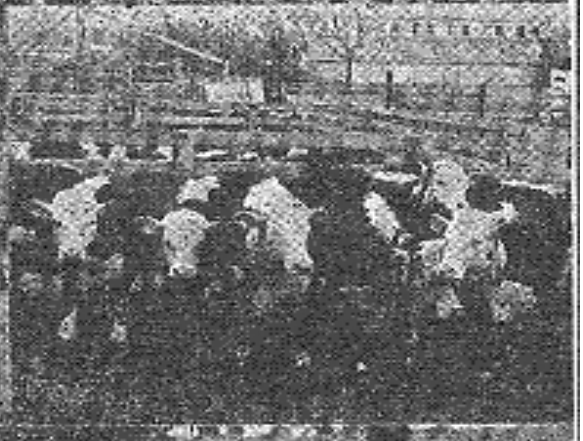
1948-49 PROGRESS REPORTS

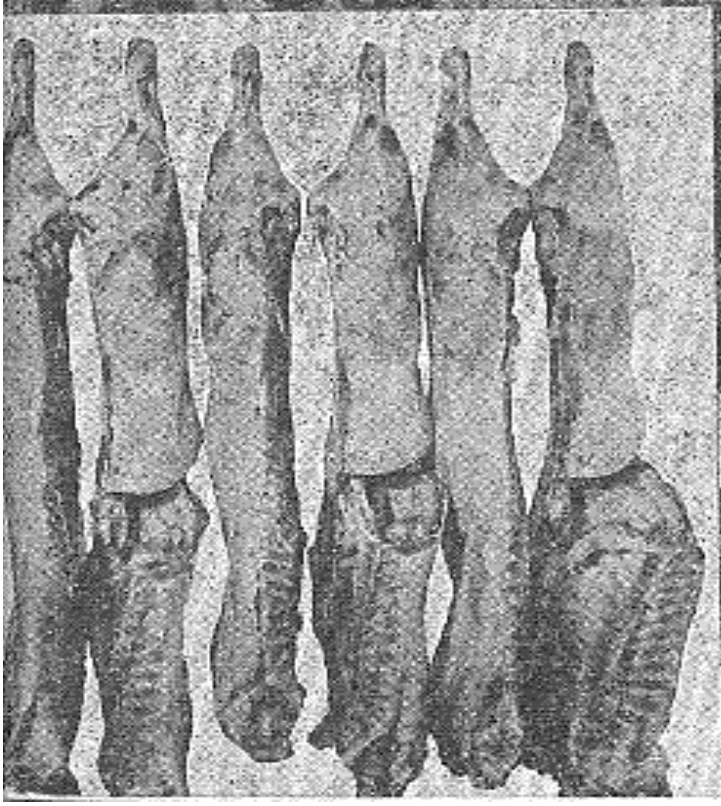
36th ANNUAL LIVESTOCK FEEDERS' DAY

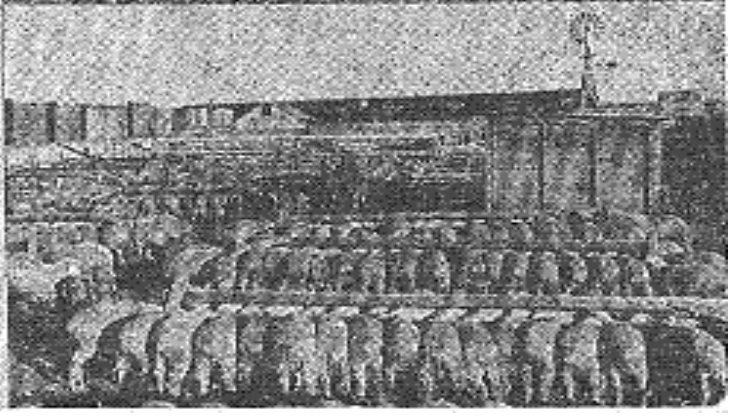
KANSAS AGRICULTURAL EXPERIMENT STATION

ANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE

MANHATTAN, KANSAS







Animal Husbandry Investigations

1948-49 PROGRESS REPORTS *

36th 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. 164 from the Department of Animal Husbandry.

INDEX

Project 246: Studies of the Development of the Livestock Industry of Kansas.

1948 - 49

WALTER M. MORGAN
FATHER OF THE KANSAS HEREFORD INDUSTRY

C. W. McCampbell

The first Hereford cattle brought to the United States were imported by the noted statesman Henry Clay in 1817 and sent to his famous Kentucky farm home known as Ashland. This importation however did not establish Herefords in this country. Years later Mr. Clay in commenting upon this matter stated "I first imported, upward of twenty years ago, two pairs of the Hereford breed and bred from crosses between them until I was induced to discontinue, in consequence of an apprehension that I should breed in-and-in too far, which in some instances I found to be the case. I could not obtain, conveniently, crosses from other females of the same race."

The next importation into this country was made by the Massachusetts Agricultural Society in 1824. It consisted of one bull and one cow. The cow proved to be a non-producer and was slaughtered. The bull was used in the vicinity of North Hampton, Massachusetts several years and his offspring were very popular both for work and for beef. There being no Hereford females available with which to mate this bull and perpetuate purebred Herefords this importation also failed to establish Herefords in America.

No further importations were made into this country until W. H. Sotham, a Hereford enthusiast who had come to the U. S. in 1832, backed by Mr. Erastus Corning, an Albany, New York banker, brought over twenty-two Hereford cattle in 1840. With these the partnership of Sotham and Corning started near Albany the herd that established Herefords in America. They made a second importation in 1842 and a third in 1843. Mr. Corning retired from the partnership in 1847 and Mr. Sotham moved the herd to a farm at Black Rock near Buffalo, New York where he continued to breed and popularize Herefords for many years.

The next notable importation of Herefords to the United States was made by Thomas Aston and John Humphries in 1852. These men were members of a colony of Englishmen who planned to establish homes and farms in this country. Their destination was Elyria, Ohio.

Aston and Humphries brought Hereford cattle with them—only a few head—but from these few and later importations they developed and maintained for many years not only the largest but also the best herds in America. It was largely through their efforts and influence that a large number of herds were established in the vicinity of Elyria—in fact, so many that this area became known as the Herfordshire of America.

Mr. Hiram Woodward, a neighbor of Aston and Humphries in Ohio, started a herd of purebred Herefords in the early 60's. In 1871 he came to Kansas, brought his Herefords with him, and settled on a farm near Blue Rapids. There were the first Herefords to find their way to Kansas and to Hiram Woodward belongs the honor of having been the first breeder of purebred registered Herefords in this state. He did not have a large herd but produced good cattle and found ready sale for them among farmers and ranchmen in Kansas and Nebraska. The excellent progress he was making as a Hereford breeder was cut short by his death in 1877. That the Woodward cattle were good cattle is evidenced by the fact that T. L. Miller of Illinois, then the

leading breeder of Herefords in America came to Kansas and bought most of the Woodward Herefords soon after Mr. Woodward's death.

The next person to bring purebred Herefords to Kansas was Walter M. Morgan who is in reality the father of the purebred Hereford industry of Kansas. He was born June 9, 1830 on a farm near Monmouth, England. Monmouth is the county seat of Monmouthshire which lies across the river Monnow from Herefordshire. Monmouthshire is a region of rolling hills better adapted to grazing than the production of grain crops and cattle grazing was the main dependence for farm income. The farm upon which Mr. Morgan was born had been operated by the Morgan family for several generations and they raised Herefordshire cattle. Mr. Morgan, when asked how long the Morgan family had been handling Hereford cattle, replied, "Probably 100 years before I was born," hence it is not surprising that he should have been a Hereford enthusiast and thoroughly familiar with the history and traditions connected with this breed in its native home as well as in America.

When not quite 22 years of age 1852 Walter Morgan came to the United States on the same boat that brought Thomas Aston and John Humphries. He stopped for a while in New York state but in the course of time found his way to Elyria, Ohio where he became associated with Thomas Aston. In 1870 Thomas Aston returned to England to spend the remainder of his days but Mr. Morgan who had married Mr. Aston's daughter Sabina in 1857 continued to raise Herefords at Elyria, Ohio until 1876 when he moved to Kansas arriving at Blue Rapids January 19. Walter Morgan and Hiram Woodward had been friends and neighbors back in Ohio and when the Morgans reached Blue Rapids they stayed with the Woodwards until they could get settled on the farm they purchased a few miles north of Irving.

When Mr. Morgan came to Kansas he brought with him a herd of purebred Herefords—not a large herd but one of excellent quality type and breeding headed by the splendid young bull Duke of Edinburgh 1223 which he purchased from John Humphries of Elyria just before leaving Ohio. The pedigree of this bull shows that he represented the best breeding of that day, tracing on his sires side to Patriot 26 who was declared the best bull in England in 1861 and on his dams side to Curly 14 second in class in the Herefordshire Society Show in 1851 and undefeated in Canada or the United States in 1853 - 54 - 55 - 56. He was then owned by Thomas Aston and shown by Walter Morgan.

