ewes breeding and lambing by indicated periods - Spring, 1966

Lot 1 - Repromix prior to flushing - 70 ewes

Breeding period	Length of period, days	No. bred[1]	Lambing period	Length of period, days	Number lambing
6/1 - 6/10	10	23	10/24 - 10/30	7	5
6/11 - 6/18	8	6	10/31 - 11/10	11	17
6/19 - 6/25	7	28 + 4 R	11/11 - 11/28	18	39
6/26 - 7/5	10	10 + 1 R	11/29 - 1/23	56	4
7/6 - 7/19	14	4 R			
			Total lambing		65

Lot 2 - Repromix - 71 ewes

6/1 - 6/10	10	28	10/24 - 10/26	3	2
6/11 - 6/18	8	0	10/27 - 11/1	6	21
6/19 - 6/25	7	31 + 8 R	11/2 - 11/9	8	0
6/26 - 7/5	10	1	11/10 - 11/17	8	32
7/5 - 7/19	14	3 + 7 R	11/18 - 1/23	67	12
			Total lambing		67

Lot 3 - MGA - 74 ewes

6/1 - 1/10	10	26	10/17 - 10/26	10	4
6/11 - 6/18	8	6 + 2 R	10/27 - 10/30	4	14
6/19 - 6/25	7	33 + 10 R	10/31 - 11/10	10	3
6/26 - 7/5	10	2 + 1 R	11/11 - 11/18	7	33
7/5 - 7/19	14	1 + 7 R	11/18 - 1/23	67	15
			Total lambing		69

Lot 4 - Control - 74 ewes

6/1 - 6/10	10	25	10/24 - 10/26	3	0
6/11 - 6/18	8	14 + 1 R	10/27 - 11/5	10	25
6/19 - 6/25	7	27 + 3 R	11/6 - 11/15	10	15
6/26 - 7/5	10	2 + 3 R	11/16 - 11/25	10	25
7/6 - 7/19	14	1 + 4 R	11/26 - 1/23	59	5
			Total lambing		70

Lot 5 - Teaser rams - 75 ewes

6/1 - 6/10	10	41	10/25 - 11/3	10	32
6/11 - 6/18	8	13 + 3 R	11/4 - 11/13	10	19
6/19 - 6/25	7	8 + 2 R	11/14 - 11/23	10	16
6/26 - 7/5	10	5 + 3 R	11/24 - 1/23	61	4
7/6 - 7/19	14	0 + 4 R			
			Total lambing		71

1. Determined by breeding marks made by rams wearing marking harness. Repeats (R) means ewes that rebred.

Accelerated Lambing Program

Procedure: May 1, 1966, 100 ewes purchased in spring, 1965, were placed in a separate group. They will be maintained separately to test possibilities of producing three lamb crops in two years. The following schedule is planned using 50-day breeding seasons, 150-day gestation periods, and weaning lambs at 43 to 60 days of age.

May 1, 1966 thru June 20, 1966	50-day breeding period
Sept. 27, 1966 thru Nov. 17, 1966	Lambing season
Nov. 26, 1966 thru Dec. 30, 1966	Lamb weaning period
Dec. 30, 1966 thru Feb. 19, 1967	50-day breeding period
May 29, 1967 thru July 17, 1967	Lambing season
July 28, 1967 thru Aug. 29, 1967	Lamb weaning period
Aug. 29, 1967 thru Oct. 18, 1967	50-day breeding period
Jan. 26, 1968 thru March 17, 1968	Lambing season
March 27, 1968 thru May 1, 1968	Lamb weaning period
May 1, 1968 thru June 20, 1968	50-day breeding period

The accelerated group was placed on rye pasture May 1, 1966. Four Hampshire rams were turned with the ewes each night from May 1, thru June 20. Ewes received rye, sudan grass, or buffalo grass pasture until lambing.

In addition, from May 23 to June 1, ewes were fed 1.5 lb. of grain sorghum per ewe per day and from June 1 to June 20 1 lb. alfalfa hay per ewe per day. Ewes were fed .75 lb. of grain and .25 lb. of alfalfa pellets per ewe per day starting Sept. 16, and 2 lb. of alfalfa hay starting October 11 through the lambing season. The first lamb in the lot was born October 10; and the last, November 13, with a very disappointing 32% of the ewes lambing.

Lambs born from this lot were handled the same as those in the regular lambing flock.

