



## 37th ANNUAL LIVESTOCK FEEDERS' DAY



1949-50 PROGRESS REPORTS  
**KANSAS AGRICULTURAL EXPERIMENT STATION, KANSAS STATE COLLEGE**  
 May 6, 1950                      MANHATTAN, KANSAS                      Circular 265

# 37th Annual Livestock Feeders' Day

Kansas State College  
Manhattan, Kansas

**SATURDAY, MAY 6, 1950**

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## 9:15-11:15 a.m.—FORENOON PROGRAM

*Assemble at Experimental Feedlots.*

Opening Remarks—R. I. Throckmorton, *Director, Kansas Agricultural Experiment Station.*

Explanation of Plan of Experiments in Progress—(*Inspection of experimental animals simultaneous with discussion.*)

Hogs—C. E. Aabel and A. J. Clawson

Sheep—R. F. Cox and R. B. Cathcart

Beef Cattle—Ed. F. Smith, F. W. Bell, Don L. Good, and Walter H. Smith.

Tour of barns and feedlots.

11:30 a.m.—Luncheon sponsored by the Kansas Livestock Association. Served by the Block and Bridle Club. (*East Agricultural Building*)

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## 1:00 p.m.-3:30 p.m.—AFTERNOON PROGRAM—*North Pavilion*

Presiding—O. W. Lynam, *Burdette, Kansas.*

*President, Kansas Livestock Association.*

Special Feature

"A Look Ahead for the Livestock Industry"—F. E. Mollin, *Executive Secretary, American National Livestock Association, Denver, Colorado.*

Animal Husbandry Research on a Regional or National Scale—Dr. A. D. Weber, *Associate Dean and Director, Kansas Agricultural Experiment Station.*

Presentation of Winners in Beef and Swine Production Contests—Walter H. Atzenweiler, *Agricultural Commissioner, Chamber of Commerce, Kansas City, Mo.,* assisted by Lot F. Taylor, Bass Powell, and Carl Elling.

Summary of Experimental Results—Animal Husbandry Staff.  
Question Box

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## WOMEN'S PROGRAM

9:30-10:30 a.m.—Coffee Hour—Calvin Lounge (*Home Economics Building*) (*For those who do not care to go to feedlots*)

11:30 a.m.—Luncheon—East Agricultural Building.

1:15 p.m.—Room 212—West Waters Hall. Presiding—David L. Mackintosh. Special Selections—YM Quartette.

1:30 p.m.—Choosing Color to Suit the Individual—Mrs. Leota Evans, Department of Art, Kansas State College.

2:30 p.m.—Salads for All Occasions—Mrs. Mary Sorenson and Others—Department of Foods and Nutrition, Kansas State College

**Animal Husbandry Investigations**

**1949-50 PROGRESS REPORTS\***

**37th ANNUAL  
LIVESTOCK FEEDERS' DAY**

**Kansas Agricultural Experiment Station**

**KANSAS STATE COLLEGE  
OF  
AGRICULTURE AND APPLIED SCIENCE**

**R. I. THROCKMORTON, Director  
A. D. WEBER, Ass't Director**

\* Contribution No. 170 from the Department of Animal Husbandry

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**Project 246: Studies of the Development of the Livestock  
Industry in Kansas,  
1949-1950**

**THOMAS A. HUBBARD  
PIONEER KANSAS AGRICULTURAL LEADER**

**C. W. McCampbell**

Many of the men who made noteworthy contributions to the development of a great livestock industry for Kansas are practically unknown to the present generation of Kansas livestock producers. One such person is the late Thomas A. Hubbard of Wellington, Kansas.

Mr. Hubbard was born in McKeen County, Pennsylvania, December 22, 1843, but in 1854 his parents moved to Barry County, Michigan, where he lived until the age of 17, when on October 1, 1861, he enlisted in Co. B 13th Michigan Infantry. His army record indicates that it is quite probable few men experienced more combat service during the Civil War, however, he was wounded only in the battle of Chickamauga September 13, 1863. He was shot twice in the left arm and once in the right during this engagement. Fortunately these wounds left no crippling effect. He was mustered out of service July 25, 1865, after having seen nearly four years of active service. He then returned to the home farm in Michigan which he later purchased.

While on a visit to friends in Marion County, Kansas, in 1872 he decided to have a look at southern Kansas. During this trip of inspection he saw a quarter section of unoccupied land seven miles south of the village of Wellington that captured his fancy so he hastened to the land office at Wichita, filed on it July 4, 1872, and returned to Michigan to make arrangements to move to Kansas. The Hubbard land holdings eventually expanded to 640 acres and he became one of the well known farmers and most highly respected agricultural leaders in Kansas.

Mr. Hubbard produced high grade Shorthorn cattle and well bred horses on an extensive farm scale but his chief livestock interest was his herds of purebred Poland China and purebred Berkshire swine which were among the largest and best in the middle west.

He started as a breeder of purebred Poland Chinas in 1882 with the purchase from S. V. Walton and Son, Wellington, Kansas, of the sow Jennie Lind 12952 farrowed April 12, 1881, and the boar Black John 4743 farrowed February 22, 1882. The last Poland China registered as bred by Mr. Hubbard was John 48448 farrowed May 10, 1907, sired by Meddler 39541, a son of the Grand Champion boar at the Louisiana Purchase Exposition in St. Louis in 1904. Mr. Hubbard bred purebred Poland Chinas continuously for 25 years.

His start as a breeder of purebred Berkshire swine was also made in 1882 with the purchase from George W. Perry, Newark, Ohio, of the sow Oakwood Maid 10857 farrowed February 2, 1882, and the boar Sambo II 4457 farrowed April 27, 1882. The last purebred Berkshire registered as bred by Mr. Hubbard was King Edward Jr. 85987 farrowed May 3, 1905. The records show that he bred purebred Berkshires continuously for 23 years.

Mr. Hubbard recognized the value of advertising purebred livestock and was a liberal advertiser especially in agricultural publications as long as he bred purebred livestock. He also appreciated the value of showing purebred livestock and started exhibiting his swine locally in 1883. As his herds improved he showed at the larger shows including the National Western Show at Bismarck Grove near Lawrence, the fairs at Topeka and Wichita, and the Nebraska State Fair where he was a leading winner for many years.

In 1887 he showed purebred swine at the St. Louis fair which in those days boasted the largest livestock exhibits of any fair in the United States. It was also the fair where East met West and breeders of the West prized very highly winnings made at this fair. Mr. Hubbard's Berkshires did remarkably well, his winnings including: 1st on aged boar; 2nd on yearling boar; 1st on sow and litter; 1st on boar and his get. The yearling boar was second to the boar that was later made Grand Champion of the show.

His winnings at the great St. Louis show of 1887 established him as one of the leading swine breeders of the country and created a demand for swine of his breeding over a wide area for many years. This resulted in an increase in the size of his herds until his annual production of purebred swine often reached 300 head.

Mr. Hubbard's achievements in the field of agriculture commanded the respect and confidence of leading farmers and livestock producers of Kansas. This respect and confidence is reflected in the recognition he received from several organizations both local and state but only two instances of this recognition will be cited at this time.

(1) He was one of the founders of the Kansas Improved Stock Breeders Association, which was organized at Topeka January 8, 1891; a member the remainder of his life, a director several terms and president two terms—1895 and 1896. It may be stated in passing that this organization whose membership consisted chiefly of breeders of purebred livestock soon developed into the most active and most influential of all Kansas agricultural organizations. Breeders of purebred livestock of several other states noting the achievements of this Kansas organization formed similar associations in their states.

(2) He was elected a member of the State Board of Agriculture continuously from 1889 until his death in 1919, served several terms as a director and two terms as president—1899 and 1900.

Mr. Hubbard was a good speaker and his name appears on the programs of many agricultural meetings of former years. The proceedings of early day agricultural meetings also show that he frequently participated in the discussions following formal talks and one is impressed with the soundness and value of his comments.

Mr. Hubbard was interested in affairs of government as well as agriculture and was elected to several public offices by the people of his community and county. His first public office after settling in Kansas was road overseer for one term followed by two terms as township trustee. In 1875 he was elected representative from Sumner County and reelected in 1876. In 1879 he was elected county treasurer and reelected in 1881.

For approximately the next 20 years he devoted most of his time to his farm and agricultural affairs in general except for the acceptance in January 1890 of an appointment as supervisor of the Census for the 4th Kansas district but in 1902 he was elected County Treasurer of Sumner County and reelected in 1904. He also served as mayor of Wellington from 1907 to 1909.

Many statements have been published about Mr. Hubbard that indicate the kind of man he was but time being short I shall bring you excerpts from only two. The first of these appears in Andreas' "History of Kansas" published in 1883 and I quote: "He commenced life without means and by his own manly, determined, and persistent effort regulated by the principles of integrity and Christian purity has won for himself abundance of wealth, the unbounded confidence of his constituents and fellow citizens, and today he occupies the proud and desirable position of one of the foremost men of his community, his county and his state."

Thirty-seven years later and soon after his death the Kansas State Board of Agriculture paid tribute to his memory. This appears in the

22nd biennial report of this organization. Tributes were paid him by several members of the Board but I shall use only excerpts from the report of the Committee on Necrology and again I quote: "In Thomas A. Hubbard the world-approved attributes of character were personified in the very highest degree. When gloom apparently possessed the public mind and strong hearts of fellow pioneers were filled with sadness akin to fear and despair, the smiles of Uncle Tom Hubbard, born of a 'hopeful and helpful heart', and his acts and words of courage and encouragement were the sort of stuff that made Kansas—that made the state. No good thing was ever opposed by him and no bad thing ever received his support or approval in voice or act. He ever lent a helping hand to him who was in need and could reprove or forgive a transgressor in a spirit almost divine. His sympathies were as broad as the range of human thought and action, and he ever showered upon all his good wishes until their sum total amounts to a veritable sublime benediction. He hated sin but not the sinner. His hopes and ambitions for himself and his fellows were along constructive lines always.

While we will pass as he has passed and his personality will not be known to them who come after us as it is known to us, but what he did and lived while here will never be effaced."

Thomas A. Hubbard died at Wellington, Kansas, November 8, 1919.

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## **Project 78: A Study of Factors Influencing Rate of Gain, Quantity of Feed Consumed, and Carcass Grade.**

### **SUMMARY OF TWO YEARS' TRIALS**

**F. W. Bell, D. L. Mackintosh, and A. G. Pickett**

#### **INTRODUCTION**

Rate of gain in the feedlot is one of the most important factors determining the profits from cattle feeding. Also cattle which gain faster usually have more finish and sell for a higher price per hundredweight. There is considerable variation in rate of gain by different cattle in the same feedlot, and we need to know if the factors which cause these differences can be determined when the feeder cattle are selected.

#### **EXPERIMENTAL PROCEDURE**

Two lots of 10 head each were selected each year from the range-bred heifer calves purchased for feeding trials at this station. The entire lot of calves each year (75 head in 1946 and 100 head in 1947), graded good to choice and were quite uniform.

Sorting for the two lots in these trials was made on probable differences in performance during the fattening period as indicated by body capacity, chest room, natural fleshing or muscling, bone, head, and general appearance. The calves in Lot 1 were somewhat deficient in one or more of the above characteristics as compared to those in Lot 2. All calves were graded individually on a standard feeder chart.

The calves in both lots received the same kinds of feed, and were given as much corn and silage as they would consume. The same amount of cottonseed meal was fed in each lot.

Differences in rate of gain and in the kind and amount of feed required to produce 100 pounds of gain are given in the table which follows. These differences indicate the relation of body features of feeder calves to the efficiency of the calves in producing beef.

The carcasses were graded by a U. S. Government grader.

**TABLE 1. AVERAGE OF TWO YEARS' TRIALS**

December 5, 1946 to July 2, 1947—209 days.  
November 11, 1947 to June 22, 1948—224 days.

1. Lot number .....	1	2
2. Number of heifers .....	20	20
3. Average daily ration:		
Ground shelled corn .....	8.94	9.45
Atlas sorgo silage .....	7.51	12.01
Cottonseed meal .....	1.27	1.27
Alfalfa hay .....	1.36	1.59
Prairie hay .....	.39	.60
Ground limestone .....	.09	.09
4. Average initial weight .....	378	454
5. Average final weight .....	731	856
6. Average total gain .....	353	402
7. Average daily gain .....	1.62	1.85
8. Feed required for 100 pounds gain:		
Ground shelled corn .....	551	511
Atlas sorgo silage .....	462	646
Cottonseed meal .....	78	68
Alfalfa hay .....	82	85
Prairie hay .....	23	31
Ground limestone .....	5	5
9. Cost of feed per 100 pounds gain .....	\$ 25.83	\$ 24.58
10. Initial cost per heifer at \$19.50 per cwt. ....	73.71	88.53
11. Total feed cost per heifer .....	91.19	98.81
12. Initial cost per heifer plus feed cost .....	164.90	187.34
13. Selling price per cwt. ....	30.50	31.00
14. Selling price per heifer less marketing costs	217.95	260.36
15. Margin per heifer above initial cost and feed costs .....	53.05	73.02
16. Carcass grades		
Choice .....	2	5
Good .....	16	15
Commercial .....	2	0

**OBSERVATIONS**

- Both lots of calves ate practically the same amount of corn.
- Lot 2 consumed considerably more silage than Lot 1.
- The calves in Lot 2 made an average gain of 49 pounds more per head head during the fattening period than those in Lot 1.
- The carcasses were graded by a Government grader. Lot 2 produced five choice and 15 good carcasses. Lot 1 produced two choice, 16 good, and two commercial grade carcasses.
- These tests indicate that feeder cattle can be selected which will make faster gains, and also utilize a greater proportion of roughages to grain during the fattening period. The results of these trials also indicate that economy of gain can be combined with a higher market value of the beef produced.

**Experiment No. 3**

November 15, 1948, to May 24, 1949—190 days

This is the third test in the study of factors which influence feedlot performance and market value of cattle. As in the two preceding years, two lots of 10 heifer calves were sorted from 100 range-bred calves



purchased for feeding experiments. The calves graded good to choice as feeders and were similar to those used in the trials of 1947 and 1948. However, there was more difference in fleshing or condition of the 100 calves from which the two lots were sorted for this year's test. They were sorted on the basis of differences in width and depth of body, chest room, heads, bone, fleshing, and general appearance. The calves in Lot 1 lacked somewhat in one or more of the above features as compared to those in Lot 2. As sorted there was a noticeable difference in fleshing or condition of the two lots, Lot 1 being thinner in fleshing than Lot 2.

This difference in fleshing of the two lots at the start of this trial doubtless accounts in part at least, for the differences in the results as compared to the two preceding tests in this project. Note that the greatest differences in this trial are in carcass grades and selling price of the two lots.