Mr. Morgan having shown the Aston cattle for many years appreciated the effectiveness of advertising one's cattle by showing them and the first year (1876) he was in Kansas he exhibited a small herd at the Kansas City Industrial Exposition and Agricultural Fair despite the fact that no classification was provided for Herefords. However Mr. Morgan had succeeded in securing a promise by letter from the management that a few small prizes would be offered if two or more herds were exhibited. The Morgan cattle were the only Herefords exhibited and Mr. Morgan got no prizes. This was the big fair of the Missouri Valley Territory and he felt well repaid for having exhibited his cattle because they attracted a great deal of attention and he met many prospective purchasers some of whom became good customers. The fact that he did not overlook local opportunities of interested cattlemen in Herefords is evidenced by the fact that he showed Herefords at his home county fair, Marshall, at Marysville in 1876. He also showed a Hereford bull calf at the Riley county fair the same year bringing him with an exhibit of purebred Cotswold sheep which he also bred on a rather extensive scale.

No prizes for Herefords were offered at the Kansas City Fair in

1877 and none was shown but largely due to the efforts of Mr. Morgan a classification and prizes for Herefords were offered by this Fair in 1878 and three exhibitors competed—Gudgell & Simpson, then of Pleasant Hill, Missouri, Thomas H. Cavanaugh of Salina, Kansas, and Walter M. Morgan of Irving, Kansas.

Mr. Cavanaugh was Secretary of State for Kansas at that time and a Hereford protege of T. L. Miller who personally selected the Cavanaugh show cattle from his own large and excellent herd and Mr. Cavanaugh showed them extensively at county and district fairs in Kansas in 1878 and 1879. These cattle appear in the records as owned by Mr. Cavanaugh but since he handled purebred Herefords only a couple of years longer it is possible that he handled these cattle as an advertising project for Mr. Miller who was a most aggressive promoter of Hereford cattle.

Despite the fact that the Gudgell & Simpson and the Cavanaugh cattle exhibited at the Kansas City Fair in 1878 were among the best in the country the Morgan cattle won first in every class in which they were shown. Their winnings included first on the well bred cow Fanny 1224 in the aged cow class and first on her daughter Queen of the Prairie 1400 in the Junior heifer calf class. The Kansas Farmer of September 25, 1876 states that, "In the distribution of awards Mr. Walter Morgan of Irving, Kansas carried off the highest honors."

The demand for Morgan Herefords was so great they did not deem it necessary to exhibit a show herd each year. Their policy in this respect seems to have been one of exhibiting a show herd at irregular intervals in order that the public in general and Hereford buyers in particular might not forget that the Morgans were still breeding and handling good Hereford cattle. Mr. Morgan advertised his cattle regularly in the agricultural press for a few years after coming to Kansas then apparently adopted a policy of advertising at irregular intervals similar to his policy relative to showing.

The Morgans and their cattle became so well and so favorably known in many sections of the range country as well as Kansas and Nebraska that they were often unable to meet the demands for purebred Herefords from their own and other local herds and for good grade Herefords, particularly bulls, from the Irving neighborhood. As an illustration of the demand for Morgan cattle it might be mentioned that on March 7, 1883 Mr. Morgan reported that he had sold 68 bulls since September 1, 1882. Fortunately, Walter Morgan, having lived in the "Herefordshire of America" of Ohio for many years, was personally acquainted with all the breeders of purebred Herefords and the farmers producing high grade Herefords in that area. He was therefore able to secure advantageously considerable numbers annually for several years of both purebred and high grade Herefords for re-sale in the west.

A word of explanation is probably in order relative to trade in grade bulls. Thousands of grade bulls went to range country for many years for two reasons in particular. First good grade bulls made marked improvement in the range cattle of that day most of which were not far, if at all, removed from the original Longhorn. Second, there were not enough purebred bulls to meet the need for improvement in range cattle. The situation was such that most Kansas dealers and breeders handled both purebreds and grades previous to 1900. It might also be mentioned that far more bulls went to the range country from Kansas from 1880 to 1900 than from any other state.

The principal sires that followed Duke of Edinburgh as the years went by were in the order of their service:

Blue Rapids 1271 calved August 22, 1878, bred by T. L. Miller, Beecher, Ill.

Imp Belmont 7825 (6304) calved April 21, 1880, imported by Gudgell & Simpson.

Edmund 6553, calved October 30, 1882, bred by N. & H. Abbe, Elyria, Ohio.

Imp Conductor 3874 (5836), calved September 19, 1878, imported by N. & H. Abbe, Elyria, Ohio.

Fancy Lad 17238, calved June 9, 1884, bred by Gudgell & Simpson, Independence, Mo.

Silver Lord 37262, calved June 9, 1889, bred by Gudgell & Simpson.

Slick 3rd 57489, calved April 25, 1893, bred by H. & N. Abbe, Elyria, Ohio.

Roy Wilton 79035, calved December 6, 1897, bred by Geo. O. Holcomb, Troy, Penn.

Elyria's Java 103456, calved January 18, 1900, bred by C. A. Stannard, Emporia, Kansas.

Perusal of the pedigrees of the herd sires used by Walter Morgan indicates that he sought the best blood lines available and those who knew him personally have stated that he was an excellent judge of cattle and insisted that his herd sires be not only well bred but also good individuals.

His early sires carried a strong infusion of the blood of Sir Richard 2nd who at long last has become recognized as one of the greatest sires used in America. When the value of Anxiety 4th blood began to manifest itself, Mr. Morgan switched to this line of breeding and used two sons and one grandson as head herd sires from 1885 to 1898. These bulls were Fancy Lad 17238, Silver Lord 37262 and Slick 3rd 57489.

When it became necessary to select a successor to Slick 3rd 57489 as head herd sire Mr. Morgan felt that since his cow herd was carrying a high percentage of Anxiety 4th blood that an outcross might be desirable and after a careful search selected the bull Royal Wilton 79035 who had four close up crosses of Sir Bartle Frere 6419 and two of Garfield 7051. This bull was bred by George O. Holcomb of Troy, Pennslyvania, but purchased from C. A. Stannard of Emporia, Kansas. Royal Wilton did not disappoint Mr. Morgan.

Mr. Morgan retired as an active breeder of Hereford cattle in 1904 but he retained ownership of some half dozen cows and bred them to bulls owned by F. W. Preston, a son-in-law. The last Herefords registered as bred by Walter M. Morgan were the bulls Lee 364467 calved April 10, 1910, and Stuart 367400 calved June 9, 1910.

W. A. Morgan, a son 16 years of age when the Morgans came to Kansas was an important factor in the success of the Morgan Hereford herd in his earlier years as a helper and in later years as a partner. He retired from the partnership in 1900.

The Kansas Farmer of September 4, 1902, states that "Marshall county is known as the 'Herefordshire of Kansas.' Over 60 herds of purebred Herefords being owned there. The owners have an organization known as the Marshall county Hereford Breeders Association." Those familiar with the facts recognize in this statement the handiwork of Walter M. Morgan who was responsible for the establishment of more purebred herds of Hereford cattle in Kansas than any other breeder of his time.

Mr. Morgan was a quiet unassuming type of person—anything but high powered promoter type—yet his achievements as a breeder, his success in the show ring, his character, his forthright method of dealing with the public, and that intangible something that drew prospective breeders to him and commanded their confidence are major factors

responsible for what might be termed his silent leadership in the Hereford ranks of Kansas.

Walter M. Morgan died September 18, 1916 and the father of the Hereford industry of Kansas was laid to rest in the beautiful little cemetery at Blue Rapids, Kansas.

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

A. D. Weber, A. G. Pickett, D. L. Mackintosh

(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. Ranch, and O. M. Wallop, Sheridan, Wyoming; and M. C. Simpson, Volborg, Montana.

These steer calves, sired by small, medium, and large size bulls are being compared at each of the three stations under three standard systems of feeding and management.

System I involves immediate full feeding for 225 days.

System II represents a deferred full feeding program in which the steers 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 will be obtained on all of the steers handled under each of the systems. At the conclusion of the experiment, a joint report will be issued by the three cooperating stations.

The work has not progressed far enough to indicate trends or to justify any discussion of the results obtained. The accompanying table is included in this circular merely 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.