Ewes that did not lamb were fed the usual maintenance ration, while ewes that lambed were kept in lamb creep lots with their lambs. Lambs on the ewes were weaned December 14, except that the last four lambs were weaned December 29. December 15, the accelerated group was divided into two groups. One group was synchronized by feeding 60 mg. per ewe per day of synthetic progestin hormone Medroxyprogesterone acetate (repromix) in ground grain sorghum for 15 days. The other group was not synchronized. Ewes in both groups were fed 2 lb. alfalfa hay per ewe per day and equal amounts of sorghum grain, which was gradually increased to 2 lb. per ewe per day during the 15 days. Both groups were placed together December 30 and were continued on the same ration until January 18. Rams were turned with the ewes at nights from December 30 to February 19. Ewes will receive a daily ration of 6 lb. silage and 2 lb. alfalfa hay until about 30 days prior to lambing when 1 lb. of sorghum grain will be added to their ration.

Lamb Creep Feeding Tests, 1966-1967

Procedure: Lambs born during the fall of 1966 were allotted to eight test groups. The general procedures were identical to those for the 1965-1966 feeding tests except that all lambs were weaned between 63 and 70 days of age and half the wether lambs and half the ewe lambs in each group were implanted with 3 mg. stilbestrol when weaned.

Lamb and ewe treatments for the various lots follow:

Lot no.	Lamb creep ration	Ewe nursing ration
1	Mixture: 45% ground sorghum grain 55% ground alfalfa hay	Mixture: (free choice) 45% ground sorghum grain 55% ground alfalfa hay
2	Rye pasture Mixture: 45% ground sorghum grain 55% ground alfalfa hay	Rye pasture[1] Standard ration when rye pasture snow covered
3	Mixture: 45% ground sorghum grain 55% ground alfalfa hay	Standard ration[1]
4	Mixture: 45% ground corn 55% ground alfalfa hay	Standard ration[1]
5	Mixture: 5% soybean meal 40% ground sorghum grain 55% ground alfalfa hay	Standard ration[1]
6	Mixture: 10% soybean meal 35% ground sorghum grain 55% ground alfalfa hay	Standard ration[1]
7	Mixture: 45% ground sorghum grain 55% ground alfalfa hay 25 to 30 mg. Aureomycin/lamb/day[2]	Standard ration[1]
8	Mixture: 50% ground sorghum grain 20% dehydrated alfalfa meal 10% soybean meal 10% wheat bran 3% molasses 5% stabilized animal fat 1% limestone 1% trace mineralized salt vitamin A & D supplement 25 to 30 mg. aureomycin/lamb/day[2]	Standard ration[1]

[1]Standard nursing ration: 1 lb. whole sorghum grain, 1.25 alfalfa hay, and sorghum silage fed to limit of appetite.

[2]Aureomycin was added in the form of Aurofac 10. Aurofac 10 contains

10 grams of Aureomycin per pound. Four pounds of Aurofac 10 were added per ton to rations 7 and 8 until the oldest 10 lambs were 80 days of age, then the level was decreased to 2 lbs. per ton where it will remain until the lambs are marketed. Those levels supply lambs 30 mgs. of Aureomycin per day when consuming 1.5 and 3 pounds of their respective rations.

Results and Discussion: These tests will be concluded in 1967 and reported in 1968.

Acknowledgments

Appreciation is expressed to the Upjohn Company, Kalamazoo, Mich., for the Repromix and M.G.A. used.

SWINE

No swine research is being reported in this bulletin. All trials in progress June 8, 1966, were abruptly terminated by the storm that evening.

Swine feeding pens at the Sargent farm and the farrowing wing of the barn were completely destroyed. Four portable buildings used to house sows were destroyed. Fences between lots were destroyed or badly damaged.

Dr. Berl Koch returned from 2 years in Nigeria August 1. Dr. Robert Hines joined the faculty September 1. Both are working with swine. The first annual swine day with a report of progress will be on the Manhattan campus Thursday, September 26, 1968.

Table 45
Prices of Feeds Used in Beef Cattle Experiments

	Per ton
Dry rolled sorghum grain	$40
Sorghum silage	$ 8
Alfalfa hay	$25
Prairie hay	$20
Dry rolled shelled corn	$46
Dry rolled wheat	$50
Urea	$134
Oyster shell	$32
Ground limestone	$16
Dehydrated alfalfa	$50
	Per lb.
Stilbestrol premix (1 gram per lb.)	$ .55
Aurofac 10 (10 grams chlortetracyclin per lb.)	$ .87
Vitamin A premix (10,000 I.U. per gram)	$ .28
Trace mineral premix	$ .10