**Experiment No. 3**  
**TABLE 2. INFLUENCE OF BODY CHARACTERISTICS ON**  
**FATTENING CATTLE.**

November 15, 1948 to May 24, 1949—190 days

	1	2
1. Lot number .....	1	2
2. Number of heifers in lot .....	10	10
3. Average daily ration, pounds:		
Ground shelled corn .....	9.31	9.88
Atlas sorgo silage .....	8.03	8.92
Soybean meal .....	1.83	1.82
Prairie hay .....	2.07	2.09
Alfalfa hay .....	.48	.44
Ground limestone .....	.08	.08
4. Average initial weight .....	403	493
5. Average final weight .....	788	874
6. Average total gain .....	385	382
7. Average daily gain .....	2.03	2.01
8. Feed required for 100 pounds gain, pounds:		
Ground shelled corn .....	457	491
Atlas sorgo silage .....	394	444
Soybean meal .....	90	91
Prairie hay .....	102	104
Alfalfa hay .....	24	22
Ground limestone .....	4	4
9. Cost of feed per 100 pounds gain .....	\$ 16.88	\$ 17.70
10. Initial cost of heifers @ \$26.50 per cwt....	106.80	130.38
11. Feed cost per heifer .....	64.61	67.66
12. Initial cost per heifer plus feed cost .....	171.41	198.04
13. Selling price per cwt. at market .....	25.00	26.00
14. Selling price per heifer less marketing costs	192.00	222.24
15. Margin per heifer above initial cost and feed cost .....	20.59	24.20
16. Carcass grades (U. S. Government grader)		
Choice .....	0	6
Good .....	10	4

#### OBSERVATIONS

1. The heifers in both lots made practically the same gain in weight.
2. All carcasses in Lot 1 graded good. In Lot 2, six carcasses graded choice and four graded good.

3. That there was no advantage in rate of gain or efficiency of gain in Lot 2 doubtless was due largely to the fact that at the start of the trial the heifers in Lot 2 carried more condition than those in Lot 1. Feed costs per pound of gain are less with thinner cattle, and increase with higher finish of cattle.
4. Another fact which affects the results of this trial as compared with those of 1947 and 1948 is the relative prices of fat cattle and feeder cattle. The calves in this trial cost \$26.50 cwt., and sold for \$25 and \$26 per cwt. If the market for fat cattle had been more favorable when these lots were marketed, Lot 2 would have shown a still greater profit as compared to Lot 1.

## Project Commercial No. 65: Performance of Steers Sired by Bulls of Different Sizes.

### COMPARISON OF HEREFORD STEERS Sired BY SMALL, MEDIUM AND LARGE SIZE BULLS

Ed F. Smith, D. L. Mackintosh, and A. D. Weber  
(Preliminary report—not for publication)

The Kansas, Oklahoma, and Ohio Agricultural Experiment Stations are cooperating in this study, which is supported by grants from the American Hereford Association. In October, 1948, each station received 96 steer calves from the following commercial herds: Bar 13 Ranch, P. K. Ranck, and O. M. Wallop, Sheridan, Wyoming; and M. C. Simpson, Volborg, Montana.

The project involves comparisons of steer calves sired by small, medium, and large size bulls at each of the three stations under three standard systems of feeding and management.

System I, immediate full feeding for 225 days.

System II, a deferred full feeding program in which the steer calves are wintered well, grazed without grain from May 1 to August 1, and then full fed in dry lot 100 days.

System III has for its objective the production of two-year-old grass fat steers without the feeding of grain. Phases under this system include: wintering as calves without grain; grazing as yearlings a full season without supplemental feed; wintering as yearlings without grain; grazing as two-year-olds without supplemental feed and selling as slaughter cattle directly off pasture.

Marketing and carcass data have been obtained on the steers handled under Systems I and II. Similar data will be obtained on all of the steers handled under System III. At the conclusion of the experiment, a joint report will be issued by the three cooperating stations.

The accompanying tables are included in this circular to indicate the experimental procedures that are being followed, and to conform to an established custom of the Kansas Agricultural Experiment Station whereby those in attendance at Livestock Feeders' Day are given an opportunity to see all of the experimental cattle and are furnished preliminary reports on unfinished tests.

### A COMPARISON OF HEREFORD STEERS Sired BY SMALL, MEDIUM AND LARGE SIZE BULLS

#### System I—Immediate Full Feeding

November 29, 1948 to July 12, 1949—225 days

1.	Lot number .....	1	2	3
2.	Size of sires .....	Small	Medium	Large
3.	Number of steers per lot .....	10	10	10
4.	Initial weight per steer .....	430	444	452

5.	Final weight per steer .....	838	903	915
6.	Gain per steer .....	408	459	463
7.	Daily gain per steer .....	1.81	2.04	2.06
8.	Daily ration per steer, pounds:			
	Ground shelled corn .....	8.93	9.70	9.66
	Soybean meal .....	2.00	2.00	2.00
	Silage .....	6.61	6.61	6.58
	Prairie hay .....	1.70	1.51	1.69
	Alfalfa hay .....	1.28	1.30	1.26
	Ground limestone .....	.07	.07	.07
	Salt .....	.01	.02	.01
9.	Feed required per 100 lbs. gain, pounds:			
	Ground shelled corn .....	492.5	475.5	469.4
	Soybean meal .....	110.3	98.0	97.4
	Silage .....	364.6	324.1	320.9
	Prairie hay .....	93.9	84.7	82.1
	Alfalfa hay .....	70.4	63.5	61.6
	Ground limestone .....	3.75	3.27	3.54
10.	Cost of feed per 100 lbs. gain..	\$ 18.59	\$ 17.47	\$ 17.24
11.	Slaughter ("onfoot") grades			
	Low prime .....	0	2	0
	Top choice .....	3	2	2
	Average choice .....	4	2	0
	Low choice .....	1	3	6
	Top good .....	1	0	2
	Average good .....	1	1	0
	Low good .....	0	0	0
12.	Shrink in transit to market			
	Pounds per steer .....	20.0	36.5	32.8
	Percent .....	2.4	4.0	3.6
13.	Dressing percent** .....	59.2	61.3	60.2
14.	Carcass grades			
	Average choice .....	—	1	—
	Low choice .....	—	3	1
	Top good .....	4	3	1
	Average good .....	2	2	5
	Low good .....	3	—	2
	Top commercial .....	1	1	1
15.	Selling price per cwt. at market .....	\$ 27.00	\$ 27.25	\$ 27.00
16.	Comparative values per cwt. in the carcass .....	26.15	27.25	26.23

\*\* Includes 2.5% cooler shrink.

**TABLE 2. A COMPARISON OF HEREFORD STEERS Sired BY SMALL, MEDIUM AND LARGE SIZE BULLS**

**System II—Deferred Full Feeding**

**PHASE I—WINTERING**

**November 29, 1948 to May 1, 1949—153 Days**

1.	Lot number .....	4	5	6
2.	Size of sires .....	Small	Medium	Large
3.	Number of steers per lot .....	10	10	10
4.	Initial weight per steer .....	427	441	451

5.	Weight per steer on May 1, 1949 .....	654	676	705
6.	Gain per steer .....	227	235	254
7.	Daily gain per steer .....	1.48	1.53	1.66
8.	Daily ration per steer, pounds			
	Atlas sorgo silage .....	19.62	19.72	19.85
	Prairie hay .....	3.31	3.91	4.17
	Ground shelled corn .....	3.83	3.83	3.83
	Soybean oil meal .....	1.00	1.00	1.00
	Ground limestone .....	.02	.02	.02
	Salt .....	.06	.06	.06
9.	Feed consumed per 100 pounds gain			
	Atlas sorgo silage .....	1322.68	1284.04	1195.86
	Prairie hay .....	223.70	254.97	251.22
	Ground shelled corn .....	258.19	249.36	230.70
	Soybean oil meal .....	67.40	65.10	60.23
	Ground limestone .....	1.81	1.74	1.61
	Salt .....	3.72	4.03	3.01

#### PHASE II—GRAZING

May 1, 1949 to August 1, 1949—92 days

10.	Initial weight per steer .....	654	676	705
11.	Weight per steer on Aug. 1, 1949 .....	735	764	804
12.	Gain per steer .....	81	88	99
13.	Daily gain per steer .....	.88	.96	1.08

#### PHASE III—FULL FEEDING

August 1, 1949 to November 9, 1949—100 days

	Lot number .....	4	5	6
14.	Initial weight per steer .....	735	764	804
15.	Final weight per steer .....	977	1006	1039
16.	Gain per steer .....	242	242	235
17.	Daily gain per steer .....	2.42	2.42	2.35
18.	Average daily ration, pounds			
	Prairie hay .....	6.32	6.63	7.28
	Alfalfa hay .....	2.00	2.00	1.98
	Ground shelled corn .....	14.20	15.03	14.24
	Soybean oil meal .....	1.79	1.80	1.80
	Salt .....	.02	.05	.04
19.	Feed required for 100 lbs. gain			
	Prairie hay .....	261.12	273.76	309.62
	Alfalfa hay .....	82.64	82.64	84.25
	Ground shelled corn .....	586.65	621.16	605.91
	Soybean oil meal .....	73.76	74.38	76.60
	Salt .....	.83	2.06	1.70

#### SUMMARY OF PHASES I, II, AND III

November 29, 1948 to November 9, 1949—345 days

	Lot number .....	4	5	6
20.	Number of steers per lot .....	10	10	10
21.	Initial weight per steer .....	427	441	451
22.	Final weight per steer .....	977	1006	1039

23.	Gain per steer .....	550	565	588
24.	Daily gain per steer .....	1.59	1.64	1.70
25.	Feed required for 100 lbs. gain			
	Atlas sorgo silage .....	545.91	534.07	516.53
	Prairie hay .....	207.22	223.31	232.26
	Alfalfa hay .....	36.36	35.40	33.67
	Ground shelled corn .....	364.67	369.77	341.82
	Soybean oil meal .....	60.27	58.94	56.63
	Ground limestone .....	.75	.73	.70
	Salt .....	2.08	2.73	2.15
27.	Cost of feed for 100 lbs. gain..	\$ 14.06	\$ 14.20	\$ 13.46
28.	Shrink in transit to market:			
	Pounds per steer .....	37	36	33
	Percentage .....	3.79	3.59	3.13
29.	Dressing percent* .....	61.2	61.9	60.1
30.	On-foot grades:			
	Average good .....	1	2	
	Low good .....	5	1	1
	Top medium .....	2	7	6
	Average medium .....	2		3
31.	Carcass grades:			
	Average good .....	2	3	
	Low good .....	3	4	2
	Top commercial .....	4	2	6
	Average commercial .....	1		2
	Low commercial .....		1	
32.	Selling price per cwt. at market	\$ 26.75	\$ 27.50	\$ 24.75

\*Figured on hot carcass weight.

The following feed prices were used: Ground shelled corn, \$1.25 per bushel; soybean oil meal, \$75 per ton; alfalfa hay, \$20 per ton; prairie hay, \$15 per ton; Atlas sorgo silage, \$6.50 per ton; ground limestone, \$12 per ton; salt, \$12 per ton.

**TABLE 3. A COMPARISON OF HEREFORD STEERS Sired BY SMALL, MEDIUM AND LARGE SIZE BULLS**  
**System III—Wintering and Grazing, Two Seasons**  
**PHASE I—WINTERING AS CALVES**  
 November 29, 1948 to May 1, 1949—153 Days

1.	Lot number .....	7	8	9
2.	Size of sires .....	Small	Medium	Large
3.	Number of steers per lot .....	10	10	10
4.	Initial weight per steer .....	427	442	454
5.	Final weight per steer .....	574	588	620
6.	Gain per steer .....	147	146	166
7.	Daily gain per steer .....	.96	.95	1.08
8.	Daily ration per steer, pounds			
	Soybean meal .....	1.00	1.00	1.00
	Atlas sorgo silage .....	19.52	19.95	19.82
	Prairie hay .....	5.39	4.88	5.30
9.	Feed required per 100 pounds of gain, pounds:			
	Soybean meal .....	104.08	104.79	92.17
	Atlas sorgo silage .....	2032.31	2090.75	1826.81
	Prairie hay .....	561.50	511.58	488.73

10.	Cost of feed per 100 pounds gain .....	\$ 14.62	\$ 14.46	\$ 12.97
11.	Total feed cost per steer .....	21.49	21.11	21.53

PHASE II—GRAZING AS YEARLINGS

May 1, 1949 to October 15, 1949—167 days

12.	Initial weight per steer .....	574	588	620
13.	Final weight per steer .....	762	790	834
14.	Gain per steer .....	188	202	214
15.	Daily gain per steer .....	1.13	1.21	1.28
16.	Cost of grazing per steer (bluestem pasture) .....	\$ 12.00	\$ 12.00	\$ 12.00
17.	Cost of 100 pounds of pasture gain .....	6.38	5.94	5.61

PHASE III—WINTERING AS YEARLINGS

October 15, 1949 to April 15, 1950—182 days

18.	Initial weight per steer .....	762	790	834
19.	Final weight per steer .....	924	984	1040
20.	Gain per steer .....	162	194	206
21.	Daily gain per steer .....	.89	1.07	1.13
22.	Daily ration per steer, pounds			
	Soybean meal .....	1.01	1.01	1.01
	Sorghum silage .....	37.76	42.64	41.19
	Prairie hay .....	4.06	4.02	4.67
23.	Feed required for 100 pounds gain, pounds:			
	Soybean meal .....	113.58	94.85	89.32
	Sorghum silage .....	4242.10	3999.85	3639.22
	Prairie hay .....	456.17	377.47	412.52
24.	Cost of feed per 100 pounds gain .....	\$ 21.26	\$ 19.19	\$ 18.09
25.	Total feed cost per steer .....	34.43	37.22	37.26

SUMMARY OF PHASES I, II, AND III

November 29, 1948 to April 15, 1950—502 days

26.	Initial weight per steer .....	427	442	454
27.	Final weight per steer .....	924	984	1040
28.	Gain per steer .....	497	542	586
29.	Daily gain per steer .....	.99	1.08	1.17
30.	Feed required per 100 pounds gain			
	Soybean meal .....	67.81	62.18	57.51
	Silage .....	1983.84	1994.87	1796.81
	Prairie hay .....	314.77	272.92	283.46
31.	Feed cost per 100 pounds gain	\$ 13.66	\$ 12.98	\$ 12.08
32.	Total feed cost per steer .....	67.92	70.33	70.79
33.	Appraised value per cwt. on May 5, 1950 .....			

**Project 253-1: Wintering and Grazing Steer Calves**  
**METHODS OF WINTERING STEER CALVES THAT ARE TO**  
**BE GRAZED A FULL SEASON AND SOLD OFF OF GRASS**  
**1949-1950**

Ed F. Smith, D. L. Good, R. F. Cox

**INTRODUCTION**

It is a well known fact that thin steers usually gain more on grass than fleshy steers. However, information is available about the total gain, winter and summer, of steers wintered at different levels and then grazed on bluestem pasture. The primary objective of this test is to determine how steer calves should be wintered that are to be grazed a full season on bluestem pasture and sold off of grass. This is a report on the wintering phase, prior to going to grass for the 1950 season.

**EXPERIMENTAL PROCEDURE**

Five lots of good quality Hereford steer calves, 10 head to a lot, were used in this study. All were fed in dry lots, except Lot 1 which was fed on dry bluestem pasture. The different lots received the following rations from November 25, 1949, to April 15, 1950.

Lot 1—Bluestem pasture and 2 pounds of soybean pellets per head daily.