TABLE I. A COMPARISON OF HEREFORD STEERS SIRED BY SMALL, MEDIUM AND LARGE SIZE BULLS

(Preliminary Report—Not For Publication)

November 29, 1948 to April 18, 1949—140 Days

1—System of Feeding and Management.	I Immediate Full Feeding			II Deferred Full Feeding			III Wintering and Grazing Two Seasons		
2—Lot Number	1	2	3	4	5	6	7	8	9
3—Size of Sires	Small	Medi'm	Large	Small	Medi'm	Large	Small	Medi'm	Large
4—Number of Steers Per Lot	10	10	10	10	10	10	10	10	10
5—Initial Weight Per Steer	430	444	452	427	441	451	427	442	454
6—Gain Per Steer	286	312	314	198	207	227	132	132	154
7—Final Weight Per Steer	716	756	765	625	648	678	559	574	608
8—Daily Gain Per Steer	2.04	2.23	2.24	1.41	1.47	1.62	.94	.92	1.10
9—Daily Ration Per Steer:									
Ground Shelled Corn	8.22	8.66	8.66	3.81	3.81	3.81	.....	.....	.....
Soybean Meal	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Silage	10.02	10.02	10.02	19.58	19.70	19.83	19.48	19.94	19.80
Prairie Hay	2.07	2.06	1.98	3.09	3.60	3.91	5.25	4.69	5.07
Ground Limestone	.10	.10	.10	.....	.....	.....	.....	.....	.....
Salt	.01	.02	.01	.05	.06	.05	.05	.08	.04
10—Feed Required per 100 Lbs. of Grain:									
Ground Shelled Corn	402.65	388.81	386.01	269.69	257.97	235.24	.....	.....	.....
Soybean Meal	97.90	90.00	89.42	70.70	67.63	61.67	106.06	106.06	90.90
Silage	490.73	449.83	445.38	1385.10	1332.12	1223.56	2066.29	2115.53	1800.32
Prairie Hay	101.60	92.69	88.50	219.98	243.67	241.18	557.80	498.03	461.10
Ground Limestone	4.54	4.07	4.49	.....	.....	.....	.....	.....	.....
11—Cost of Feed Per 100 Lbs. Gain	$ 15.70	$ 14.92	$ 14.74	$ 15.23	$ 14.85	$ 13.70	$ 14.76	$ 14.49	$ 12.63
12—Appraised Value Per Cwt. May 7, 1949									

FEED PRICES: Ground Shelled Corn, $1.35 per Bu.; Soybean Meal, $75.00 per ton; Prairie Hay, $15.00 per ton; Silage, $6.50 per ton.

Project 253-2—Factors Influencing Profitable Grass Utilization and Sound Pasture Management. Wintering, Grazing, and Fattening Heifers.

FATTENING HEIFERS FOR THE SUMMER OR EARLY FALL MARKET

A. G. Pickett - Ed F. Smith

Experiment IV - 1947-1948

INTRODUCTION

The previous tests with heifer calves have been completed. Pasture was not used in these tests but instead, heifer calves were fed a full feed of grain, three-fourths feed, one-half feed, one-fourth feed and no grain, respectively with silage and a protein supplement. As a result of these tests it was determined that for heifer calves which are to be full fed grain in the dry lot or which are to be grazed 75 to 100 days and then full fed grain for approximately 100 days, two to two and one-half pounds of grain in the winter ration will produce enough flesh to result in U. S. Good carcasses after 100 days of full feeding, yet not too much flesh to justify grazing 75-100 days before full feeding. Beginning with this, the fourth test, a study was initiated to determine the best way to utilize bluestem and brome grass in fattening heifers.

Experimental Procedure

Lot 1 - Wintered with grain, cottonseed meal, silage and prairie hay; grazed without grain on bluestem grass April 27 to July 15 (78 days); full fed in dry lot July 15 to October 12 (90 days.)

Lot 2 - Wintered with grain, soybean meal, silage and prairie hay; grazed without grain on bluestem grass April 27 to July 15 (78 days); fed 1.5 pounds of cotton seed meal on bluestem grass July 15 to Oct. 12 (90 days); full fed on bluestem grass Oct. 12 to November 9 (28 days); full fed in dry lot November 9 to January 8 (60 days).

Lot 3 - Wintered with grain, linseed meal, silage and prairie hay; grazed without grain on bluestem grass April 27 to July 15 (78 days); full fed on bluestem grass July 15 to October 30 (108 days.)

Lot 4 - Wintered with grain, dehydrated alfalfa pellets, silage and prairie hay; full fed in dry lot April 27 to July 31 (95 days.

Lot 5 - Wintered with grain, dehydrated brome grass, silage and prairie hay; full fed on brome grass pasture April 27 to July 31 (95 days).

Lot 6 - Wintered with silage, prairie hay and mustard seed meal; grazed without grain on bluestem grass April 27 to July 15 (78 days); full fed dry lot July 15 to October 30 (108 days.)

Lot 7 - Wintered with silage, cottonseed meal and prairie hay; grazed without grain on bluestem grass April 27 to July 15 (78 days);fed 1.5 pounds cottonseed meal July 15 to October 12 (90 days); full fed on bluestem grass October 12 to November 9 (28 days); full fed in dry lot November 9 to January 8 (60 days.)

Lot 8 - Wintered with silage, prairie hay, cottonseed meal and dehydrated brome grass; grazed without grain on bluestem grass April 27 to July 15 (78 days); full fed on bluestem grass July 15 to October 30 (108 days.)

OBSERVATIONS

Wintering Phase

1. Cottonseed meal, soybean meal, linseed meal and mustard seed meal proved to be of equal value as protein supplements in wintering heifers.

2. Two pounds of dehydrated alfalfa or two pounds of dehydrated brome grass testing 19.9 percent and 20.4 percent protein respectively were required to equal one pound of the oil-seed meals in wintering heifers. Two pounds daily of the dehydrated products also replaced approximately one pound of hay in the ration.

3. The price of the dehydrated products caused the wintering costs for lots four and five and the full feeding cost of lot four to be relatively higher.

4. Winter gains were approximately one-fourth pound per head daily higher than would normally be expected from the rations fed.

Grazing Phase

1. Summer gains from May 1 to July 15 were smaller by about one-fourth pound daily than would normally be expected, due probably to unusually large winter gains.

2. Lots 1, 2 and 3 wintered with two pounds of grain gained approximately 50 pounds more during the winter than lots 6, 7, and 8 wintered without grain. The well-wintered lots maintained 40 pounds of this advantage on July 15. That is, well wintered lots gained almost as well during the early grazing season as did those which were rough wintered. This confirms results of the previous season's grazing.

3. Foul foot was prevalent throughout the first two and one-half months of the grazing season.

4. Lots 2 and 7 were fed 1.5 pounds of cottonseed meal daily from July 15 to October 15 and gained 1.38 pounds and 1.44 pounds daily respectively. The well-wintered group, lot two, still maintained its weight advantage at the close of the grazing season.

Full Feeding Phase

1. Full feeding grain in dry lot, contrary to the 1947 results did not give the same advantage in the 1948 tests over full feeding during the latter half of the grazing season. In 1947 dry lot feeding gave a daily gain of 2.5 pounds on one and one-half bushels less corn. The heifers fed on pasture gained only 1.87 pounds. The 1948 test showed dry lot and pasture gains to be approximately the same. Pasture feeding gave slightly higher gains than in the previous year while dry lot gains averaged a little less than two pounds daily or approximately .6 of a pound less daily.

2. Lots 1 and 6 fed in dry lot sold for 50 cents per hundredweight more than lots 3 and 8 fed on bluestem pasture.

3. Heifers full fed in dry lot yielded higher grading carcasses than those full fed on pasture. This was particularly true of lot 1 which had been wintered well.

4. The well wintered lots still held most of their winter weight advantage when marketed.

5. Grazing a full season, then feeding 1.5 pounds of cotton seed cake per heifer daily from July 15 to October 12 produced satisfactory gains, but feeding on grass after October 12 did not. Lots 2 and 7, fed on grass from October 12 to November 9, lost three-fourths of a pound daily. They gained over three pounds daily the next month in a dry lot.

6. Heifers grazed a full season and then fed out were too large and began to show "hooky". They were not desirable to the packer.

7. Wintering well and finishing with a full feed of grain on brome grass was not as profitable as finishing in the dry lot. Dry lot fed heifers:

A. Gained 2.03 pounds daily compared to 1.60 pounds made by those full fed on brome grass.
B. Sold for $2.00 per hundred more.
C. Graded one-third of a grade higher and packers called them a much better buy at $2.00 per hundred more.
D. Dressed one-half percent higher.
E. Made $18.00 more net profit per head.

General Observations

1. Heifers fed two pounds of grain daily during the winter made larger gains than those wintered without grain. They maintained 50 to 75 percent of this weight advantage through the grazing and full feeding periods.

2. The effect of including two pounds of grain in the winter ration was definitely noticeable in the carcasses whether the heifers are full fed grain after wintering or after grazing 75 to 100 days.

3. When the selling price of fat heifers was based on the value of the dressed beef, it paid to use two pounds of grain in the winter ration.

4. Two pounds of grain in the winter ration helped also to get heifers off to an earlier market, which is desirable both from the standpoint of carcass weight and price.

5. At least 100 days of full feeding appeared to be necessary to make the heifers grade U. S. Good.

6. On the basis of gains produced, the advantage in favor of feeding in dry lot instead of on bluestem grass the last of the grazing season was not as large from a gain standpoint as in 1947 but it was responsible for a higher degree of finish.

7. The over-all results indicated a decided advantage in favor of dry lot feeding.

8. These tests show that heifer calves give a good account of themselves as consumers of roughage, grass and grain.

9. Heifer calves offer a definite possibility for producers with winter feed but with little if any pasture or good early pasture.

Fattening Heifers for the Summer or Early Fall Market

Phase 1—Wintering

November 11, 1947 to April 27, 1948—168 Days

1—Lot Number	1	2	3	4	5	6	7	8
2—Number of heifers in lot	10	10	10	10	10	10	10	10
3—Average daily ration, lbs								
Silage	19.96	19.96	19.96	19.96	19.96	19.96	19.96	19.96
Prairie hay	4.74	4.72	4.62	3.91	4.34	4.98	5.01	4.80
Ground shelled corn	1.98	1.98	1.98	1.98	1.98			
Cottonseed meal	1.01						1.00	.51
Soybean meal		1.01						
Linseed meal			1.01					
Dehyd. alfalfa pellets				1.69				
Dehyd. brome grass					1.68			
Mustard seed meal						1.00		
4—Feed consumed per heifer, lbs								
lbs								
Silage	3,354.00	3,354.00	3354.00	3354.00	3354.00	3354.00	3354.00	3354.00
Prairie hay	794.00	790.00	748.00	629.00	697.00	808.00	836.00	882.00
Ground shelled corn	334.00	334.00	334.00	360.00	360.00			
Cottonseed meal	170.00						170.00	86.00
Soybean meal		170.00						
Linseed meal			170.00					
Dehyd. alfalfa pellets				302.00				
Dehyd. brome grass					300.00			110.00
Mustard seed meal						170.00		
5—Initial wt. per heifer	408.00	406.00	405.00	404.00	404.00	406.00	406.00	404.00
6—Final wt. per heifer	666.00	655.00	658.00	636.00	635.00	610.00	604.00	595.00
7—Gain per heifer	258.00	249.00	253.00	232.00	231.00	204.00	198.00	191.00
8—Daily gain per heifer	1.54	1.48	1.51	1.38	1.38	1.21	1.18	1.14
9—Feed cost per heifer	31.12	31.00	31.19	33.19	33.64	23.17	23.38	23.88

(Continued from preceding page)

10—Initial cost of heifers at 21.50 per cwt.	87.72	87.29	87.07	86.86	86.86	87.29	87.29	86.86
11—Heifer cost plus feed cost	118.54	118.38	118.25	120.05	120.50	110.00	110.46	110.74
12—Necessary selling price per cwt. to pay for feed and initial cost	17.84	18.07	17.97	18.88	18.98	18.11	18.32	18.61
13—Appraised value per cwt. May 1 1948	27.00	27.50	26.50	27.50	27.50	26.50	26.00	26.25

Phase 2—Grazing, Early Summer Period
April 27 to July 15, 1948—78 Days

Lot Number	1	2	3	4	5	6	7	8
14—Management followed	Grazed on Bluestem grass			Full fed in dry lot	Full fed on [illegible] grass	Grazed on Bluestem grass		
15—Initial weight per heifer	668.00	655.00	658.00			610.00	604.00	595.00
16—Final weight per heifer	722.00	703.00	716.00			683.00	665.00	656.00
17—Gain per heifer	54.00	48.00	58.00			73.00	61.00	61.00
18—Daily gain per heifer	.72	.62	.74			.94	.78	.78

Phase 3—Grazing, Late Summer Period
July 15 to October 12, 1948—90 days

Lot Number	1	2	3	4	5	6	7	8
19—Management followed	Full fed in dry lot	C. S. M. on Bluestem	Full fed on Bluestem			Full fed in dry lot	C. S. M. on Bluestem	Full fed on Bluestem

(Continued from preceding page)

20—Cottonseed meal per heifer daily, lbs		1.5					1.5	
21—Total Cottonseed meal fed per heifer		135.					135.	
22—Initial weight per heifer		703.					665.	
23—Final weight per heifer		827.					795.	
24—Gain per heifer		124.					130.	
25—Daily gain per heifer		1.38					1.44	

Phase 4—Full Feeding

Lot Number	1	3	6	8	2	7	4	5
26—Period when full fed	July 15 to Oct. 30 1948	July 15 to Oct. 30 1948	July 15 to Oct. 30 1948	July 15 to Oct. 30 1948	Oct. 12, 1948 Jan. 8, 49	Oct. 12, 48 Jan. 8, 49	Apr. 27 to July 31, 1948	Apr. 27 to July 31, 1948
27—Where fed	Dry Lot	Blue-stem Grass	Dry Lot	Blue stem Grass	Blue-stem Grass and Dry Lot *	Blue-stem Grass and Dry Lot *	Dry Lot	Brome Grass
28—Number of days in this phase	108	108	108	108	88	88	95	95
29—Daily ration per heifer, lbs.								
Ground shelled corn	10.2	10.5	10.6	10.5	11.7	11.7	10.5	9.8
Cottonseed meal	1.5	1.5	1.5	1.5	1.55	1.55		1.5
Dehyd. alfalfa and brome grass							5.9	
Atlas silage					10.7	10.7	1.7	
Prairie hay	4.2		4.9				6.4	

* October 12 to November 9, 1948 on Bluestem grass.

Phase 4, cont.

Lot Number	1	3	6	8	2	7	4	5
29—Daily ration, etc., Cont.								
Alfalfa hay	6.5		6.6		1.1	1.1		
Bluestem grass		July 15 to Oct. 30 1948		July 15 to Oct. 30 1948	Oct. 12 to Nov. 9, 1948	Oct. 12 to Nov. 9, 1948		
Brome grass								Apr. 27 to July 31, 1948
30—Feed Consumed per heifer during this phase:								
Corn (Bu.)	19.7	20.2	20.4	20.2	18.4	18.4	17.9	16.5
Cottonseed Meal (Lbs)	162.	162.	162.	162.	136.	136.		14.
Dehyd. alfalfa and brome grass (Lb.)							559.	
Silage (Lbs.)					941.	941.	160.	
Prairie hay (Lbs.)	453.		527.				606.	
Alfalfa hay (Lbs.)	707.		710.		98.	98.		
Bluestem grass		July 15 to Oct. 30, 48	July 15 to Oct. 30 1948	Oct. 12 to Nov. 9 1948	Oct. 12 to Nov. 9 1948			
Brome grass								Apr. 27 to July 31 1948
31—Initial weight per heifer	722.	716.	683.	656.	827.	795.	636.	636.
32—Final weight per heifer	921.	920.	895	869	951	931	829	788
33—Gain per heifer	199.	204.	212	213	124	136	193	152
34—Daily Gain per heifer	1.84	1.89	1.96	1.97	1.41	1.55	2.03	1.60

Summary of Phases 1, 2, 3, and 4

Lot Number	1	3	6	8	2	7	4	5
35—Number of heifers per lot	10	10	10	10	10	10	10	10
36—Date placed on test	November 11, 1947							
37—Date Expt. completed and heifers marketed	October 30, 1948				January 8, 1949		July 31, 1948	
38—Number of days heifers were on experiment	354	354	354	354	424	424	263	263
39—Initial weight per heifer	408	405	406	404	406	406	404	404
40—Total gain per heifer	513	515	489	465	545	525	425	384
41—Final weight per heifer	920	920	895	869	951	931	829	788
42—Daily gain per heifer	1.45	1.45	1.38	1.31	1.29	1.24	1.62	1.46
43—Total feed consumed per heifer:								
Ground Shelled Corn. (Bu.)	25.6	26.2	20.4	20.2	24.4	18.4	24.3	23.
Protein Concentrate (Lbs.)	332.	329	331.	246.	441.	441.		14.
Dehyd. Alfalfa & Brome Grass Pellets. (Lbs.)				111.			861.	302.
Silage (Lbs.)	3354	3354	3354	3354	4295	4295	3514	3354
Alfalfa Hay. (Lbs.)	707		710		98	98		
Prairie Hay. (Lbs.)	1328	748	1335	782	789	836	1235	705
Bluestem Grass	April 27 to July 15, 48 78 days	April 27 to Oct. 30, 48 190 dys	April 27 to July 15, '48 78 days	April 27 to Oct. 30, '48 190 dys	Apr. 27 to Nov. 9, 48 196 dys	April 27 to Nov. 9, 48 196 dys	None	
Brome Grass								Apr. 27 to July 31, 48 95 days
44—Cost of feed per 100 lb gain	20.16	18.15	$ 19.03	$ 17.54	$ 15.07	$ 14.17	$ 24.62	$ 24.17
45—Total cost of feed and grass per heifer	$103.41	$ 93.50	$ 93.05	$ 81.56	$ 82.12	$ 74.37	$104.65	$ 92.81
46—Initial cost per heifer at $21.50 cwt.	$ 87.72	$ 87.07	$ 87.29	$ 86.86	$ 87.29	$ 87.29	$ 86.86	$ 86.86