Lot 2—Silage and 1 pound of soybean pellets per head daily.

Lot 3—Prairie hay and 1 pound of soybean pellets per head daily.

Lot 4—Prairie hay, 2 pounds of corn and 1 pound of soybean pellets per head daily.

Lot 5—Prairie hay, 4 pounds of corn and 1 pound of soybean pellets per head daily.

All lots will be grazed on bluestem pasture a full season in 1950.

**OBSERVATIONS**

1. Lot 1 wintered on bluestem pasture and fed 2 pounds of soybean pellets per head daily made a gain of .79 pound per head daily. The winter was exceptionally mild with very little rain or snow. The pasture in which these calves were wintered is a creek bottom bluestem pasture with considerable bluegrass in it.
2. The calves in Lot 2 fed silage and 1 pound of soybean pellets gained 1.13 pounds per head daily, about the same gain made by the calves in Lot 3 fed prairie hay and 1 pound of soybean pellets, which was 1.11 pounds per head daily.
3. Two pounds of corn fed in Lot 4 increased the gain .21 of a pound per head daily and 4 pounds of corn fed in Lot 5 increased gain .45 of a pound per head daily over the gain in Lot 3, fed prairie hay and 1 pound of soybean pellets, per head daily.
4. About one-half ton of prairie hay in addition to the soybean pellets was required to produce 100 pounds of gain in Lot 3, and about 1 1/4 tons of silage in addition to soybean pellets were required to produce 100 pounds of gain in Lot 2.

**TABLE 1. METHODS OF WINTERING STEER CALVES THAT ARE TO BE GRAZED A FULL SEASON AND SOLD OFF OF GRASS**  
**PHASE I—WINTERING**

November 25, 1949, to April 15, 1950—141 days					
1. Lot number ....	1	2	3	4	5
2. Number of steers per lot..	10	9	9	10	10
3. Place of wintering .....	Bluestem Pasture	Dry Lot	Dry Lot	Dry Lot	Dry Lot

4.	Average initial weight .....	431	430	434	432	432
5.	Average final weight .....	543	590	591	618	652
6.	Average gain..	112	160	157	186	220
7.	Average daily gain .....	.79	1.13	1.11	1.32	1.56
8.	Average daily ration, pounds:					
	Ground shelled corn .....				2.00	4.00
	Soybean pellets .....	2.00	1.00	1.00	1.00	1.00
	Prairie hay <sup>1</sup> ..	.04		12.24	10.84	9.83
	Silage .....		28.23			
	Bluestem pasture .....	Ad lib				
	Salt .....	.07	.06	.06	.06	.06
9.	Feed required for 100 pounds of gain:					
	Ground shelled corn .....				151.61	256.36
	Soybean pellets .....	251.79	88.13	89.91	75.81	64.09
	Prairie hay ..	5.36		1099.57	821.88	630.05
	Silage .....		2487.50			
	Salt .....	9.02	5.50	5.17	4.65	3.64
10.	Cost of feed per 100 pounds gain .....	\$ 14.89	\$ 11.30	\$ 10.55	\$ 11.59	\$ 12.24
11.	Total feed cost per steer .....	\$ 16.67	\$ 18.08	\$ 16.56	\$ 21.56	\$ 26.92
12.	Initial cost per steer at \$24.50 per cwt. ....	\$105.60	\$105.35	\$106.33	\$105.84	\$105.84
13.	Initial cost per steer plus feed cost .....	\$122.27	\$123.43	\$122.89	\$127.40	\$132.76
14.	Necessary selling price per cwt. to cover initial cost plus feed cost .....	\$ 22.52	\$ 20.92	\$ 20.79	\$ 20.61	\$ 20.36
15.	Appraised value per cwt. on May 5, 1950 ..					

- (1) Prairie hay was fed to Lot 1 only when snow covered the grass.  
(2) Feed prices: Ground shelled corn, \$1.25 bu.; Soybean pellets, \$75 per ton; Prairie hay, \$13 per ton; Silage, \$6.50 per ton; Bluestem pasture, \$6 for the winter season; Salt, \$12 per ton.



## Project 253-2: Wintering, Grazing and Fattening Heifers

### FATTENING HEIFERS FOR THE SUMMER OR EARLY FALL MARKET 1948-1949

Ed F. Smith - Don L. Good - A. G. Pickett

#### INTRODUCTION

The purpose of this experiment is to develop a desirable system or systems of fattening heifer calves similar to the Deferred Full Feeding system for steer calves. The system developed for good quality steer calves consists of three phases (1) producing 225 to 250 pounds of gain during the winter, which usually requires the feeding of four to five pounds of grain per head daily; (2) grazing 90 days without grain; (3) full feeding 100 days in the dry lot. The results of several prior trials at this station with heifer calves were considered before planning this experiment.

Some of the problems which it is hoped this experiment will answer are: (1) How well should heifer calves be wintered that are going to be full fed following the winter period or full fed after a short period on grass? (2) Wintering, followed by full feeding vs. wintering, early summer grazing and then full feeding. (3) Should the full feeding of grain take place on grass or in the dry lot?

This is the second of a series of three tests. The first was reported at the 1949 Livestock Feeders' Day. Eighty good quality Hereford heifer calves were purchased for use in this test October 23, 1948, at \$26.50 per cwt. They were handled as follows.

#### EXPERIMENTAL PROCEDURE

Lot 1 - Wintered on atlas silage, prairie hay, dehydrated alfalfa pellets, 2 pounds of corn and then full fed 105 days in dry lot.

Lot 2 - Wintered on atlas silage, prairie hay, soybean oil meal, 2 pounds of corn and then full fed corn 105 days on brome grass.

Lot 3 - Wintered on atlas silage, prairie hay, dehydrated brome grass pellets and 2 pounds of corn; grazed from April 13 to June 1 on brome grass and full fed corn on brome grass from June 1 to July 1 at which time they were moved to dry lot and full fed until September 18, a total of 109 days on full feed.

Lot 4 - Wintered on atlas silage, prairie hay, cottonseed meal and 2 pounds of corn; grazed from May 1 to July 18 on bluestem pasture and then full fed corn on bluestem pasture for 103 days.

Lot 5 - Wintered on atlas silage, prairie hay, linseed meal and 2 pounds of corn; grazed from May 1 to July 18 on bluestem pasture and then full fed in the dry lot for 103 days.

Lot 6 - Wintered on atlas silage, prairie hay and cottonseed meal; grazed from May 1 to July 18 on bluestem pasture and then full fed corn on bluestem grass for 103 days.

Lot 7 - Wintered on atlas silage, prairie hay and cottonseed meal; grazed from May 1 to July 18 on bluestem grass and then full fed for 103 days in dry lot.

Lot 8 - Wintered on atlas silage, prairie hay and cottonseed meal; grazed on bluestem pasture from May 1 to August 15; fed 1½ pounds of soybean pellets per head daily in addition to the grass from July 18 to August 15; and then full fed 75 days in a dry lot.

#### OBSERVATIONS

##### Wintering Phase:

1. Approximately 2 pounds of corn fed per head daily in Lots 2, 4 and 5 increased the gain per head daily about one quarter of a pound over Lots 6, 7 and 8 where no corn was fed.

2. Heifers fed 1 pound of cottonseed meal, linseed meal or soybean oil meal (Lots 2, 4 and 5) on the average gained about a quarter of a pound more per head daily than heifers fed one and three quarter pounds of either dehydrated alfalfa pellets (15.4% protein) or dehydrated brome grass pellets (16.4% protein) Lots 1 and 3.

3. The addition of dehydrated alfalfa pellets or brome grass pellets to the ration decreased roughage consumption slightly.

4. Soybean oil meal (41% crude protein), cottonseed meal (41% crude protein) and linseed meal (36% crude protein) were found to be about equal in producing gains in this test.

5. The cost of feed per hundred pounds of gain and the total feed cost per heifer was appreciably increased for Lots 1 and 3 due to the feeding of dehydrated alfalfa and brome grass pellets to those lots.

#### Grazing Phase:

1. On the average, Lots 6 and 7 wintered on roughage and protein, without grain, gained about a quarter of a pound more per head daily on bluestem pasture than Lots 4 and 5 wintered on roughage, protein and 2 pounds of corn per head daily.

2. The well wintered heifers, Lots 4 and 5, averaged 16 pounds more gain per head, considering both the winter and summer phase, at the close of the grazing phase, than did Lots 6 and 7 which were wintered only on roughage and protein.

3. Lot 3, wintered on roughage, protein and 2 pounds of corn made a daily gain of 1.84 pounds per head daily on brome grass from April 18 to June 1. This is approaching the gain expected on full feed in the dry lot.

4. Lot 8 was fed 1½ pounds of soybean oil meal pellets per head daily from July 18 to August 15 and then moved to dry lot for full feeding. Although not shown, this lot gained 1.36 pounds per head daily up to July 18. From July 18 to August 15, the caking period, it gained 1.32 pounds per head daily which included a shrink in moving them to dry lot.

#### Full Feeding and Summary:

1. Heifers full fed for 105 days after the wintering period are ready for market at a time when this kind of cattle are usually highest in price.

2. According to this and the preceding test, heifers full fed corn on brome grass following the wintering period will not gain as rapidly nor finish as well as heifers full fed corn in the dry lot after the wintering period - see Lots 1 and 2. Due largely to the increased cost of feeding dehydrated alfalfa pellets to Lot 1, they failed to show as much profit as did Lot 2 (line 38).

3. The system of management which seemed to work best in this test was followed with Lot 3 in which well wintered heifers were turned on brome grass pasture April 18, fed corn on brome grass pasture June 1 to July 1, and then moved to dry lot. For completion of the full feeding period these heifers made good gains on brome grass and in the dry lot. Furthermore, they:

- a. Sold for more per cwt. than any other lot (line 36).
- b. Returned a greater profit per head (line 38).
- c. Outdressed all the other lots of heifers (line 40).
- d. Graded considerably higher than any other lot (line 41).

4. Full feeding corn on bluestem grass in this test was not as satisfactory as full feeding in the dry lot - see Lots 4, 5, 6 and 7. Dry lot fed heifers:

- a. Consumed slightly more corn.
- b. Sold for \$1.50 to \$2.00 more per cwt.
- c. Returned a greater profit per head, see line 38.
- d. Graded higher in the carcass, 7 out of 20 were in the good

grade whereas heifers full fed corn on grass yielded only one carcass out of 20 that graded good.

5. In this test on the basis of total gain, selling price and carcass grade the feeding of 2 pounds of corn per head daily during the winter period in addition to roughage and protein was not justified. Compare the well wintered Lots 4 and 5 to Lots 6 and 7 which were fed no corn during the winter. In other tests at this station, the feeding of 2 pounds of grain per head daily during the winter appeared to be desirable.

6. Heifers that were continued on grass after July 18 (Lot 8) and fed 1½ pounds of protein per head daily until August 15, 28 days, then moved to dry lot for full feeding graded just as high in the carcass as heifers full fed in the dry lot starting July 18 (Lot 7) both being marketed at the same time. However, they sold for \$1.00 a cwt. less than Lot 7 which was fed 103 days in dry lot. They also failed to return as much profit per head due to the lower selling price and to the fact that they failed to make as much total gain.

7. On the basis of this and other tests, heifer calves that are well wintered and then full fed or go to grass followed by full feeding require 100 days full feeding or longer to produce heifers that will grade U. S. Good.

## FATTENING HEIFERS FOR THE SUMMER OR EARLY FALL MARKET

### PHASE I—WINTERING

November 29, 1948 to May 1, 1949—153 Days

1. Lot number .....	1 <sup>1</sup>	2 <sup>1</sup>	3 <sup>1</sup>	4	5	6	7	8
2. Number of heifers per lot ....	10	9	9	10	10	10	10	10
3. Number of days in phase .....	140	140	140	153	153	153	153	153
4. Average daily ration, lbs.:								
Ground shelled corn .....	1.90	1.92	1.92	1.93	1.93			
Cottonseed meal .....				1.00		1.01	1.01	1.01
Soybean meal .....		1.00						
Linseed meal .....					1.04			
Dehydrated alfalfa pellets ..	1.75							
Dehydrated brome grass pellets .....			1.78					
Prairie hay .....	3.73	4.16	4.05	4.71	4.38	4.92	4.92	4.92
Atlas sorgo silage .....	19.67	20.00	19.85	19.90	19.90	19.95	19.95	19.95
Salt .....	.05	.04	.03	.06	.05	.02	.02	.02
5. Average initial weight, lbs. ..	446	463	444	460	463	446	450	440
6. Average final weight, lbs. ....	588	614	594	648	650	589	608	576
7. Average gain, lbs. ....	142	151	150	188	187	143	158	136
8. Average daily gain, lbs. ....	1.01	1.29	1.07	1.23	1.22	.93	1.00	.80
9. Cost of feed for cwt. gain ....	\$ 18.39	\$ 18.61	\$ 17.79	\$ 14.65	\$ 14.88	\$ 14.85	\$ 13.44	\$ 15.61
10. Feed cost per heifer .....	\$ 26.12	\$ 24.64	\$ 26.69	\$ 27.54	\$ 27.83	\$ 21.24	\$ 21.24	\$ 21.24

PHASE II—GRAZING

11. Lot number .....	1	2	3	4	5	6	7	8
12. Management followed .....	Full fed in Dry lot	Full fed on brome grass	Grazed on brome grass April 18 to June 1, '49	Grazed on bluestem grass May 1 to July 18, '49	Grazed on bluestem grass May 1 to July 18, '49	Grazed on bluestem grass May 1 to July 18, '49	Grazed on bluestem grass May 1 to July 18, '49	Grazed on bluestem grass May 1 to Aug. 15, Fed 2½ lbs. soybean pellets per head daily after July 18
13. Number of days in phase ....			44	78	78	78	78	106
14. Average initial weight, lbs...			594	648	650	589	608	576
15. Average final weight, lbs. ....			675	714	745	697	702	719
16. Average gain, lbs. ....			81	66	95	108	94	143
17. Average daily gain, lbs. ....			1.84	.85	1.22	1.38	1.21	1.35

PHASE III—FULL FEEDING

18. Lot number .....	1	2	3	4	5	6	7	8
19. Period when full fed and where .....	Apr. 18, '49 to Aug. 1, '49 Dry lot	Apr. 18, '49 to Aug. 1, '49 Brome grass	June 1, '49 to Sept. 18, '49 Brome grass Dry lot	July 18, '49 to Oct. 29, '49 Bluestem grass	July 18, '49 to Oct. 29, '49 Dry lot	July 18, '49 to Oct. 29, '49 Bluestem grass	July 18, '49 to Oct. 29, '49 Dry lot	Aug. 15, '49 to Oct. 29, '49 Dry lot
20. Number of days in phase ....	105	105	109	103	103	103	103	75
21. Average initial weight, lbs...	588	644	675	714	745	697	702	719
22. Average final weight, lbs. ....	809	839	884	866	933	884	909	867
23. Average gain, lbs. ....	221	195	209	152	188	187	207	148
24. Average daily gain, lbs. ....	2.10	1.77	1.92	1.48	1.83	1.82	2.01	1.97