Summary—Phases 1, 2, 3 and 4, Cont

Lot number	1	3	6	8	2	7	4	5
47—Feed cost plus heifer cost	$191.13	$180.57	$180.34	$168.42	$169.41	$161.66	$101.51	$179.67
48—Weight per heifer at market	887	871	857	824	915	890	797	760
49—Selling price per cwt. at market	$ 30.00	$ 29.50	$ 30.00	$ 29.50	$ 24.50	$ 24.00	$ 38.50	$ 36.50
50—Selling price per heifer	$266.10	$256.95	$257.10	$243.08	$224.18	$213.60	$306.85	$277.40
51—Margin per heifer above feed cost and initial cost	74.97	76.38	76.76	74.66	54.77	51.94	115.33	97.73
52—Price of corn per bushel	2.00	2.00	2.00	2.00	1.35	1.35	2.40	2.40
53—Shrink in shipping to market								
Pounds per heifer	33	49	38	45	36	41	32	28
Per cent	3.58	5.32	4.24	5.17	3.78	4.40	3.86	3.55
54—Dressing percentage	58.8	59.3	58.3	58.6			59.7	59.2
55—Carcass grades:	*	*	*	*	**	**	**	**
Choice								
High								
Average								
Low								
Good								
High	1				3	2	3	3
Average	2		1	1	6	2	5	1
Low	4	4	6	2	1	4	1	4
Commercial								
High	1	5	2	5		2		1
Average	1	1	1	2				
Low	1							

Feed prices: Ground shelled corn for lots 1, 3, 6, & 8; $2.00 per bu. Ground shelled corn for lots 2 & 7; $1.35 per bu. Ground shelled corn for lots 4 & 5; $2.40 per bu.; Cottonseed meal and soybean meal $75. per ton; Linseed meal $80. per ton; Dehyd. alfalfa or brome grass, $60. per ton; Silage, 6.50 per ton; Prairie hay, $15. per ton; Alfalfa hay, $20. per ton; Oat straw, $15. per ton; Bluestem grass, $10. a head; Brome grass, $3.00 per head per month.

*—Graded by the Packer.

**—Graded by U. S. Gov't. Graders.

Project 253-2: Factors Influencing Profitable Grass Utilization and Sound Pasture Management. Wintering Grazing and Fattening Heifers.

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

Experiment V - 1948-1949

A. G. Pickett - Ed F. Smith

INTRODUCTION

Previous tests have shown that two or two and one-half pounds of grain daily will winter heifer calves well, which are to be full fed for an early market either after wintering or following wintering and grazing without grain 75 to 100 days.

This wintering phase was preparatory to grazing and feeding. Comparisons are being made of full feeding in the dry lot and feeding on bluestem grass and brome grass of both the well-wintered and rough-wintered heifers.

The objectives of this work with heifer calves are:

1 - To determine the best methods of utilizing grass in fattening heifers.

2 - To develope systems of fattening heifers that may be adapted to varying farm and ranch conditions.

Dehydrated alfalfa and dehydrated brome grass pellets were compared with soybean meal, cottonseed meal and linseed meal as protein supplements in the winter rations.

Experimental Procedure

Lot 1 - Wintered with 20 pounds silage, prairie hay, two pounds of ground corn and one pound cottonseed meal per head daily. This lot will be grazed on bluestem grass until about July 15 then full fed in dry lot.

Lot 2 - Wintered with 20 pounds silage, prairie hay, two pounds corn and one pound soybean meal per head daily. This lot will be full-fed on brome grass pasture following the winter period.

Lot 3 - Wintered with 20 pounds silage, prairie hay, one pound linseed meal and two pounds ground corn per head daily. This lot will be grazed on bluestem grass until about July 15, then full fed on grass.

Lot 4 - Wintered with 20 pounds of silage, prairie hay, two pounds of ground corn and dehydrated alfalfa pellets per head daily. This lot will be fed out at the close of the winter period without going to grass.

Lot 5 - Wintered with 20 pounds silage, prairie hay, two pounds of ground corn and dehydrated brome grass pellets per head daily. This lot will be grazed on brome grass without grain at the close of the winter period and full-fed in dry lot beginning about June 1.

Lots 6 - 7 and 8 - Wintered with 20 pounds silage, prairie hay and one pound cottonseed meal daily. These lots will be grazed on bluestem pasture with well-wintered lots 1 and 2 and will be full fed as check lots.

Observations

1 - Calves wintered on silage, prairie hay, one pound oil seed meal and two pounds grain, should gain approximately 1.25 pounds per day. Lot 1, 2, and 3, receiving one pound, cottonseed meal, soybean meal and linseed meal respectively made such gains. Neither 1.75

pounds dehydrated alfalfa nor 1.78 pounds of dehydrated brome grass equalled one pound of the oil seed meals as protein supplements.

2 - One pound cottonseed meal fed without grain to lots 6, 7, and 8, gave only slightly lower gains than 1.75 pounds of the dehydrated grasses plus two pounds of ground corn.

3 - Wintering costs on lots 4 and 5 are higher than lots 1, 2, and 3 due to the relatively higher price of the dehydrated feeds.

4 - Feeding the dehydrated feeds as a protein supplement decreased hay consumption slightly.

5 - Lots 6, 7, and 8 wintered on silage, prairie hay and one pound of cottonseed meal, gained approximately one pound per head daily which is about a normal gain on this ration.

6 - Lots 6, 7, and 8 were wintered together. It is of interest to note that more variation was found in gain between the lots eating the same feed out of the same bunk than resulted between the gains in lots 1, 2, and 3 which were fed different protein supplements in separate lots.

Phase 1—Wintering

November 29, 1948 to April 18, 1949—140 Days

1—Lot Number	1	2	3	4	5	6	7	8
2—Number of heifers in lot	10	10	10	10	10	10	10	10
3—Ration fed	Silage Prairie hay Cotton-Seed meal Corn	Silage Prairie hay Soybean meal Corn	Silage Prairie hay Linseed meal Corn	Silage Prairie hay Dehyd. alfalfa pellets corn	Silage Prairie hay Dehyd. Brome grass pellets corn	Silage Prairie hay Cotton-Seed meal	Silage Prairie hay Cotton-seed meal	Silage Prairie hay Cotton-seed meal
4—Average daily ration, lbs								
Silage	20.	20.	20.	20.	20.	20.	20.	20.
Prairie hay	4.43	4.16	4.24	3.73	4.05	4.79	4.79	4.79
Ground Corn	2.	2.	2.	2.	2.			
Cottonseed meal	1.					1.	1.	1.
Soybean meal		1.						
Linseed meal			1.					
Dehyd. alfalfa pellets				1.75				
Dehyd. brome grass pellet					1.78			
Salt	.05	.04	.05	.05	.03	.02	.02	.02
5—Average initial weight	460.	463.	463.	446.	446.	446.	450.	440.
6—Average Final weight	631.	646.	633.	588.	596.	580.	604.	571.
7—Total gain per heifer	171.	183.	170.	142.	150.	134.	154.	131.
8—Average daily gain	1.22	1.31	1.21	1.01	1.07	.95	1.10	.93

(Continued from preceding page)

9—Feed required for 100 pounds; gain lbs.	1628.65	1530.05	1638.23	1940.14	1853.33	2084.40	1813.70	2132.14
Silage	362.92	318.96	349.41	368.52	738.20	500.60	435.58	512.06
Prairie hay	137.89	147.54	158.82	188.02	180.00			
Ground Corn	81.67					105.67	91.95	108.10
Cottonseed meal		76.50						
Soybean meal			81.17					
Linseed meal				173.16				
Dehyd. alfalfa pellets					166.60			
Dehyd. brome grass pellets								
10—Cost of feed for 100 pounds gain	$ 14.81	$ 13.72	$ 14.94	$ 18.69	$ 18.11	$ 14.38	$ 12.52	$ 14.71
11—Feed cost per heifer	$ 25.32	$ 25.10	$ 25.40	$ 26.55	$ 27.16	$ 19.28	$ 19.28	$ 19.28
12—Initial cost of heifers at $26.50 per cwt.	$121.90	$122.70	$122.60	$118.19	$118.19	$118.19	$119.25	$116.60
13—Heifer cost plus feed cost	$147.22	$147.80	$148.00	$144.74	$145.35	$137.47	$138.53	$135.88
14—Necessary selling price per cwt. to pay for feed and initial cost	$ 23.33	$ 22.88	$ 23.38	$ 24.62	$ 24.39	$ 23.70	$ 22.94	$ 23.80
15—Appraised value per cwt. May 1, 1948								

FEED PRICES: Ground shelled corn, $1.25 per bushel; Cottonseed meal, soybean meal, $75.00 perton; Linseed meal, $80.00 per ton; Dehydrated alfalfa pellets, dehydrated Brome grass pellets, $60.00 per ton; Prairie hay, $15 per ton; Silage, $6.50 per ton.

Project 253-1: Factors Influencing Profitable Grass Utilization and Sound Pasture Management. Wintering and Grazing Steer Calves.

INFLUENCE OF WINTER RATIONS AND GAINS ON SUBSEQUENT PASTURE GAINS

A. G. Pickett—Ed F. Smith

1. Atlas silage, oats straw and a combination of these two roughages were compared in wintering calves. During the second winter the yearlings were fed a limited amount of silage with prairie hay.
2. One pound of cottonseed meal was compared with four pounds of alfalfa hay as protein supplements to the above feeds.
3. The advisability of feeding cottonseed meal on grass the latter part of the bluestem grazing season was studied in a series of tests.
4. The practicability of wintering yearling steers on bluestem grass with a protein supplement was studied.

INTRODUCTION

Five lots of good steer calves were used in this test which was started in the fall of 1946. Three lots were continued through two winters and two full grazing seasons. The other two lots were full fed as yearlings at the close of the first grazing season.

The objects of the test were to use grass to the fullest extent, compare early summer gains with late season gains and to determine the value of feeding a protein supplement on bluestem grass after mid-summer. During the winter periods rations were designed to secure varying rates of gain in order that the influence of winter gains on summer gains might be determined.

The comparison of feeds was incidental to the main purpose of this test.

EXPERIMENTAL PROCEDURE

Atlas silage, oats straw and a combination of these two roughages were used in wintering the steer calves in the 1946-47 season. Lot 1 was full fed silage, lots 2 and 3 were full fed oats straw alone and lots 4 and 5 were fed a half-feed of silage plus oats straw. All five lots were grazed together on bluestem grass until August 2. From August 2 until October 29, lots 2 and 4 received 1½ pounds cottonseed cake on grass while lots 1, 3, and 5 were continued on grass the full season without supplementary feed.

Following the grazing period, lots 4 and 5 were full fed in dry lot. These lots had been wintered alike but lot 4 was fed cottonseed meal on grass.

Lot 3 was wintered as yearlings on bluestem grass with cottonseed cake fed at the rate of 1 pound per head daily from November 1 until December 16 and 1½ pounds cottonseed cake until May 1. A low grade of prairie hay was fed only when the grass was covered with snow. These steers were not fed daily, but only every second day. Lots 1 and 2 were wintered on silage, prairie hay, and cottonseed meal.

During the summer of 1948, lots 1, 2, and 3, now two years old, were grazed together on bluestem grass until July 15. From July 15 to October 12, lots 2 and 3 were fed three pounds of cottonseed cake daily and lot 1 continued to graze without supplemental feed.

All three lots were full fed together in the pasture and marketed December 11, 1948.

OBSERVATIONS

PHASE 1—Wintering as Calves

1. Atlas silage again proved to be an excellent roughage for wintering steer calves. Gains were cheaper than from oats straw and a combination of silage and oats straw.
2. Four pounds of stemmy, medium to low grade alfalfa hay was equal to one pound of cottonseed meal as a protein supplement.
3. Oats straw as the only roughage produced slightly more than 1-3 pound daily gain and the steers to which it was fed developed large paunchy middles. They were, however, in good thrifty condition.
4. All lots, especially the last four, appeared to be in excellent condition to make large gains on grass.

PHASE 2—Early Summer Period Grazing as Yearlings
April 24, to August 2, 1947

1. All five lots made practically the same gains regardless of differences in winter gains. This was contrary to what was expected, since previous tests had indicated that summer gains tend to be inversely proportional to winter gains.
2. Lot 1, wintered on silage, still showed more flesh and bloom on August 2.
3. Grass was abundant but gains were relatively low. All of the steers were slow in shedding their winter hair coats.

PHASE 3—Grazing as Yearlings
August 2 to October 29, 1947

1. As stated above, the level of winter gains had little if any influence on grass gains up to August 1. Lot 1, which made the largest winter gain, gained approximately one-half as much from August 1 to October 29 as did lots 3 and 5.
2. One and one-half pounds of cottonseed meal fed during this period increased daily gains more than one pound per day.
3. Each pound of cottonseed cake fed produced approximately three-fourths pound extra gain.
4. Full season grazing gains were low considering the small gains during the previous winter.

PHASE 4—Wintering as Yearlings
October 29, 1947 to April 29, 1948

1. Lots 4 and 5 were full fed as yearlings at the end of the first year. The results of this will be discussed later under the full feeding phase.
2. Lots 1 and 2 were wintered with the expectation of putting them on grass at approximately the same weight and condition. Lot 1 had been wintered on silage as calves and grazed a full season, while lot 2 had been wintered on oats straw and fed cottonseed cake on grass which put them in fleshier condition and heavier off grass.
3. The thinner condition and extra cottonseed meal in the winter ration of lot 1 brought these two lots to grass as two-year-olds at approximately the same weight and condition.
4. Atlas silage and early cut, bright prairie hay proved to be an excellent roughage combination for wintering yearlings. Daily gains were 1.4 pounds and 1.13 pounds. Experienced cattlemen considered these steers too fleshy to put on grass.
5. Lot 3, wintered on bluestem grass with a protein supplement came through in strong thrifty condition. Every other day feeding of cottonseed cake proved to be satisfactory.

PHASE 6—Grazing as Two-Year-Olds
April 29 to July 15, 1948

1. Early pasture gains were about what would be expected. The fleshy steers of lots 1 and 2 gained .84 and .82 of a pound daily while the lot-3 steers, which were thin, gained 2.58 pounds daily. The season was quite dry until about mid-June.

PHASE 6—Grazing as Two-Year Olds
July 15 to October 12, 1948

1. In 1947 the rate of gain on lot 1 steers as yearlings was about one-third as much during the late grazing season as was the rate of gain up to August 1. In 1948 as two-year-olds the daily gain on these fleshy steers was .84 of a pound up to July 15 and 1.47 pounds from July 15 to October 12, without supplemental feed.
2. Lot 2 fed three pounds of cottonseed cake per head daily gained 1.61 pounds daily or only .14 of a pound more than lot 1 fed no supplemental feed.
3. Lot 3 which gained 2.58 daily up to July 15, gained only 2.00 daily after July 15 despite the fact that three pounds of cottonseed cake were fed daily.
4. Contrary to popular belief and in contrast to results of some previous tests, the steers in this experiment as two-year-olds made larger gains after July 15 than they did before that date. It would seem therefore, that extended research on this problem is needed.
5. Feeding cottonseed cake on grass did not show the large increase in gain as in 1947 with yearlings. No increase in gain was noted until about September 1.
6. Steers receiving cottonseed cake showed more bloom and flesh and were appraised $2.00 per hundred higher than those not receiving cottonseed cake.

Phase 7 - Full Feeding

1. Lots 1, 2, and 3 were wintered and summered twice and fed out after the second summer. Lots 4 and 5 were fed out as yearlings after the first summer.
2. Full feeding on pasture late in the fall proved to be very unsatisfactory. Gains were only about one pound per head daily, whereas two-year-old steers normally may be expected to gain at least two pounds per head daily when full fed in the dry lot.
3. Lot 4 was gaining faster than lot 5 in the fore part of the full feeding period, but went off feed when eating about 17 pounds of grain. It was then necessary to reduce the grain to ten pounds daily and they never consumed as much again as when they went off feed. These steers made practically no gain for 28 days and lost most of the weight advantage over lot 5.

   The apparent cause was a foul, dirty bunk. This loss of four weeks gain when the cattle were on full feed was expensive and emphasized the importance of careful feeding.

SUMMARY

1. Even though the feeding and management varied widely between lots 1, 2, and 3 over a period of more than 2 years, the average daily gain for the entire period was the same for all three lots.
2. The three lots fed two years consumed less than one-half as much corn as the two lots full fed and finished as yearlings.
3. Although the table shows all five lots grading approximately the same it should be noted that it was necessary to use packer grades on lots 1, 2, and 3, while U. S. Government grades were used for lots 4 and 5. The packer grades may be somewhat higher than the U. S. Government grades.

4. Actual cost of corn was used and since lots 4 and 5 were fed out a year before lots 1, 2, and 3; the price was $1.05 more per bushel

5. Using the same price for corn, lots 4 and 5 would show a profit, (line 66 in table), of $87.00 and $85.00 per head respectively. It should be remembered that profits for these lots are for one year, while profits shown for lots 1, 2, and 3 are for two years' operation and must be divided by two to get a figure comparable to that for lots 4 and 5. It should also be remembered that more calves can be wintered on a given amount of feed. Profit per head is not a true picture of profit or return for feed.

6. There is a tendency many times to evaluate cattle operations on the basis of bushels of corn used. Such a measure is not reliable. In Kansas the maximum gains from grass and roughage is a better criterion. If feeding more corn will increase the returns from grass and roughage, then it is advisable.

   Lot 1 fed as two-year-olds consumed only 12 bushels of corn, while lot 5 consumed 28.7 bushels. Yet profit per head on a yearly basis assuming one price for corn was only $54.89 for lot 1 marketed as two-year-olds, whereas it was $85.16 per head for lot 1 marketed as yearlings.

7. Lot 1 wintered as calves produced 67 pounds of gain for each ton of silage fed. The second winter when fed to yearlings each ton of silage or its equivalent produced only 40 pounds of gain.

8. Feeding lot 2 three pounds of cottonseed cake from July 15 to October 12 resulted in practically no additional gain but did prove definitely beneficial as judged by the carcasses. Only one carcass was graded below U. S. Good while lot 1, grazed a full season without cottonseed cake, had seven carcasses in the commercial grade.

9. Lot 3 steers wintered on bluestem grass equalled lot 2 in weight when marketed but were disappointing as carcasses. This again indicates that in addition to weight, gain and apparent condition the plane of nutrition over a relatively long period of time also has an important bearing on the grade of beef produced.