PHASE III, Continued	1	2	3 <sup>1</sup>	4	5	6	7	8
25. Average daily ration, lbs.:								
Ground shelled corn .....	9.37	9.12	9.98	11.56	12.58	11.56	12.81	12.78
Soybean meal .....	.80	.67	1.22	1.56	1.66	1.56	1.66	1.76
Dehydrated alfalfa pellets ..	2.64		1.04					
Prairie hay .....	4.98				6.86		7.82	7.64
Alfalfa hay .....	6.06		4.79		1.75		1.75	1.81
Atlas silage .....	3.81							
26. Bushels corn fed per heifer during this phase .....	17.57	17.11	19.42	21.26	23.13	21.26	23.56	17.11
27. Feed per cwt. gain, lbs.:								
Ground shelled corn .....	445.29	515.11	520.31	783.13	680.04	636.55	637.25	647.43
Soybean meal .....	38.00	37.63	63.69	105.92	90.96	86.10	82.61	117.91
Dehydrated alfalfa pellets ..	125.34		54.22					
Prairie hay .....	53.53				375.90		388.94	387.36
Alfalfa hay .....	387.87		250.03		95.74		86.96	91.89
Atlas silage .....	181.00							
28. Cost of feed for 100 pounds of gain .....	\$ 18.97	\$ 17.77	\$ 19.56	\$ 21.44	\$ 22.55	\$ 17.42	\$ 21.10	\$ 22.08
29. Total feed cost this phase ..	\$ 41.93	\$ 33.05	\$ 40.88	\$ 32.58	\$ 42.40	\$ 38.38	\$ 43.67	\$ 33.67

SUMMARY OF PHASES 1, 2 AND 3

	1	2	3	4	5	6	7	8
30. Average total gain (all phases) .....	363	367	440	406	470	438	459	427
31. Average daily gain (all phases) .....	1.48	1.51	1.50	1.22	1.41	1.31	1.37	1.28
32. Feed cost for 100 pounds of gain (all phases) .....	\$ 18.75	\$ 15.72	\$ 16.95	\$ 17.77	\$ 17.50	\$ 15.03	\$ 16.75	\$ 15.65
33. Total cost of feed and grass per heifer .....	\$ 68.06	\$ 57.69	\$ 70.62	\$ 72.15	\$ 82.23	\$ 65.84	\$ 76.90	\$ 66.81

## SUMMARY OF PHASES 1, 2 AND 3—Continued

	1	2	3	4	5	6	7	8
34. Initial cost per heifer at \$26.50 cwt. ....	\$118.19	\$122.70	\$117.66	\$121.90	\$122.70	\$118.19	\$119.25	\$116.60
35. Feed cost plus heifer cost ...	\$186.25	\$180.39	\$188.28	\$194.05	\$204.93	\$184.03	\$196.15	\$183.41
36. Selling price per cwt. at market .....	\$ 27.00	\$ 26.00	\$ 27.33	\$ 21.50	\$ 23.50	\$ 22.00	\$ 23.50	\$ 23.50
37. Selling price per heifer .....	\$211.68	\$209.55	\$235.86	\$179.53	\$212.68	\$188.54	\$208.92	\$188.33
38. Margin per heifer above feed cost and initial cost .....	\$ 25.43	\$ 29.17	\$ 47.58	\$-14.52	\$ 7.75	\$ 4.51	\$ 12.77	\$ 4.92
39. Percent shrink in shipping to market .....	3.09	2.89	2.38	3.58	3.00	3.05	2.20	3.46
40. Dressing percent .....	58.5	58.6	60.6	59.13	59.0	57.56	57.39	57.51
41. Carcass grades, U. S.:								
High Good .....			1					
Average Good .....			3		1			
Low Good .....	5		4		2	1	4	4
High Commercial .....	4	3	1	3	6	5	5	5
Average Commercial .....	1	5		6	1	3	1	1
Low Commercial .....		1		1		1		

- (1) For Lot number 2, 4 and 5 the winter period extended only to April 18, 1949.
- (2) One and one half pounds of soybean pellets were fed per head daily on bluestem pasture from July 18 to August 15, 1949.
- (3) Lot 3 was full fed corn on brome grass from June 1 to July 1 at which time they were moved to a dry lot and continued on full feed until September 18.
- (4) Feed prices: Ground shelled corn, \$1.25 per bu.; Cottonseed meal, Soybean oil meal or pellets, \$75 per ton; Linseed meal, \$80 per ton; Dehydrated alfalfa and brome grass pellets, \$60 per ton; Alfalfa hay, \$20 per ton; Prairie hay, \$15 per ton; Silage, \$6.50 per ton; Limestone and salt, \$12 per ton; Bluestem grass, \$12 per head; Brome grass, \$3 per head per month.

**Project 253-2: Wintering, Grazing and Fattening Heifers**  
**Wintering Heifer Calves That Are To Be Fattened for the Summer or**  
**Early Fall Market, 1949-50**

E. F. Smith, D. L. Good and R. F. Cox

This is a report of the wintering phase of the third of a series of tests started in the fall of 1947 to develop a system or systems of fattening heifer calves similar to the deferred full feeding system involving the use of good quality steer calves which was developed at Kansas State College.

Upon completion of this year's test the results will be published in the Annual Feeders' Day report for 1951. The results of this experiment should prove of interest to producers with native pasture or temporary pasture, as well as those who have no pasture but are interested only in wintering and full feeding heifers.

The objectives of this experiment are:

- (1) To develop a system of deferred full feeding using heifer calves.
- (2) To compare different wintering rations for heifer calves.
- (3) To compare various methods of finishing heifers. The 1949-50 wintering test included:
  - (1) A comparison of grain VS. no grain in wintering rations.
  - (2) A comparison of five protein supplements, solvent extracted cottonseed meal 41% crude protein, old process cottonseed meal 41% crude protein, soybean pellets 41% crude protein, dehydrated red clover pellets 14.55% crude protein, dehydrated alfalfa 17% crude protein.

**EXPERIMENTAL PROCEDURE**

Eighty good quality Hereford heifer calves were purchased November 4, 1949, for use in this test. They were divided into eight lots of 10 head each. The system of management planned for each lot follows.

- Lot 1 - Wintered on 2 pounds of corn, solvent extracted cottonseed meal, silage and prairie hay; grazed on bluestem pasture May 1 to July 15; then full fed in dry lot 100 days.
- Lot 2 - Wintered on 2 pounds of corn, soybean pellets, silage and prairie hay; grazed on bluestem pasture May 1 to July 15; then full fed corn on bluestem pasture 100 days.
- Lot 3 - Wintered on 2 pounds of corn, old process cottonseed meal, silage, and prairie hay; then full fed in dry lot 100 days.
- Lot 4 - Wintered on 2 pounds of corn, dehydrated red clover pellets, silage and prairie hay; then full fed corn on brome grass 100 days.
- Lot 5 - Wintered on 2 pounds of corn, dehydrated alfalfa pellets, silage and prairie hay; grazed on brome grass April 15 to June 1; full fed corn on brome grass June 1 to July 1, then full fed in a dry lot.
- Lot 6 - Wintered on soybean pellets, silage and prairie hay; grazed May 1 to July 15 on bluestem pasture; then full fed 100 days in dry lot.
- Lot 7 - Wintered on soybean pellets, silage and prairie hay; grazed May 1 to July 15 on bluestem pasture; then full fed 100 days on bluestem pasture.
- Lot 8 - Wintered on soybean pellets, silage and prairie hay; grazed May 1 to August 15 on bluestem pasture, fed 1½ pounds of soybean pellets per head daily on pasture from July 15 to August 15; then full fed in a dry lot.

**OBSERVATIONS**

1. Heifers fed 2 pounds of corn per head daily in addition to silage,



prairie hay and a protein concentrate gained on the average .18 of a pound more per head daily than heifers fed only silage, prairie hay and a protein concentrate. Stated in another way, 290 pounds (5.2 bu.) of corn produced 24 pounds of gain on the average. Compare lots 1, 2 and 3 with lots 6, 7 and 8.

2. The heifers in lots 1, 2, 3 and 5 fed the additional 2 pounds of corn were quite fleshy at the close of the wintering period.
3. Three pounds of dehydrated red clover pellets fed in lot 4 as a protein supplement produced a gain of only .95 of a pound per head daily compared to gains of 1.32 pounds for lot 1 fed solvent extracted cottonseed meal, 1.32 pounds for lot 2 fed soybean pellets and 1.28 pounds for lot 3 fed old process cottonseed meal. The red clover pellets were unpalatable, having a bitter taste, and difficulty was encountered in getting the heifers to consume them. Finally, they had to be ground and mixed with the silage. This lot presented an unthrifty appearance, had harsh appearing hair and showed considerably less flesh than any other well wintered lot.
4. Two and one half pounds of dehydrated alfalfa pellets per head daily fed in lot 5 produced a lower gain than was obtained in lots 1, 2 and 3 fed protein concentrates.
5. The feeding of dehydrated red clover pellets in lot 4 and dehydrated alfalfa pellets in lot 5 decreased the roughage consumption significantly. All lots were fed as much prairie hay as they would consume after cleaning up their silage ration. It was planned to feed 20 pounds of silage per head daily but lot 4 was never able to consume quite 20 pounds of silage per head daily and lot 5 had some difficulty in consuming this amount.
6. One pound of soybean pellets, and 20 pounds of silage per head daily fed with prairie hay in lots 6, 7 and 8 produced a little more than 1 pound of gain per head daily.
7. Solvent extracted cottonseed meal, old process cottonseed meal and soybean pellets gave approximately the same daily gain. see lots 1, 2 and 3. No other differences were noted among these lots.
8. The cost of producing 100 pounds of gain was greatly increased in lots 4 and 5 fed dehydrated red clover and alfalfa pellets.

TABLE 1. WINTERING HEIFER CALVES THAT ARE TO BE FATTENED FOR THE SUMMER OR EARLY FALL MARKET

PHASE I—WINTERING

November 21, 1949 to April 15, 1950—145 days

1. Lot number .....	1	2	3	4	5	6	7	8
2. Number of heifers per lot...	10	11	10	10	10	11	10	10
3. Ration fed .....	Corn, Solvent extracted cottonseed meal, Silage, Prairie Hay	Corn, Soybean Pellets, Silage, Prairie Hay	Corn, old process Cottonseed Meal, Silage, Prairie Hay	Corn, Dehydrated Red Clover Pellets, Silage, Prairie Hay	Corn, Dehydrated Alfalfa Pellets, Silage, Prairie Hay	Soybean Pellets, Silage, Prairie Hay	Soybean Pellets, Silage, Prairie Hay	Soybean Pellets, Silage, Prairie Hay
4. Average daily ration, lbs.:								
Corn .....	2.00	2.00	2.00	2.00	2.00			
Solvent Extracted Cotton- seed Meal .....	1.00							
Soybean Pellets .....		1.00				1.00	1.00	1.00
Old process Cottonseed Meal			1.00					
Dehydrated Red Clover Pellets .....				2.95				
Dehydrated Alfalfa Pellets..					2.50			
Silage .....	20.00	20.00	19.95	18.74	19.93	20.00	20.00	19.93
Prairie Hay .....	2.63	2.56	2.54	.59	.78	3.06	3.16	3.22
Salt .....	.08	.07	.06	.07	.06	.05	.04	.05
5. Average initial weight .....	418	417	417	418	417	418	420	417
6. Average final weight .....	609	608	602	562	587	576	590	583
7. Average gain .....	191	191	185	144	170	158	170	166
8. Average daily gain .....	1.32	1.32	1.28	.99	1.17	1.09	1.17	1.14

PHASE 1—WINTERING (Continued)

Lot number .....	1	2	3	4	5	6	7	8
9. Feed required for 100 pounds gain, lbs.:								
Corn .....	151.83	151.83	156.76	201.39	170.59			
Solvent extracted Cottonseed Meal .....	75.92							
Soybean Pellets .....		75.92				91.77	85.29	87.35
Old process Cottonseed Meal			78.38					
Dehydrated Red Clover Pellets .....				297.22				
Dehydrated Alfalfa Pellets..					212.94			
Silage .....	1518.32	1518.32	1563.51	1887.15	1700.00	1835.44	1705.88	1740.96
Prairie Hay .....	199.97	194.43	198.92	59.38	66.71	280.90	269.64	281.19
Salt .....	5.78	5.57	4.92	7.29	4.82	4.80	3.63	4.57
10. Cost of feed for 100 pounds gain .....	\$ 12.42	\$ 12.30	\$ 12.76	\$ 19.87	\$ 16.10	\$ 11.17	\$ 10.43	\$ 10.70
11. Feed cost per helper .....	\$ 23.73	\$ 23.66	\$ 23.61	\$ 28.62	\$ 27.36	\$ 17.65	\$ 17.73	\$ 17.77
12. Initial cost of helpers at \$23.50 per cwt. ....	\$ 98.23	\$ 98.00	\$ 98.00	\$ 98.23	\$ 98.00	\$ 98.23	\$ 98.70	\$ 98.00
13. Helper cost plus feed cost ....	\$121.96	\$121.66	\$121.61	\$126.85	\$125.36	\$115.88	\$116.43	\$116.77
14. Necessary selling price per cwt. to pay for feed and initial cost .....	\$ 20.03	\$ 20.01	\$ 20.20	\$ 22.57	\$ 21.36	\$ 20.12	\$ 19.73	\$ 19.86
15. Appraised value per cwt. May 5, 1950 .....								

Feed Prices: Ground shelled corn, \$1.25 per bushel; Solvent extracted cottonseed meal, Soybean Pellets, old process Cottonseed Meal, \$75.00 per ton; Dehydrated Red Clover Pellets, Dehydrated Alfalfa Pellets, \$6.00 per ton; Silage, \$6.50 per ton; Prairie Hay, \$13.00 per ton; Salt, \$12.00 per ton.

## Project 253-3: Effect of Grazing System on Livestock and Vegetation

### A Comparison of Different Methods of Grazing Bluestem Pastures

Ed P. Smith - A. G. Pickett  
and Kling Anderson

It is important that we know as much as possible about the carrying capacity of our bluestem pastures. Cattlemen in general are interested in obtaining as much gain as possible from their grass in keeping with sound management. They would like to know whether there is any method of increasing the safe stocking load and maintaining gain as well as grass. Also the effect of such increase on forage species, stand and vigor, and weed population.

#### EXPERIMENTAL PROCEDURE

Six pastures containing 60 acres each are being used in this study and were managed as follows in 1949:

Pasture 1: Normal rate of stocking, 4 acres per head

Pasture 2: Overstocked, 3 1/3 acres per head

Pasture 3: Not stocked during May, turned on June 1, 3 acres per head

Pastures 4, 5 and 6: Deferred and rotation grazing, 4 acres per head. All steers were held in two pastures until June 20, then turned into the protected pasture until deemed advisable to allow them the run of all three pastures which in 1949 was August 5.

The stocking rates are flexible and may be adjusted as deemed necessary.

#### OBSERVATIONS

1. The gain made by the steers in the pasture grazed at the rate of 4 acres per steer was 244 pounds per head; on the deferred and rotation plan 221 pounds; and at the rate of 3 1/3 acres per steer, 219 pounds.