PHASE 1—WINTERING AS CALVES

December 5, 1946 to April 24, 1947—140 Days

1—Lot number	1	2	3	4	5
2—Number of steers per lot	10	10	10	10	10
3—Daily ration per steer (pounds):					
Atlas silage	27.46			13.75	13.75
Oats straw		9.18	7.31	4.81	2.02
Alfalfa hay			4.00		4.00
Cottonseed meal	1.00	1.00		1.00	
Salt	.14	.04	.07	.08	.06
4—Daily gain per steer	.96	.36	.39	.76	.70
5—Initial weight per steer	411	411	411	410	412
6—Gain per steer	135	50	55	106	98
7—Final weight per steer	546	461	466	516	510
8—Appraised value per cwt. May 3, 1947	$ 22.00	$ 21.00	$ 21.00	$ 22.00	$ 21.75

PHASE 2—GRAZING AS YEARLINGS
April 24, 1947 to August 2, 1947—100 Days

9—Weight per steer at close of this period	653	568	586	624	624
10—Gain per steer	107	107	120	108	114
11—Daily gain per steer	1.07	1.07	1.20	1.08	1.14

PHASE 3—GRAZING AS YEARLINGS
August 2, 1947 to October 29, 1947—88 Days
Cottonseed Cake vs. No Cottonseed Cake

Lot Number	1	2	3	4	5
12—Amount of Cottonseed cake fed per steer daily. lbs		1.5		1.5	
13—Daily gain per steer..	.35	1.79	.67	1.65	.60
14—Additional daily gain per steer as a result of feeding Cottonseed cake		1.13*		1.06*	
15—Additional gain per steer as a result of feeding cake		1.13*		1.06*	
16—Initial weight per steer	653.	568.	586.	624.	624.
17—Gain per steer	31.	158.	59.	146.	53.
18—Final weight per steer	684.	726.	645.	770.	677.
19—Gain per steer for the total grazing season April 24 to October 29, 1947—188 days	138.	265.	179.	254.	167.
20—Appraised value per cwt. October 29, 1947	$ 23.00	$ 23.25	$ 22.75	$ 23.50	$ 23.00

*—Lots 2 & 3 were wintered the same and compared to obtain the 99 pound figure while lots 4 & 5 were wintered the same and compared for the 93 lb figure.

PHASE 4—WINTERING AS YEARLINGS
October 29, 1947 to April 29, 1948—183 Days

Lot Number	1	2	3	4	5
21—Management follow'd	Winter'd in Dry Lot	Winter'd in Dry Lot	Winter'd on n'tive Blu'stem Grass	Full Fed in Dry Lot	Full Fed in Dry Lot
22—Daily ration per steer in lbs.					
Prairie Hay	5.23	5.00	1.36*	See Phase 7	See Phase 7
Silage	38.25	38.25			
Cottonseed Meal...	1.21	1.06	1.37		
23—Daily gain per steer.	1.40	1.13	.36		
24—Initial wt. per steer..	684.	726.	645.		
25—Gain per steer.....	257.	206.	66.		
26—Final wt. per steer..	941.	932.	711.		

27—Appraised value per cwt., April 29, 1948..	$28.50	29.00	28.50		

*—A total of 228 lbs of poor quality prairie hay was fed each steer when snow covered the grass.

PHASE 5—GRAZING AS TWO YEAR OLDS
April 29 to July 15, 1948—76 Days

Lot Number	1	2	3	4	5
28—Initial wt. per steer..	941.	932.	711.		
29—Gain per steer	64.	62.	196.		
30—Final wt. per steer..	1005.	994.	907.		
31—Daily gain per steer .	.84	.82	2.58		

PHASE 6—GRAZING AS TWO-YEAR-OLDS
July 15 to October 12, 1948—89 Days
Cottonseed Cake vs. No. Cottonseed Cake

Lot Number	1	2	3	4	5
32—Amount of cottonseed cake fed per steer daily, lbs.		3.00	3.00		
33—Daily gain per steer..	1.47	1.61	2.00		
34—Additional daily gain per steer as a result of feeding cake.		.14			
35—Additional gain per steer as a result of feeding cake, lbs.		12.			
36—Initial weight per steer.	1005.	994.	907.		
37—Gain per steer	131.	143.	178.		
38—Final weight per steer	1136.	1137.	1085.		
39—Appraised value per cwt. October 15, 1948	$ 26.00	28.00	26.75		

Phase 7—Full Feeding

Lot Number	1	2	3	4	5
40—Period when full fed.	(Oct. 12 to Dec. 11, 1948) Two-Year-Olds			(Oct. 29, 1947 to Feb. 18, 1948) Yearlings	
41—Where fed	Fed on Bluestem Grass			Fed in Dry Lot	
42—Total days fed	60	60	60	112	112
43—Daily ration per steer, lbs.					
Gr. shelled corn...	11.18	11.18	11.18	13.7	14.4
Cottonseed meal ..	2.00	2.00	2.00	1.36	1.36
Atlas silage	15.00	15.00	15.00	16.2	14.9
Alfalfa hay				2.00	2.00
44—Feed consumed per steer					
Gr. shelled corn (Bu.)	12.00	12.00	12.00	27.4	28.7

Cottonseed meal(lbs)	120.00	120.00	120.00	153.00	153.00
Atlas silage (lbs.)	900.00	900.00	900.00	1814.00	1666.00
Alfalfa hay (lbs)				224.00	224.00
45—Initial wt. per steer	1136.	1137.	1693.	770.	677.
46—Gain per steer	64.	65.	100.	213.	293.
47—Final wt. pe rsteer	1200.	1202.	1193.	983.	970.
48—Daily gain per steer	1.07	1.08	1.67	1.90	2.62

SUMMARY—Phases 1 through 7

49—Date experiment began	December 5, 1946				
50—Date experiment completed	December 11, 1948			Feb. 18, 1948	
51—Total days on experiment	737	737	737	440	440
52—Initial wt. per steer	411	411	411	410	412
53—Total gain per steer6	789	791	782	573	558
54—Final wt. per steer	1200	1202	1193	983	970
55—Daily gain per steer.	1.07	1.07	1.06	1.30	1.37
56—Total feed consumed per steer:					
Ground shelled corn (bu)	12	12	12	27.4	25.7
Cottonseed meal(lbs)	484	859	620	422	153
Alfalfa hay (lbs)	....	.....	562	226	786
Prairie hay (lbs)	914	910	228	.....	.....
Atlas silage	11,674	7830	900	3740	3592
Oat straw	.....	1285	1024	673	307
Bluestem grass—days	413	413	596	188	188
57—Feed cost per steer:					
Ground shelled corn	16.20	16.20	16.20	65.85	68.96
Cottonseed meal	18.15	32.21	23.25	15.83	5.74
Alfalfa hay	.....	.....	5.62	2.26	7.86
Prairie hay	6.85	6.83	1.71	.....	.....
Atlas silage	37.36	25.06	2.83	11.97	11.49
Oat straw	.....	9.64	7.68	5.05	2.30
Bluestem grass	27.00	27.00	37.00	10.00	10.00
58—Total cost of feed and grass	$105.56	$116.94	$ 94.34	$110.96	$106.37
59—Cost of feed per 100 lbs. gain	13.38	14.78	12.06	19.36	19.06
60—Initial cost per steer.	80.40	80.40	80.40	80.40	80.40
61—Feed cost plus initail cost per steer	185.96	197.34	174.74	191.36	186.77
62—Wt per steer at m'ket	1116	1128	1118	945	930
63—Necessary selling price per cwt. at market to feed cost & initial cost	16.66	17.49	15.63	20.25	20.08
64—Selling price per cwt. at market.	26.50	27.00	27.00	26.50	26.00
65—Selling price per steer at market	295.74	304.56	301.86	250.43	241.80

66—Margin per steer above feed cost and initial cost	109.78	107.22	127.12	59.07	55.03
67—Marketing expense a steer sold at Kansas City	5.68	5.68	5.68	4.41	4.41
68—Shrink in transit:					
Pounds per steer	84	74	75	38	60
Percent	7	6.15	6.28	3.86	4.12
69—Dressing per cent	61.4	62.2	60.1	59.7	58.5
70—Carcass	**	**	**	***	***
Choice					
High					
Average					
Low		1			1
Good					
High				1	
Average		7	1	4	2
Low	3	1	4	3	4
Commercial					
High	7	1	4	1	2
Average				1	1
Low				1	1

[a]Feed Prices:
Ground shelled corn for lots 1, 2, and 3, $1.35 per bu.
Ground shelled corn for lots 4 and 5, $2.40 per bu.
Cottonseed meal, $75 per ton; alfalfa hay, $20 per ton; prairie hay, $15 per ton; Atlas silage, $6.50 per ton; oat straw, $15 per ton; bluestem grass for 1947, $10 per head for yearlings; bluestem grass for winter of 1947-48, $10 per head; bluestem grass for 1948, $17 per head for two-year-olds.
**Lots 1, 2 and 3 graded by the packer grader.
***Lots 4 and 5 graded by the U. S. Government grader.

Project 253-1: Factors Influencing Profitable Grass Utilization and Sound Pasture Management.