2. Pasture 3 in which grazing was deferred until June 1, thus allowing the grass to obtain good growth and thereby increasing carrying capacity produced the smallest gain in this test. Although difficult to show, it should not be overlooked that the steers grazed in this pasture were utilizing other grass prior to June 1 and had already made substantial gains before going on test. A system of grazing of this type is designed to utilize earlier grasses in conjunction with bluestem.

3. The greatest gain per acre was obtained from Pasture 2, overstocked. Other experiments have sometimes shown this to be true during the early stages of the experiment, but as overgrazing continued gains per acre have declined.

4. In view of the unusually light rainfall during the period from July to the close of the growing season of 1949 all of the pastures were fairly closely grazed; however, the three used in the deferred-rotation trials were much less closely grazed than the other three.

TABLE 1. A COMPARISON OF DIFFERENT METHODS OF GRAZING BLUESTEM PASTURES

May 1, 1949 to October 10, 1949—162 days

1. Pasture number .....	1	2	3	4, 5 & 6
2. Method of grazing.....	Normally stocked	Overstocked	Stocked June 1	Deferred and rotated <sup>1</sup>
3. No. of head per pasture	15	18	20	45
4. No. of acres per pasture	60	60	60	3-60 acre pastures
5. No. of acres per head ....	4	3 1/3	3	4

6. Av. initial weight, lbs...	731	728	804 <sup>2</sup>	729
7. Av. final weight, lbs. ..	975	947	951	950
8. Av. gain, lbs. ....	244	219	147	221
9. Av. daily gain, lbs. ....	1.51	1.35	1.12	1.36
10. Gain per acre, lbs. ....	61	66	49	55

- 1—Deferred and rotated grazing—all steers were held in two pastures until June 20, then turned into protected pasture until August 5 at which time they were allowed the run of all three pastures.
- 2—Lot 3 was held on another pasture until June 1 which decreased their number of days on test to 131. Their initial weight is as of June 1, whereas the other weights date from May 1.

## Project 253-4: Wintering and Grazing Yearling Steers

### A—A Comparison of Protein Supplements and Methods of Feeding Protein Supplements to Yearling Steers Wintered on Bluestem Pasture, 1948-49

Ed F. Smith—A. G. Pickett

Good to choice quality yearling Hereford steers were used in this study which included four lots of 10 steers each. The objective was to determine the value of dry bluestem grass when supplemented with different proteins fed by various methods. All pastures used for winter grazing had been used the previous summer but were not closely grazed and dry grass was abundant. The steers were allowed from twelve to eighteen acres per head.

#### EXPERIMENTAL PROCEDURE

- Lot 1—Wintered on bluestem grass with three pounds of soybean pellets per steer fed every other day.
- Lot 2—Wintered on bluestem grass with a mixture of salt and cottonseed meal, self-fed. (The purpose of the salt is to limit the consumption of the cottonseed meal.)
- Lot 3—Wintered on bluestem grass with six pounds of alfalfa hay per steer daily.
- Lot 4—Wintered on bluestem grass with 1½ pounds of soybean pellets per steer daily.

TABLE 1. A COMPARISON OF PROTEIN SUPPLEMENTS AND METHODS OF FEEDING PROTEIN SUPPLEMENTS TO YEARLING STEERS WINTERED ON BLUE-STEM PASTURE

December 1, 1948 to May 1, 1949—151 Days

1. Lot number .....	1	2	3	4
2. No. steers per lot .....	10	10	10	10
3. Method of feeding .....	Fed soybean pellets every other day	Self fed cottonseed meal and salt mixed together	Fed alfalfa hay daily	Fed soybean pellets daily
4. Average daily winter ration:				
Soybean pellets .....	1.51			1.50
Cottonseed meal .....		2.81		
Salt .....	ad lib	.88	ad lib	ad lib
Alfalfa hay .....			6.10	

	ad lib	ad lib	ad lib	ad lib
Bluestem grass .....				
Prairie hay <sup>1</sup> .....				
5. Av. initial weight .....	745	755	755	749
6. Av. final weight .....	757	806	769	775
7. Av. gain .....	12	51	14	26
8. Av. daily gain .....	.08	.34	.09	.17
9. Feed cost per steer for entire winter .....	\$ 20.94	\$ 28.94	\$ 20.38	\$ 20.56
10. Initial cost per steer at 25 1/2c per pound .....	\$189.98	\$192.53	\$192.53	\$191.00
11. Initial cost per steer plus winter feed cost .....	\$210.92	\$221.47	\$212.91	\$211.56
12. Necessary selling price per cwt. to cover initial cost plus wintering cost .....	\$ 27.86	\$ 27.48	\$ 27.69	\$ 27.30
13. Appraised value per cwt. on May 6, 1949 .....	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00

(1) All lots were fed Prairie hay when snow covered the grass. The total Prairie hay fed per steer is as follows: Lot 1, 318 lbs.; Lot 2, 300 lbs.; Lot 3, 156 lbs.; Lot 4, 276 lbs.

Feed prices: Cottonseed meal and Soybean Pellets, \$75 per ton; Alfalfa hay, \$20 per ton; Prairie hay, \$15 per ton; Bluestem grass for winter 1948-49, \$10 per head; Salt, \$12 per ton.

#### OBSERVATIONS

- All steers in this test wintered in a strong thrifty condition.
- The total winter gains were so small except in the case of Lot 2 that it is difficult to make comparisons of the different rations.
- All lots gained in weight up to March 1 and all except Lot 4 showed heavy losses for the month of March; Lot 1 lost 67 pounds, Lot 2 lost 28 pounds and Lot 3 lost 58 pounds. All these losses were offset by heavy gains during the month of April.
- Lot 2 which was self-fed the salt-cottonseed meal mixture consumed almost twice as much protein as was hand fed to Lot 4, the check lot. This probably accounts for the larger gain of this lot.
- The limited information available indicates that the ability of a steer to consume large quantities of salt will vary with his age and weight. Under the conditions of this test with yearling steers weighing about 750 pounds it appears that it would require about 50 pounds of salt per 100 pounds of meal to limit the cottonseed meal consumption to two pounds or less per steer daily. No ill effects from the high salt consumption were observed.
- Prairie hay was fed only when the grass was covered with snow.

#### B—The Effect of Feeding a Protein Supplement During the Latter Part of the Grazing Season to Two-Year-Old Steers on Bluestem Pasture

The rate of gain made by steers on bluestem pasture during the first 75 to 90 days is difficult to improve on; however, as the season progresses past mid-summer the nutritive value of the grass, particularly its protein value, usually declines and along with it, cattle gains. The objective of this experiment is to find what effect the feeding of a protein supplement after mid-summer will have on cattle gains and condition. It is hoped that by starting the feeding at different times, the most opportune date to start feeding may be determined, if feeding is found worthwhile. The two-year-old steers used in this test were dry wintered steers and are the same steers that were used in the winter study last year, "A Comparison of Protein Supplements and Methods

of Feeding Protein Supplements to Yearling Steers Wintered on Bluestem Pasture".

#### EXPERIMENTAL PROCEDURE

- Lot 1—May 1 to July 18 - Bluestem pasture.  
July 18 to October 10 - Bluestem pasture  
and 3 pounds of soybean pellets per head daily.
- Lot 2—May 1 to August 10 - Bluestem pasture.  
August 10 to October 10 - Bluestem pasture  
and 3 pounds of soybean pellets per head daily.
- Lot 3—May 1 to September 1 - Bluestem pasture.  
September 1 to October 10 - Bluestem pasture  
and 3 pounds of soybean pellets per head daily.
- Lot 4—May 1 to October 10 - Bluestem pasture.

#### OBSERVATIONS

1. All lots made excellent gains during the early summer period when the grass was not supplemented.
2. Feeding protein during the late summer period increased the gain in every lot during that period; 15 pounds per head for Lot 1, 44 pounds per head for Lot 2 and 43 pounds per head for Lot 3.
3. Lots 1, 2 and 3 carried more flesh than Lot 4, their hair presented a more glossy appearance, and they were appraised at a higher price, 50¢ a hundred more for Lot 1 and \$1.00 a hundred more for Lots 2 and 3. (The presence of three plain steers in Lot 1 reduced the appraisal price of that lot.)
4. The total gain for the grazing season does not indicate a strong response to caking in respect to total gain in this test. On the other hand, the higher appraisal price, particularly in the case of Lots 2 and 3, coupled with an increased gain in the case of Lot 3 makes caking appear worthwhile.
5. Of interest is the fact that the 40 steers in this test, 30 of which were caked for various periods, had a shrink of only 2.7% when shipped to market. Similar steers shipped with them, none of which were caked, shrank 6.7%.

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## Project 253-4: Wintering and Grazing Yearling Steers

### B—Wintering Yearling Steers on Bluestem Pasture 1949-50

Ed F. Smith—R. F. Cox

The maximum utilization of bluestem pasture in keeping with sound management is of utmost importance to Kansas stockmen. If a system of wintering and grazing yearling steers can be developed to utilize bluestem grass profitably during the winter it will be a major contribution to the industry.

The primary purpose of this study, then, is to test the value of dry bluestem pasture as a winter feed for yearling steers when fed different kinds and amounts of protein supplements.

#### EXPERIMENTAL PROCEDURE

Four lots of good quality Hereford yearling steers, 10 head to a lot, were used in this test which started on December 11, 1949. All of the four pastures in which these steers were wintered had been grazed the previous season but a plentiful supply of dry grass was available. There are creek bottoms with some blue grass in each of these pastures. From 6 to 19 acres of pasture were allowed each steer.

Each lot received a supplement in addition to pasture as follows:

Lot 1—2 pounds of soybean pellets per head daily.

Lot 2—4 pounds of soybean pellets fed per head every other day.

Lot 3—6.5 pounds of alfalfa hay per head daily.

Lot 4—Soybean oil meal and salt self-fed (the salt was mixed with the soybean oil meal to limit its consumption and make it possible to self-feed the protein supplement).

The proportions of soybean oil meal and salt were 100 pounds of soybean oil meal and 35 pounds of salt.

**TABLE 1. THE EFFECT OF FEEDING A PROTEIN SUPPLEMENT DURING THE LATTER PART OF THE GRAZING SEASON TO TWO-YEAR-OLD STEERS ON BLUESTEM PASTURE**

**PHASE I—Grazing, Early Summer Period**

May 1 to August 1, 1949—92 Days

1. Lot number .....	1	2	3	4
2. No. steers per lot .....	9	10	10	10
3. Av. initial weight, lbs. ....	757	806	769	775
4. Av. final weight, lbs. ....	991	1003	1002	1018
5. Av. gain, lbs. ....	234	197	233	243
6. Daily gain, lbs. ....	2.54	2.14	2.53	2.64

**PHASE II—Grazing, Late Summer Period**

August 1, 1949 to October 10, 1949—70 Days

7. Period during which soybean pellets were fed .....	July 18 to Oct. 10, '49	Aug. 10 to Oct. 10, '49	Sept. 1 to Oct. 10, '49	None fed
8. Soybean pellets fed per steer daily, lbs. ....	3	3	3	
9. Av. initial weight, lbs. ....	991	1003	1002	1018
10. Av. final weight, lbs. ....	1060	1101	1099	1072
11. Av. gain, lbs. ....	69	98	97	54
12. Av. daily gain, lbs. ....	.99	1.40	1.39	.77
13. Total soybean pellets fed per steer, lbs. ....	287	183	117	None
14. Total gain per steer, May 1 to October 10, 1949, lbs. ....	303	295	330	297
15. Appraised value per cwt., October 10, 1949 .....	\$ 21.50	\$ 22.00	\$ 22.00	\$ 21.00

**OBSERVATIONS**

1. The winter of 1949-50 was very mild, extremely dry and ideal for wintering cattle.

2. Two pounds of soybean pellets fed per steer daily to Lot 1 on bluestem pasture produced .66 of a pound of gain per head daily. This is approximately twice as much gain as was obtained with any of the other lots.

3. Steers in Lot 2 fed every other day on pasture gained only .34 of a pound per head daily whereas the steers fed daily in Lot 1 gained .66 of a pound per head daily, which in this test makes daily "caking" appear worth while in so far as gain is concerned.

4. Nearly seven pounds of alfalfa hay per head daily fed as a protein supplement to Lot 3 produced only .26 of a pound of gain per head daily whereas 2 pounds of soybean pellets per head daily fed to Lot 1 produced .66 of a pound of gain per head daily.

5. Lot 4 self-fed the soybean meal and salt mixture gained .27 of a pound per head daily which was about the same as the gain made by the steers fed alfalfa hay but considerably below the .66 of a pound



daily gain made by the check group, Lot 1. No ill effects were noted in the salt-meal group but they did present a somewhat rougher appearance than the other lots at the end of the wintering period. Some difficulty was experienced in getting them accustomed to the salt-meal mixture.

6. All lots showed a loss in weight for the month of March, the most severe loss being in Lot 4, the salt-meal self-fed group.

**TABLE 1. WINTERING YEARLING STEERS ON BLUESTEM PASTURE 1949-50**

December 11, 1949 to April 15, 1950—125 Days

1. Lot number .....	1	2	3	4
2. Number of steers per lot..	10	10	10	10
3. Method of feeding .....	Fed soybean Pellets daily	Fed soybean Pellets every other day	Fed Alfalfa Hay daily	Self-fed Soybean oil meal and Salt mixed together
4. Average daily winter ration, lbs.:				
Soybean pellets .....	2.00	2.02		
Soybean oil meal .....				1.92
Salt .....	.14	.14	.11	.62
Alfalfa hay .....			6.91	
Prairie hay <sup>1</sup> .....	.38	.38	.24	.91
Bluestem pasture .....	ad lib	ad lib	ad lib	ad lib
5. Average initial weight ....	624	622	623	623
6. Average final weight .....	707	665	655	657
7. Average gain .....	83	43	32	34
8. Average daily gain .....	.66	.34	.26	.27
9. Total feed cost per steer....	\$ 15.79	\$ 15.86	\$ 13.62	\$ 16.21
10. Initial cost per steer at \$24.75 per cwt. ....	\$154.44	\$153.95	\$154.19	\$154.19
11. Initial cost per steer plus winter feed cost .....	\$170.23	\$169.81	\$167.81	\$170.40
12. Necessary selling price per cwt. to cover initial cost plus wintering cost .....	\$ 24.08	\$ 25.54	\$ 25.62	\$ 25.94
13. Appraised value per cwt. on May 5, 1950 .....				

1. Prairie hay was fed only when snow covered the grass.

Feed prices: Soybean pellets, soybean meal, \$75.00 a ton; alfalfa hay, \$17.00 a ton; prairie hay, \$13.00 a ton; bluestem pasture, \$6.00 for the season; salt, \$12.00 a ton.

## Project 68: Factors Influencing the Salt Requirements of Beef Cattle

The Effect of Withholding Salt on the Growth and Condition of Steers and on the Apparent Digestibility of Feed Constituents

Ed F. Smith and D. B. Parrish

(Preliminary Report—Not for Publication)

I—The Effect of Withholding Salt on the Growth and Condition of Steers.

Twelve good quality Hereford steer calves were used in this study. They were divided into two lots of six steers each. Both lots were treated similarly throughout the experiment except that one lot was allowed free access to salt and the other was not. The calves were started on test December 18, 1948, wintered on dry grass, used in spring digestion trial, grazed, then full fed in dry lot, and marketed on December 2, 1949.

#### OBSERVATIONS

1. Lot 2, which did not have access to salt, evidenced a craving for salt early in the feeding period. It was necessary to fence the old salting grounds to prevent the steers from eating the soil.
2. Lot 1, which received salt during the wintering period, gained 39 pounds more per head than Lot 2, which received no salt. The only evidence of salt deficiency of the calves of Lot 2 at this time was less weight and a thinner and rougher appearance when compared to Lot 1.
3. During the summer period on grass, the salt-fed group gained 36 pounds more per head than the non-salt group and the hair presented a glossy appearance, whereas the non-salt group failed to shed all their winter hair.
4. Both groups were removed to dry lots on July 20 for the full feeding phase of this test. Lot 1 had free access to salt. Lot 2 did not. Both lots made exceptionally good gains and performed satisfactorily except for one steer in Lot 2, the non-salt lot. This steer failed to respond to feeding and became emaciated. He was killed on October 27 and an autopsy was performed which revealed nothing abnormal. This steer was omitted in computing the results of this test.
5. The fact that the non-salt steers gained slightly more on full feed than the salt steers indicates that steers on a full grain feed do not require as much salt as those on dry feed or green grass.
6. Over the 327-day period that the steers were on test, those having access to salt gained 65 pounds more than the steers not having access to salt and sold for 50¢ a hundred more. The non-salt steer carcasses were better covered over the chuck and round and generally graded higher.

TABLE 1. THE EFFECT OF WITHHOLDING SALT ON THE GROWTH AND CONDITION OF STEERS

December 18, 1948 to December 2, 1949—327 Days

#### PHASE I—WINTERING

December 18, 1948 to May 1, 1949—134 Days

1. Management .....	Salt, Free Choice	No Salt
2. Lot number .....	1	2
3. Number of steers per lot .....	6	5
4. Average daily ration, lbs.:		
Soybean pellets .....	1.50	1.50
Salt (ad lib feeding) .....	.04	
Bluestem grass .....	ad lib	ad lib
Prairie hay .....	1.94	1.94
5. Initial weight per steer .....	477	482
6. Gain per steer, lbs. ....	60	21
7. Weight per steer, May 1, 1949 .....	537	503
8. Daily gain per steer .....	.45	.16

PHASE II—GRAZING

May 23, 1949 to July 20, 1949—58 Days<sup>1</sup>

9. Initial weight per steer May 23, 1949 <sup>2</sup> ..	536	506
10. Gain per steer .....	152	116
11. Weight per steer, July 20, 1949 .....	688	622
12. Daily gain per steer .....	2.62	2.00
13. Average daily salt consumption in pounds (ad lib feeding) .....	.10	

PHASE III—FULL FEEDING

July 20, 1949 to December 2, 1949—135 Days

14. Gain per steer .....	349	355
15. Final weight per steer .....	1037	977
16. Daily gain per steer .....	2.59	2.63
17. Average daily ration, lbs.:		
Ground shelled corn .....	16.34	14.48
Prairie hay .....	8.46	8.61
Soybean meal .....	1.96	2.00
Ground limestone .....	.08	.08
Salt (ad lib feeding) .....	.07	

SUMMARY—ALL PHASES

18. Total gain per steer .....	560	495
19. Daily gain per steer .....	1.71	1.51
20. Dressing percent <sup>3</sup> .....	56.3	57.1
21. Carcass grades:		
Average good .....	1	1
Low good .....		2
Top commercial .....	5	1
Average commercial .....		1
22. Selling price per hundredweight at market .....	\$ 23.50	\$ 23.00

1. Prairie hay was fed only when snow covered the grass. A total of 260 pounds of hay was consumed per steer.
2. May 1 to May 23, 1949 the steers were on a digestion trial.
3. Figured with 2.13 percent cooler shrink.

II.—Effect of Withholding Salt on Digestibility of Feed Constituents.

The effect of withholding salt on the digestibility of cottonseed meal-silage rations and on alfalfa pellet-silage rations was tested with six steers in each group during the period May 1 to May 23, 1949. Rations were adjusted to minimum requirements. During an adjustment period rations were further reduced if necessary, so that each steer consumed all the feed offered. If the quantity of feed decreased, both silage and protein concentrate were reduced by the same proportion. After adjustment of the rations, the steers were given a ten-day preliminary feeding period. This was followed by a ten-day trial feeding period during which feces were collected for analysis.

The steers receiving salt apparently digested both the cottonseed meal-silage and the alfalfa pellet-silage rations somewhat better than did those receiving no salt, but it is questionable whether the differences are significant.

**TABLE 2. THE EFFECT OF WITHHOLDING SALT ON THE AP-  
PARENT DIGESTIBILITY OF FEED CONSTITUENTS**

1949 data

Lot No.	No. of Steers	Ration	Av. Apparent Coefficient of Digestibility of Rations					
			Dry Matter	Crude Protein	Ether Extract	Crude Fiber	Ash	N. P. E.
1	3	C. S. M. Silage Salt	61.4	62.2	66.3	58.4	40.5	64.2
2*	3	C. S. M. Silage	59.9	61.5	65.7	57.4	36.0	62.5
3	3	Dehy. Alfalfa pellets Silage Salt	60.0	61.9	60.6	49.1	48.1	67.7
4*	3	Dehy. Alfalfa pellets Silage	56.9	59.7	58.4	45.0	40.9	65.8

\* Steers had no access to salt during previous five months.

#### BALANCE STUDY

The six steers on the cottonseed meal-silage ration were also used to study nitrogen, ash, sodium, and chloride balance at the same time as the digestion trials were run.

The animals were all found to be in positive nitrogen balance. Ash output was 6 to 12 percent of intake except in the case of one steer in the non-salt group which died later. This steer also retained less sodium and chlorine than did the others receiving no salt. With the exception of one other steer, sodium retention was similar regardless of which group they were in. Chlorine retention was almost twice as high by steers receiving no salt as those having access to salt.

#### SODIUM AND CHLORIDE CONCENTRATIONS IN BLOOD

The concentrations of sodium and chlorides in the blood were determined at two stages during this study of the effect of withholding salt. The first analyses were made at the time of the digestion trial, at which time half of the steers had received no dietary salt for six months. Analyses also were made at the termination of the study, at which time salt had been withheld for 11 months. Results indicate that the rations fed during this test either with or without salt, furnished sufficient sodium and chloride to maintain normal blood concentrations of these ions.

### Project 68: Factors Influencing the Salt Requirements of Beef Cattle

#### The Influence of Salt on the Gains of Steer Calves 1949-50

Ed F. Smith - D. B. Parrish

Three lots of steer calves were wintered on silage and 1 pound of soybean pellets per head daily. In addition to this ration Lot 1 received free access to salt. Lot 2 was fed a limited salt allowance (approximately one-sixth of an ounce per head daily) and Lot 3 received no salt.

Lot 1 allowed free access to salt gained 1.26 pounds per head daily.

Lot 2, fed a limited salt allowance, gained about the same. The non-salt fed lot gained considerably less than either of the other lots. Its gain was only .65 of a pound per head daily.

The steers were fed all the silage they would consume. The steers in Lot 1 which had free access to salt consumed 28.2 pounds of silage per head daily whereas the steers in Lot 3 which received no salt consumed only 26.15 pounds of silage per head daily.

The amount of feed required to produce 100 pounds of gain was almost twice as high for the steers not allowed access to salt, Lot 3, as it was for steers fed salt, Lot 1.

**TABLE 1. THE INFLUENCE OF SALT ON THE GAINS OF STEER CALVES**

December 14, 1949 to April 15, 1950—122 Days

1. Lot number .....	1	2	3
2. Number of steers per lot .....	5	4	5
3. Management .....	Free access to salt	Limited salt allowance	No salt
4. Average initial weight .....	448	447	448
5. Average final weight .....	602	596	527
6. Average gain .....	154	149	79
7. Average daily gain .....	1.26	1.22	.65
8. Average daily ration, lbs.:			
Soybean pellets .....	1.00	1.00	1.00
Silage .....	28.20	29.30	26.15
Salt .....	.8 oz.	.16 oz.	No salt
9. Feed required per 100 pounds of gain, lbs.:			
Soybean pellets .....	79.22	81.88	154.43
Silage .....	2233.77	2399.33	4037.97

CHEMICAL ANALYSIS OF FEEDS USED IN THE 1948-1949 BEEF CATTLE FEEDING TRIALS

	Moisture %	Protein %	Fat %	Fiber %	N-free extract %	Mineral matter %	Calcium %	Phosphorus %
Soybean oil meal .....	9.51	43.69	5.38	6.09	29.31	5.79	.41	.59
Soybean pellets .....	9.14	43.81	5.60	6.14	29.31	5.88	.40	.59
Cottonseed meal .....	9.01	41.13	1.94	10.46	28.60	5.84	.32	1.13
Linseed oil meal .....	8.83	36.38	4.05	8.10	26.88	5.66	.55	.86
Dehydrated alfalfa pellets .....	8.57	15.38	2.70	28.25	37.15	7.74	1.77	.13
Dehydrated bromo grass pellets..	8.76	16.38	3.40	26.67	36.35	8.07	.73	.22
Corn .....	11.92	9.50	4.52	3.27	70.44	1.54	.009	.26
Atlas sorgo silage .....	71.4	1.84	.80	8.30	15.6	1.85	.11	.049
Prairie hay .....	7.07	5.00	2.06	33.04	45.30	7.25	.46	.12
Bluestem pasture grasses, 1949 (computed to a no-moisture basis)								
May 20 .....	0	10.78						
June 1 .....	0	8.29						
June 10 .....	0	8.36						
June 21 .....	0	7.3						
July 1 .....	0	8.94						
July 11 .....	0	9.29						
July 20 .....	0	7.44						
August 1 .....	0	7.04						
August 10 .....	0	5.97						
August 20 .....	0	5.24						
September 1 .....	0	6.28						
September 10 .....	0	6.00						
September 20 .....	0	6.80						
October 1 .....	0	3.43						
October 10 .....	0	4.03						
November 1 .....	0	4.93						
December 1 .....	0	3.90						
Bluestem pasture grasses, 1950 (Air dry basis)								
January 1 .....	11.58	2.44	1.81	30.92	45.07	8.24	.39	
February 1 .....	15.38	2.63	1.63	29.27	43.26	7.83	.39	.067
March 1 .....	7.40	2.81	1.50	33.20	46.11	8.98	.41	.03

## Project 110: Swine Feeding Investigations

The comparative value of corn and sorghum grains as swine fattening feeds.

C. E. Arbel

In many parts of Kansas, sorghum grains are used extensively for hog feeding. In previous feeding tests with hogs at this station, ground kafir grain was shown to have about 90 percent of the value of corn. In a more recent test, ground Atlas sorgo grain was shown to have 93.6 percent of the value of corn. Since in recent years a number of new varieties of sorghum have been developed and grown throughout the state, hog feeders have a desire to know about the feeding merits of these varieties, especially in times of high priced corn when it might be desirable to substitute sorghum grain for corn. They also wish to know whether the grain should be fed whole or ground.

In order to obtain this information Kansas State College conducted two experiments, one during the winter of 1949 and one during the winter of 1950, to determine the value of several sorghum grains for fattening swine.

### EXPERIMENT I—Winter, 1949

The sorghum grains used in this test were some of the varieties recently developed. They were Colby, Westland, Midland and Martin milos.

The following figures show the nutrient content on a percentage basis of the grains used in this experiment.

Feed	Protein	Ether Extract	Crude Fiber	Moisture	Ash	N-free Extract	Carbo-hydrates
Martin Milo .....	9.88	3.24	1.64	11.24	1.31	72.69	74.33
Westland Milo ..	9.06	2.93	1.97	10.87	1.74	63.43	65.40
Midland Milo ....	10.63	3.18	1.45	9.95	1.59	73.20	74.65
Colby Milo .....	14.25	2.90	2.44	10.97	1.92	67.52	69.92
Corn .....	9.88	4.24	1.95	11.16	1.50	71.27	73.22

The following table gives a summary of the record of this experiment.

### EXPERIMENT I—Winter, 1949

The comparative value of shelled corn, Colby, Martin, Westland, and Midland milos for fattening pigs in the dry lot.

(January 8, 1949 to April 19, 1949—101 Days)

Ration Fed .....	Alfalfa Hay (Self-Fed)				
	Shelled Corn Tackage (Self-Fed)	Ground Martin Milo Tackage (Self-Fed)	Ground Westland Milo Tackage (Self-Fed)	Ground Midland Milo Tackage (Self-Fed)	Ground Colby Milo Tackage (Self-Fed)
Lot Number .....	1	2	3	4	5
No. pigs per lot .....	10	10	10	10	10
	Pounds	Pounds	Pounds	Pounds	Pounds
Av. Initial Weight per Pig .....	77.55	76.80	77.75	78.30	78.05
Av. Final Weight per Pig .....	242.87	230.97	255.07	232.50	224.83

Av. Total Gain per Pig .....	165.32	154.17	177.32	154.20	146.78
Av. Daily Gain per Pig .....	1.64	1.53	1.76	1.53	1.45
Av. Daily Ration per Pig:					
Shelled Corn .....	5.13				
Ground Martin Milo .....		6.06			
Ground Westland Milo .....			5.62		
Ground Midland Milo .....				5.91	
Ground Colby Milo .....					5.80
Alfalfa Hay .....	.39	.38	.39	.35	.39
Tankage .....	.30	.40	.40	.40	.30
Feed Consumed per 100 lbs. Gain:					
Shelled Corn .....	313.63				
Gr. Martin Milo ..		397.29			
Gr. Westland Milo ..			320.04		
Gr. Midland Milo ..				387.16	
Gr. Colby Milo ....					398.90
Alfalfa Hay .....	23.95	24.78	22.05	23.22	26.77
Tankage .....	18.15	25.95	22.56	25.94	20.44
Feed Cost per 100 lbs. Gain .....	\$ 10.40	\$ 13.24	\$ 10.79	\$ 12.93	\$ 13.02

Feed Prices Charged: Shelled corn \$1.65 per bu., Tankage \$110.00 per ton, Alfalfa Hay \$25.00 per ton, The Milos \$2.90 per 100 pounds.

Methods of Feeding: The shelled corn, ground milos, alfalfa hay and Tankage were self-fed free choice. The milo was ground through a 3/32 inch screen in a hammer mill. The Martin Milo was of excellent weight, the Colby Milo was light in weight.

### OBSERVATIONS AND CONCLUSIONS

1. Corn produced approximately 7% less gain per day but proved to be slightly more efficient and economical in producing 100 pounds of gain than Westland milo.
2. Westland milo produced greater daily gain and proved to be significantly more efficient and economical in producing 100 pounds of gains than Martin, Midland, or Colby milo.
3. There was no significant difference in the daily gain, efficiency in producing 100 pounds of gain or economy of gain of the Martin milo, Midland milo and Colby milo fed lots.
4. The average daily consumption of each of the milos was greater than the average daily consumption of corn which indicates that they were not lacking in palatability.

### EXPERIMENT II—Winter, 1950

The comparative value of corn and two sorghum grains as swine fattening feeds in the dry lot.

In this experiment three lots of pigs were self-fed in the dry lot, one each on Westland and Midland milo and one on shelled corn.

A summary of the results follows:



EXPERIMENT II—Winter, 1950  
(December 12, 1949 to March 17, 1950—95 Days)

Ration Fed .....	Alfalfa Hay (Self-Fed)		
	Shelled Corn Tankage (Self-Fed)	Ground Midland Milo Tankage (Self-Fed)	Ground Westland Milo Tankage (Self-Fed)
Lot Number .....	1	2	3
No. of pigs in lot .....	10	10	10
	Pounds	Pounds	Pounds
Av. Initial Weight per Pig .....	70.20	67.95	69.10
Av. Final Weight per Pig .....	222.70	239.80	244.80
Av. Total Gain per Pig .....	152.50	171.85	175.70
Av. Daily Gain per Pig .....	1.60	1.80	1.84
Av. Daily Ration per Pig:			
Shelled Corn .....	5.80		
Gr. Westland Milo .....			5.71
Gr. Midland Milo .....		5.80	
Tankage .....	.46	.52	.42
Alfalfa Hay .....	.15	.16	.19
Feed Consumed per 100 lbs. Gain:			
Shelled Corn .....	361.31		
Gr. Westland Milo .....			309.04
Gr. Midland Milo .....		320.91	
Tankage .....	28.85	29.09	22.76
Alfalfa Hay .....	9.70	8.90	10.41
Feed Cost per 100 lbs. Gain .....	\$ 10.73	\$ 10.69	\$ 10.03

Feed Prices Charged: Shelled corn, \$1.40 per bu.; The milos, \$2.80 per cwt.; Tankage, \$110.00 per ton; Alfalfa hay, \$25 per ton.

Methods of Feeding: The shelled corn, ground milos, alfalfa hay and tankage were self-fed free choice. The milo was ground through a 3/32 inch screen in a hammer mill. Both milos were of good quality and weight.

#### OBSERVATIONS AND CONCLUSIONS

1. There was very little difference in the daily gain produced by Westland milo and Midland milo, and the daily gain produced by each was approximately 12% greater than that produced by corn.
2. There was not much difference in the efficiency of Westland milo and Midland milo in producing 100 pounds of gain and each proved to be somewhat more efficient than corn.
3. Westland milo produced gain at a cost of approximately 5% less than Midland milo. There was very little difference in the cost of gain produced by Midland milo and corn.

#### EXPERIMENT III - Summers 1948 and 1949

The value of hog wallows for pigs that are full fed in the summer.

Two lots of pigs were fed each of the summers of 1948 and 1949. One lot had a well developed wallow or mud hole. The other lot was run in a pasture in which a mud hole was not allowed to develop. The pigs were fed from June until September.

The following table gives a summary of the results of this experiment:

EXPERIMENT III—Summers of 1948 and 1949

The value of hog wallows for full fed pigs on alfalfa pasture.  
Average of two experiments in the Summers 1948 and 1949 from June to September—98 days

Ration .....	Shelled Corn and Tankage (Self-fed) Alfalfa Pasture	
	1	Wallow 2
Lot Number .....	1	2
Number Pigs in Lot .....	10	10
Average Initial Weight per Pig .....	55.66	54.06
Average Final Weight per Pig .....	233.45	252.15
Average Total Gain per Pig .....	177.78	193.08
Average Daily Gain per Pig .....	1.79	1.90
Average Daily Feed per Pig:		
Shelled Corn .....	6.38	6.89
Tankage .....	.44	.43
Feed Consumed per 100 lbs. Gain:		
Shelled Corn .....	354.55	352.04
Tankage .....	24.94	21.88
Feed Cost per 100 lbs. Gain .....	\$ 10.23	\$ 9.99

Feed Prices Charged: Shelled Corn, \$1.40 per bu.; Tankage, \$110 per ton.

Methods of Feeding: The pigs of both groups were self-fed, free choice, shelled corn and tankage on alfalfa pasture. The wallows were mud holes part in shade and part in the sun. In both the pigs were sprinkled with water at least twice a day, sometimes more in the hottest weather. The summer of 1948 was wet and so all lots wallowed some. The summer of 1949 was wet in early part of the experiment but dry in last part.

**OBSERVATIONS**

1. The hogs with a wallow made the most rapid gains, and the greatest total gains.
2. The amount of feed used per 100 pounds gain was about the same in both lots, with a slight advantage with the wallow lot pigs.

**EXPERIMENT IV - Winter, 1950**

The value of sorghum distillers dried solubles\* in protein feed mixtures when fed as a supplement to shelled corn for fattening fall pigs in the dry lot.

In recent years much attention has been given to the feeding of distillers by-products to livestock. One of these is distillers dried solubles derived from the malting of various grains. In addition to other nutrients it furnishes some of the B vitamins that have lately been shown to be so important in swine feeding.

A discussion of an experiment conducted at Kansas State College to determine the value of distillers dried solubles in protein supplements for swine follows:

**EXPERIMENTAL PROCEDURE**

In the experiment reported herein, five lots of pigs were self-fed shelled corn and alfalfa hay. In addition to the basal ration protein

\* The sorghum distillers dried solubles used in this experiment were furnished through the courtesy of the Midwest Solvents Co., Inc., Atchison, Kan.

supplements were fed as follows: in Lot 1, the control lot, tankage; in Lot 2 a mixture of tankage 50%, soybean meal 50%; in Lot 3 a mixture of tankage 50%, dried solubles 50%; in Lot 4 a mixture of soybean meal 50%, dried solubles 50%; in Lot 5 a mixture of tankage,  $\frac{1}{3}$ , soybean meal,  $\frac{1}{3}$ , and dried solubles,  $\frac{1}{3}$ .

The protein content of the tankage was 60%, soybean meal 43%, and the distilled solubles 25%.

The following table gives a summary of the record of this experiment:

#### EXPERIMENT IV—Winter, 1950

The Value of Sorghum Distillers Dried Solubles in Protein Feed Mixtures When Fed as a Supplement to Shelled Corn for Fattening Fall Pigs in a Dry Lot.

(December 12, 1949 to March 17, 1950—95 Days)

Ration Fed .....	Shelled Corn and Alfalfa Hay (self-fed)				
	Tankage (Self-fed)	Tankage 50% Soybean meal 50% (Self-fed)	Tankage 50% Distilled Sol. 50% (Self-fed)	Soybean meal 50% Distilled Sol. 50% (Self-fed)	Tankage $\frac{1}{3}$ , Soybean meal $\frac{1}{3}$ Distilled Sol. $\frac{1}{3}$ (Self-fed)
Lot Number .....	1	2	3	4	5
No. pigs per lot .....	10	10	10	10	10
	Pounds	Pounds	Pounds	Pounds	Pounds
Av. initial weight per pig .....	70.20	70.20	70.29	70.00	70.07
Av. final weight per pig .....	222.70	218.60	225.90	226.70	224.40
Av. total gain per pig .....	152.50	148.40	155.61	156.70	154.33
Av. daily gain per pig .....	1.60	1.57	1.63	1.64	1.62
Av. daily ration per pig:					
Shelled corn .....	5.80	5.53	5.53	5.36	5.90
Tankage .....	.46	.48	.47		.27
Alfalfa Hay .....	.15	.15	.14	.13	.12
Soybean Meal .....		.48		.66	.27
Distillers Solubles			.47	.66	.27
Feed Consumed per 100 lbs. gain:					
Shelled Corn .....	361.31	354.44	338.34	325.46	363.18
Tankage .....	28.85	30.82	28.59		16.63
Alfalfa Hay .....	9.70	9.63	8.67	8.29	7.90
Soybean meal .....		30.82		40.20	16.63
Distillers Solubles			28.59	40.20	16.63
Feed Cost per 100 lbs. gain .....	\$ 10.73	\$ 11.60	\$ 11.27	\$ 11.05	\$ 11.25

Feed Prices Charged: Shelled corn, \$1.40 per bu.; Tankage, \$110.00 per ton; Alfalfa Hay, \$25 per ton; Sorghum Distillers Dried Solubles, \$80.00 per ton; Soybean meal, \$60.00 per ton.

Methods of Feeding: All lots were self-fed shelled corn and alfalfa hay. The protein supplements were mixed in the proportions indicated and self-fed in a separate compartment.

#### DISCUSSION OF RESULTS

It will be seen from the foregoing figures that Lots 3, 4, and 5 which

received dried solubles made almost identical gains. The lowest gains were made in the Lots 1 and 2, which received no dried solubles. All the rations produced efficient and economical gains, though there is a slight difference in favor of the pigs fed the dried solubles, whether with tankage and alfalfa hay or soybean meal and alfalfa hay. Lot 1, receiving tankage alone as a protein supplement, made the cheapest gains.

#### EXPERIMENT V - Summer, 1949

The limited feeding of tankage in the ration of fattening pigs when self-fed corn on alfalfa pasture.

C. E. Aubel

To produce swine profitably, it is necessary to make use of forage crops. This practice not only saves grain, but contributes to the general health of the hogs. Since swine feeders are seeking new and cheaper methods of producing hogs on pasture, the limited feeding of tankage for fattening pigs on alfalfa pasture was studied in this feeding trial.

#### How the Hogs Were Fed and

#### The Tankage Supplement Allowance

Six lots of spring pigs having an average initial weight of approximately 57 pounds were self-fed corn on good alfalfa pasture.

A protein supplement was also fed, or not fed, as follows:

Lot 1—Tankage self-fed throughout the test. Lot 2—No protein supplement fed. The remaining lots were self-fed tankage until they reached different weights—100 pounds in Lot 3, 125 pounds in Lot 4, 150 pounds in Lot 5, and 175 pounds in Lot 6.

The experiment started June 9, 1949, and each lot was continued on feed until it had attained a weight of approximately 216 pounds.

A summary of the results is on the following page.

#### OBSERVATIONS

(1) The maximum use of alfalfa pasture without other protein supplement produced low cost gain.

(2) Full feeding a protein supplement free choice with the fattening ration of corn and alfalfa pasture increased the rate of gain of the hogs. As the protein feeding period was lengthened, the rate of gain for the entire feeding period was increased.

(3) The protein supplement was used most effectively in the feeding period where it was omitted from the ration after the hogs had reached the weight of 100 pounds. With this plan of feeding the rate of gain was fairly high and the feed cost low. Feeding the protein for longer periods increased the total feed requirement and cost of gain, although the rate of gain was increased.

#### CONCLUSIONS

The results of this experiment show that the feed cost of gains can be kept at a comparatively low figure by omitting the protein supplement from the ration for the entire fattening period. The rate of gain, however, will be reduced with this plan of feeding.

The results of this experiment show further that hogs will gain efficiently on a full-feed of corn and good alfalfa pasture, without receiving a protein supplement after they have reached a weight of 100 to 150 pounds.

If maximum gains are desired despite the higher cost, the protein supplement should be full-fed throughout the fattening period. This speeding up in gains should insure an earlier market.

EXPERIMENT V—Summer, 1949

The Limited Feeding of Tankage in the Ration of Fattening Pigs When Self-Fed Corn on Alfalfa Pasture

C. E. Aubel

(June 9, 1949 to November 5, 1949)

	Corn (self-fed)		Alfalfa Pasture			
	Tankage (self-fed) throughout entire period	Corn alone throughout entire period	Tankage (self-fed) up to wt. 100 lbs.	Tankage (self-fed) up to wt. 125 lbs.	Tankage (self-fed) up to wt. 150 lbs.	Tankage (self-fed) up to wt. 175 lbs.
Lot Number .....	1	2	3	4	5	6
No. of pigs per lot .....	10	10	10	10	10	10
No. of days supplement fed .....	91	0	24	36	58	78
Days required to reach 216 lbs. ....	91	149	119	114	99	94
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Av. initial weight per pig .....	56.93	58.03	58.40	58.53	58.00	56.40
Av. final weight per pig .....	216.70	214.10	216.10	216.60	215.90	218.10
Av. total gain per pig .....	159.77	156.07	157.70	158.07	159.90	161.70
Av. daily gain per pig .....	1.75	1.03	1.32	1.38	1.59	1.72
Feed required for 100 lbs. gain:						
Corn .....	362.98	331.14	324.41	329.91	321.84	353.19
Tankage .....	26.91		6.46	12.66	15.19	27.21
Feed cost per 100 lbs. ....	\$ 10.53	\$ 8.35	\$ 8.46	\$ 8.91	\$ 8.87	\$ 10.29

Feed Prices Charged: Shelled corn, \$1.40 per bu.; Tankage, \$110.00 per ton.

Methods of Feeding: All lots were self-fed shelled corn, on alfalfa pasture. The tankage was self-fed the number of days shown in the table. After that the pigs received only shelled corn until they reached a weight of 216 pounds.

## Project 242: Swine Breeding Investigations

### EXPERIMENT VI - Summers 1948 and 1949

Some studies on breeding market pigs by crossing Duroc and Poland with Minnesota No. 1.

C. E. Aubel

There has been much discussion in Kansas as to the desirability of using the Minnesota No. 1 breed of swine for crossing on other breeds. Consequently a few years ago one of these boars was secured for this purpose. In order to get as true a value of crossing as possible, it was planned in this experiment to double mate the sows. That is, to breed them to a boar of their own breed first and immediately after to breed them again to the Minnesota No. 1 boar. In this way it was theoretically possible to get in the same litter cross bred pigs and pure bred pigs. The plan involved further the separating of these pure bred and cross bred pigs and feeding them out for market in separate groups.

Two tests were carried on with this, one in the spring of 1948 and one in 1949. In each experiment 4 sows of the Poland China breed and 4 of the Duroc breed were bred in the manner described.

In the first test in 1948, no purebred pigs could be identified in the litters of the Poland China. The Duroc crosses were successful however and were separated at weaning and fed out as the figures in the following table show. The plan of the experiment included a study of the carcasses at slaughter time but due to a mix-up at the packing plant this was not done.

### EXPERIMENT VI

TABLE 1. SOME STUDIES ON BREEDING MARKET PIGS BY CROSSING DUROCS WITH MINNESOTA NO. 1

1st Test—Summer, 1948  
(July 8, 1948 to October 25, 1948—104 Days)

Ration Fed .....	Shelled Corn and Tankage (Self-Fed) on Sudan Grass Pasture	
	Purebred Durocs	Minnesota No. 1 + Duroc Cross
Lot Number .....	1	2
No. Pigs in Lot .....	15	15
Av. Birth Weight per Pig .....	2.68	2.27
Av. 56 Day Weight per Pig .....	23.74	17.28
Av. Initial Weight per Pig .....	54.00	47.30
Av. Final Weight per Pig .....	250.50	230.00
Av. Total Gain per Pig .....	196.50	182.70
Av. Daily Gain per Pig .....	1.80	1.67
Av. Daily Feed Consumed per Pig:		
Corn .....	8.31	7.56
Tankage .....	.64	.61
Feed Consumed per 100 lbs. Gain:		
Shelled Corn .....	488.54	451.55
Tankage .....	35.62	36.12
Feed Cost per 100 lbs. Gain .....	\$ 14.16	\$ 13.26

Feed Prices Charged: Shelled corn, \$1.40 per bu.; Tankage, \$110.00 per ton.

Method of Feeding: The shelled corn and tankage were self-fed free choice on alfalfa pasture.

The second test in the summer of 1949 was a repetition of the first test in breeding except that only 3 sows of each breed were mated. This year however the purebred and the crossbred pigs of the Durocs could not be identified at weaning time, so had to be discarded.

The Poland purebreds and crossbreds were separated, placed in the feed lots in separate groups to be compared with the crossbred Duroc and Poland pigs.

The results of this feeding trial as well as some hog carcass data follow:

**EXPERIMENT VI**  
**TABLE 2. SOME STUDIES ON BREEDING MARKET PIGS**  
**BY CROSSING**

2nd Test—Summer, 1949

C. E. Aubel                      D. L. Mackintosh

(June 23, 1949 to September 16, 1949—85 Days)

Ration Fed .....	Shelled Corn and Tankage (Self-Fed) on Alfalfa Pasture		
	Purebred Polands	Minnesota No. 1 Cross on Poland China	Duroc and Poland China Cross
Lot Number .....	1	2	3
No. of Pigs in Lot .....	4	15	10
Birth Weight .....	3.0	3.1	
56 Day Weight .....	27.0	29.8	
Av. Initial Weight per Pig .....	49.10	54.44	59.50
Av. Final Weight per Pig .....	190.50	207.00	195.50
Av. Total Gain per Pig .....	141.40	152.56	136.00
Av. Daily Gain per Pig .....	1.66	1.79	1.60
Feed per Day per Pig:			
Shelled Corn .....	5.67	6.14	5.78
Tankage .....	.43	.47	.40
Feed for 100 lbs. Gain per Pig:			
Shelled Corn .....	341.23	342.59	361.39
Tankage .....	25.84	26.65	25.00
Feed Cost per 100 lbs. Gain .....	\$ 9.95	\$ 10.01	\$ 10.40
Feed Prices Charged: Shelled corn, \$1.40 per bu.; Tankage, \$110.00 per ton.			
Method of Feeding: The shelled corn and tankage were self-fed free choice on alfalfa pasture.			

EXPERIMENT VI  
TABLE 3. HOG CARCASS DATA—FALL, 1949

Breeding .....	No. of Hogs	Av. Live Wt.	Length (CM)			Fat Back (CM)		
			Av.	Max.	Min.	Av.	Max.	Min.
Poland .....	4	195	73.0	77.5	69.5	4.47	5.4	3.8
Poland - Minn. Cross .....	15	215	74.13	78.5	69.0	4.63	5.3	3.8
Poland - Duroc Cross .....	10	206	70.6	74.0	68.0	4.64	5.6	3.3

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Live Weight—Packing Weight.

Length of Carcass—From anterior point of atch bone to anterior edge of first rib.

Fat Back—Average of 3 measurements on each hog.



## OBSERVATIONS AND CONCLUSIONS

From these data it is seen that varying results were achieved. In the first experiment the greatest daily gains were made by the purebred pigs but they consumed more feed per 100 pounds gain. In the second experiment the best daily gains were made by the crossbred Minnesota No. 1 and Poland pigs but the feed required per 100 pounds gain was about the same as that of the purebreds. It would seem that no definite advantage for cross breeding has been shown by these tests.

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### Project 111 GC: Lamb Feeding Investigations

Dept. of Animal Husbandry and  
Garden City Branch Agricultural Experiment Station Cooperating  
1949-1950

#### WHEAT PASTURE WITH VARIOUS SUPPLEMENTS FOR FATTENING LAMBS

R. F. Cox and A. B. Erhart

Many uncertainties and notions are current concerning the use of wheat pasture for fattening lambs. In an effort to find definite information on some of these, experiments on pasturing wheat have been conducted during seasons when wheat growth furnished sufficient pasture.

Comparisons were made this year of fattening lambs in the lot and on wheat pasture. One lot of lambs on wheat pasture received nothing else. Additional lots were pastured on wheat and received in addition either dry roughage, bicarbonate of soda, a mineral mixture or vaccination against enterotoxemia.

#### Lambs:

The lambs fed in these tests were of straight fine-wool type and were good quality feeder lambs. They were received at Cuervo, New Mexico, in late October. They weighed about 71 pounds per head into the experiment.

#### Feed Prices:

Westland Milo .....	\$ 2.00	per cwt.
Alfalfa .....	\$ 22.50	per ton
Cottonseed Cake .....	\$ 75.00	per ton
Salt .....	\$ .90	per cwt.
Ground Limestone .....	\$ 1.00	per cwt.
Steamed Bone Meal .....	\$ 5.00	per cwt.
Bicarbonate of Soda .....	\$ 4.85	per cwt.
Vaccination .....	\$ .12 1/2	per head
Wheat Pasture .....	\$ .30	per head per month

#### Death Loss:

Five of the 549 lambs in the experiment died, a loss of .9 of one percent. One lamb was lost from each of lots 2, 3, 5 and 6 from enterotoxemia or "over-eating disease". One lamb in lot 3 was killed by dogs.

#### Note:

It should be pointed out that lot 3 was ravaged seriously by dogs. Twelve of the lambs were injured and one killed. They did not recover fully from this attack and indications are that their lower gain may be attributed to this.

## DRY LOT AND WHEAT PASTURE COMPARISONS

Rufus F. Cox and A. B. Erhart

November 7, 1949 to February 19, 1950—105 Days

1. Lot Number .....	1	2	3	4	5	6
	Wheatland Mts Gr.	Wheat Pasture	Wheat Pasture	Wheat Pasture	Wheat Pasture	Wheat Pasture
2. Ration fed .....	C. S. Cake Alfalfa Hay		Plus Alfalfa Hay	Plus Vaccination	Plus Soda	Plus Mineral <sup>1</sup>
3. Number of lambs per lot .....	50	99	98	100	98	99
4. Number of days on feed .....	105	105	105	105	105	105
5. Initial weight per lamb .....	70.90	70.53	70.20	69.83	69.65	70.28
6. Final weight per lamb .....	105.70	107.27	103.52	106.80	104.20	106.41
7. Total gain per lamb .....	34.80	36.74	33.32	36.97	34.64	36.13
8. Daily gain per lamb .....	.33	.35	.35	.33	.34	
9. Number of lambs died .....	0	1	1	0	1	1
10. Feed per lamb daily:						
Grain .....	1.11					
C. S. Cake .....	.20					
Alfalfa Hay .....	1.80		.31			
Salt .....	.022	.066	.028	.066	.031	
Soda .....					.016	
Mineral .....						.04
11. Feed cost per cwt. gain .....	\$ 15.86	\$ 4.74	\$ 6.18	\$ 4.71	\$ 5.14	\$ 4.87
12. Initial cost per lamb into feedlot .....	\$ 15.98	\$ 16.13	\$ 16.13	\$ 16.11	\$ 16.13	\$ 16.13
13. Feed cost per lamb .....	\$ 5.52	\$ 1.74	\$ 2.06	\$ 1.74	\$ 1.78	\$ 1.76
14. Lamb cost plus feed cost .....	\$ 21.50	\$ 17.87	\$ 18.19	\$ 17.85	\$ 17.91	\$ 17.89
15. Final cost per cwt. ....	\$ 20.34	\$ 16.66	\$ 17.57	\$ 16.71	\$ 17.17	\$ 16.81

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1. Low gain due to ravages by dogs—See note page 1.
2. 50% Salt, 25% Steamed Bone Meal and 25% Ground Limestone.
3. Includes cost of herding and of dry roughage fed for about one week at the beginning of the experiment.
4. Death loss is charged into this cost for those lots in which losses occurred. Vaccination cost, 12½¢ per head, is charged to Lot 4. Freight, trucking and other costs are included for all lots. The lambs cost 21¢ per pound at the range loading point.

### SUMMARY

1. Lambs fattened on wheat pasture during the 1949-50 winter grazing season gained fully as much as lambs fattened in the feed lot on a ration of milo grain, cottonseed cake and alfalfa hay.
2. The feed cost of gains of lambs on wheat pasture averaged about one-third the cost of those in the feedlot.
3. Lambs receiving alfalfa hay while on wheat pasture made no larger gain than those getting wheat pasture alone. It should be pointed out that the wheat grew rank early in the season and when it froze down later much dead leafy material simulating dry roughage was eaten by the lambs. Without this the alfalfa hay might have been expected to increase the gains somewhat, as has been the case in former years.
4. There was no conclusive evidence from these tests that vaccinating lambs fed on wheat pasture prevented losses from over-eating disease.
5. Neither bicarbonate of soda nor a mineral mixture proved beneficial to wheat pasture lambs from the standpoint of loss prevention or gains.
6. Gains made by lambs on wheat pasture during the current season have been exceptional. This has probably been due to a combination of factors. The open mild winter undoubtedly has contributed to the good gains. Probably fully as important also has been the relatively dry condition of the wheat pasture and the dry dead leafy material eaten with it.
7. About 200 acres of wheat were grazed in these tests: 40 acres of volunteer and the remainder drilled wheat.
8. Because of extremely dry weather, the wheat did not grow sufficiently to provide additional grazing after it was grazed down once. Normally it could be expected to have a much heavier carrying capacity.

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## Project 236: The Relationship of Physical Balance and Energy Value in Sheep Rations

Kansas Agricultural Experiment Station, Manhattan, Kan.  
1948-49 Progress Report

Rufus F. Cox—J. S. Hughes

In a number of experiments conducted at the Kansas Agricultural Experiment Station in recent years, rations varying in physical nature but as nearly alike chemically as they could be made have been tested for fattening lambs. Until this problem was tested at the Kansas Station about 1938, the physical nature of the ration had received little attention and was not even recognized as having any influence on the nutritive value of the ration. In several experiments since then it has been demonstrated that the rate of gains and the efficiency of feed utilization by fattening lambs are associated closely with the physical balance, or the concentration and bulkiness of the ration.

The objects of the experiment reported here are:

1. To test the relative efficiency of rations which vary in the amount and in the nature or condition of the crude fiber consumed by fattening lambs.
2. To further investigate the value of bicarbonate of soda in controlling digestive disorders in lambs consuming rations which are highly concentrated, or which have had the crude fiber finely reduced by grinding.

#### PLAN OF FEEDING

- Lot 1—Corn and alfalfa hay - medium concentration. (Crude Fiber: Total Digestible Nutrient Ratio - CF:TDN - 1:4)
- Lot 2—Corn and alfalfa hay - highly concentrated. (CF:TDN Ratio 1:5.5)
- Lot 3—Corn and alfalfa hay plus Bicarbonate of Soda (CF:TDN Ratio 1:5.5)
- Lot 4—Corn and alfalfa hay (Lambs vaccinated against enterotoxemia) CF:TDN Ratio 1:5.5)
- Lot 5—Corn and Pelleted alfalfa (CF:TDN Ratio 1:5.5)
- Lot 6—Corn and Pelleted alfalfa plus Bicarbonate of Soda (CF:TDN Ratio 1:5.5)

CRUDE FIBER: TOTAL DIGESTIBLE NUTRIENT RATIOS IN LAMB FATTENING RATIONS

Rufus F. Cox and J. S. Hughes  
 March 29, 1949 to June 30, 1949—93 Days

1. Lot number .....	1	2	3	4	5	6
2. Ration fed .....	Corn Alfalfa Hay	Corn Alfalfa Hay	Corn Alfalfa Bicarbonate of Soda	Corn Alfalfa plus *Vaccination	Corn Pelleted Alfalfa	Corn Pelleted Alfalfa plus Bicarbonate of Soda
3. Ratio .....	Crude Fiber 10 T. D. N.	1 4	1 5.5	1 5.5	1 5.5	1 5.5
4. Number lambs per lot .....	9	9	10	10	10	10
5. Number days on feed .....	93	93	93	93	93	93
6. Initial weight per lamb .....	69.56	70.90	69.50	69.50	69.50	69.50
7. Final weight per lamb .....	97.00	97.00	91.90	91.30	95.90	98.67
8. Total gain per lamb .....	27.44	27.00	23.40	21.80	26.40	29.17
9. Daily gain per lamb .....	.30	.29	.24	.23	.28	.31
10. Feed per lamb daily:						
Corn (pounds) .....	1.27	1.50	1.49	1.49	1.49	1.49
Alfalfa hay (pounds) .....	1.36	.96	.95	.95	.95	.95
Soda (ounces) .....			.18			.18
11. Feed per cwt. gain:						
Corn (pounds) .....	429.25	516.95	619.98	637.04	526.04	476.09
Alfalfa hay (pounds) .....	460.23	331.93	396.43	407.34	336.36	304.42
Soda (pounds) .....			4.69			3.60
12. Dry matter per lamb daily .....	2.36	2.20	2.19	2.19	2.20	2.21
13. T. D. N. per lamb daily .....	1.74	1.73	1.72	1.72	1.73	1.73
14. Gain per 100 pounds T. D. N. ....	17.24	16.76	13.95	13.37	16.18	17.92

\* Vaccinated against Enterotoxemia.

### SUMMARY

1. Lambs which were fed corn and alfalfa in medium concentration made larger gains and more efficient gains than those which received the same feeds in heavy concentration. Note daily gains, daily feed consumption and gain per 100 pounds T.D.N., lines 9, 10 and 14 for lots 1 and 2 in Table.
2. Lambs fed corn and pelleted alfalfa gained slightly less and required more feed per pound of gain than those eating the same nutrients in corn and alfalfa. (Compare lots 2 and 5)
3. Both the above lots which were fed highly concentrated rations (crude fiber: digestible nutrient ratio of 1 to 5.5) exhibited frequent systems of digestive disorders, such as vomiting grain, diarrhea, and refusing feed.
4. It was more difficult to keep the lambs which received pelleted alfalfa on feed than was the case of those fed long hay.
5. Bicarbonate of soda appeared to depress feed consumption of lambs fed corn and long alfalfa hay. Consequently it reduced the gains and increased the cost of gains. (Compare lots 2 and 3)
6. When fed with corn and pelleted alfalfa, bicarbonate of soda did not reduce feed consumption. It was effective in reducing digestive disorders however and therefore increased the gains and reduced the cost of gains. (Compare lots 5 and 6)
7. Vaccinating lambs for prevention of losses from enterotoxemia or over-eating disease was ineffective in this experiment. The vaccinated lambs (lot 4) had as much digestive trouble as any of the lots and gained less at a greater cost than lot 2 which received the same ration but was not vaccinated. (Compare lots 2 and 4)

### ANALYSES OF FEEDS USED IN LAMB FEEDING EXPERIMENT

	Protein	Ether Extract	Crude Fiber	Moisture	Ash	N. F. E.	Carbo- hydrate
Corn .....	9.00	4.16	2.10	11.63	1.39	71.72	73.82
Alfalfa Hay..	14.88	1.50	32.30	8.91	7.73	34.68	66.98
Alfalfa Pellets .....	15.75	2.39	30.69	6.78	8.24	36.15	68.84