WINTERING YEARLING STEERS ON BLUESTEM GRASS

Experiment II - 1948 - 1949

A. G. Pickett - Ed F. Smith

This current test includes four lots of 10 steers each. The objective is to determine the value of dry bluestem grass as a winter feed for yearling steers. All pastures used for winter grazing had been used the previous summer but were not closely grazed and dry grass was abundant. Steers were given from 12 to 18 acres per head.

EXPERIMENTAL PROCEDURE

Lot 1 - Wintered on bluestem grass with 3 lbs. of soybean pellets per steer every other day.
Lot 2 - Wintered on bluestem grass with a mixture of salt and cottonseed meal, self-fed.
Lot 3 - Wintered on bluestem grass with 6 lbs. alfalfa hay per steer daily.
Lot 4 - Wintered on bluestem grass with 1½ lbs. of soybean pellets per steer daily.

December 1, 1948 to April 18, 1949
138 Days

1—Lot Number	1	2	3	4
2—Number of steers per lot	10	10	10	10
3—Method of feeding	Fed 3 lbs. Soybean Pellets every other day.	Self-fed Cottonseed meal & salt mixed together	Fed alfalfa hay daily	Fed Soybean pellets daily
4—Daily winter ration, lbs.				
Soybean meal	1.5			1.5
Cottonseed meal		2.83		
Salt	ad lib	.39	ad lib	ad lib
Alfalfa hay			6.23	
Bluestem grass Prairie hay*	ad lib	ad lib	ad lib	ad lib
5—Initial weight per steer	745.	755.	755.	749.
6—Gain or loss per Steer	-10.	31.	-6.	9.
7—Final weight per steer	735.	786.	749.	758.
8—Daily gain or loss per steer	-.07	.22	-.04	.06
9—Total feed consumed per steer, lbs.				
Cottonseed meal		391.3		
Soybean meal	210.			210.
Alfalfa hay			860.7	
Bluestem grass	ad lib	ad lib	ad lib	ad lib
Prairie hay	318.	300.	156.	276.
Salt		123.2		
10—Feed cost per steer**	$ 20.27	$ 27.54	$ 19.78	$ 19.89
11—Initial cost per steer.	$ 189.98	$ 192.53	$ 192.53	$ 191.00
12—Initial cost per steer plus winter feed cost	$ 210.25	$ 220.07	$ 212.31	$ 210.89
13—Necessary selling price per cwt. to cover initial cost plus wintering cost.	$ 28.61	$ 28.00	$ 28.35	$ 27.82
14—Appraised value per cwt. on May 7, 1949				

* All lots were fed Prairie hay when snow covered the grass. For the amount see line 9, total feed consumed per steer.

** Feed prices:
Cottonseed meal and soybean meal, $75 per ton; alfalfa hay, $20

per ton; prairie hay, $15 per ton; bluestem grass for winter 1948-49 $10. per head; salt, $10 per ton.
***30 to 40 pounds salt to 100 pounds cottonseed meal.

OBSERVATIONS

1. The steers of all four lots in this test gained up to March 1 and all except lot 4 showed moderately heavy losses during March. Lot 1 lost 67 pounds, lot 2 lost 28 pounds and lot 3 lost 58 pounds per head.
2. For the first 18 days of April the steers made substantial gains.
3. This season's gains were not as large as those of last winter. During the winter of 1947-48 one lot of ten yearling steers which were fed three pounds of cottonseed cake per head every other day, gained 66 pounds per head for the season.
4. Prairie hay was fed only when grass was covered with snow.
5. Lot 2 self-fed the salt-cottonseed meal mixture ate almost twice as much cottonseed meal as was hand fed to lots 1 and 4. This probably accounts for the larger gain in this lot.
6. The limited information available indicates that a steer will eat nearly one pound of salt daily. On this basis it would require 50 to 60 pounds of salt with 100 pounds of meal to limit the cottonseed meal consumption to two pounds or less per steer daily.
7. All steers in this test wintered in strong thrifty condition. No ill effects from the high salt consumption in lot 2 were observed.

Project 253: Factors Influencing Profitable Grass Utilization and Sound Pasture Management.

AMOUNT AND SEASONAL TREND OF GAINS OF YEARLING STEERS ON BLUESTEM PASTURE

A. G. Pickett—Ed F. Smith

One hundred thirty-five yearling steers which had been wintered as calves at Guymon, Oklahoma, on short grass, sorghum bundles, prairie hay and cottonseed cake, were furnished to Kansas State College by the Robbins Ranch of Belvidere, Kansas. These steers were thin in flesh but were thrifty in condition.

Beginning weights were taken after the steers had been at the College about one week. They were fed hay and a small feed of silage and weighed with a normal fill. No protein or other supplement was fed.

The accompanying table and chart shows the gains and the trend of gains by weigh periods.

Effect of Burning Pastures on Gains of Steers

The purpose for which these steers were grazed was to compare the six pastures to be used in future experimental work. The six pastures, numbered one to six inclusive, were burned about April 15 in order to give them all an even start. The odd lot of steers listed as lot seven was grazed on unburned adjoining pasture. There was an abundant growth of old dead grass. These steers on unburned pasture made gains equal to the six lots of cattle on pastures that had been burned.

This represents only a one-year test. It is planned to have the grass project developed so that regular burning tests can be started with the 1950 grazing season.

Protein Content of Bluestem Grass

The accompanying chart shows the protein content of bluestem grass from the Kansas State College pastures during the 1948 grazing season. There appears to be a definite correlation between the protein content and the rate of gain as the grazing season progresses.

EFFECT OF BURNING PASTURES ON GAINS OF STEERS

April 26 to Oct. 15, 1948—172 Days

	Bluestem Pasture Burned						Not Burned
1—Lot Number	1	2	3	4	5	6	7
2—Number of head per pasture	20	20	20	20	20	30	15
3—Number of acres per pasture	60	60	60	60	60	60	
4—Initial weight per steer	526	526	525	524	524	522	579
5—Gain per steer also daily gain by periods:							
April 26 to June 11							
Gain per steer	139.00	153.70	149.25	145.00	144.00	151.70	152.33
Daily gain per steer	3.08	3.40	3.31	3.22	3.20	3.37	3.37
June 11 to July 15							
Gain per steer	73.00	61.00	61.70	61.50	64.70	63.20	68.66
Daily gain per steer	2.15	1.79	1.81	1.80	1.89	1.85	2.02
July 15 to August 16							
Gain per steer	68.00	79.70	79.00	56.50	104.70	81.30	66.00
Daily gain per steer	2.06	2.41	2.39	1.71	3.17	2.46	1.69
August 16 to September 15							
Gain per steer	53.00	54.50	36.50	61.70	18.50	23.50	54.66
Daily gain per steer	1.89	1.94	1.08	2.20	.66	.84	1.95
September 15 to October 15							
Gain per steer	3.50	3.25	22.50	31.75	21.85	25.75	12.66
Daily gain per steer	.12	.11	.80	1.10	.78	.92	.45
6—Total gain per steer	337.	352.	343.	358.	354.	345.	344
7—Final weight per steer	863.	878.	868.	880.	878.	868.	923
8—Daily gain per steer	1.96	2.05	1.95	2.07	2.06	2.01	2.00

It is planned to keep a record of the protein content of bluestem grass at two-week intervals throughout the grazing season over a period of several years. Such a record should be valuable in determining at what time during the grazing season the feeding of a protein supplement might be expected to be profitable.

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

1947-1948

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

INTRODUCTION

This is a study of the characteristics of feeder calves which are associated with differences in:

1. Rate of gain.
2. Kind and amount of feeds required to make gain.
3. Value of the carcass.

EXPERIMENTAL PROCEDURE

The two lots of calves were selected from 100 range-bred heifer calves purchased in November 1947 for feeding tests at this station. These calves graded good to choice feeders and were quite uniform.

Sorting for the two lots in this trial was made on probable differences in performance during the fattening period as indicated by body capacity, chest room, natural fleshing or muscling, form, and general appearance. The ten calves in lot 1 were those which were somewhat deficient in one or more of the above characteristics as compared to those in lot 2. All calves were graded individually by using 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 and alfalfa hay was fed in each lot.

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

November 11, 1947 to June 22, 1948—224 Days

	1	2
1—Lot Number		
2—Number of heifers in lot	10	10
3—Average daily ration		
Ground shelled corn	8.74	9.43
Atlas sorgo silage	7.47	13.52
Cottonseed meal	1.23	1.23
Alfalfa hay	1.86	1.92
Prairie hay	.77	1.20
Ground limestone	.09	.09
4—Average initial weight	373.	455.
5—Average final weight	757.	888.
6—Average total gain	384.	433.
7—Average daily gain	1.71	1.93

8—Feed required for 100 pounds gain		
Ground shelled corn	510.	488.
Atlas sorgho silage	436.	700.
Cottonseed meal	73.	63.
Alfalfa hay	108.	99.
Prairie hay	45.	62.
Ground limestone	5.	5.
9—carcass grades	1 choice 9 good	4 choice 6 good

OBSERVATIONS

1. Both lots of calves ate practically the same amount of corn.
2. Lot 2 consumed considerably more silage than lot 1.
3. The calves in lot 2 made an average gain of 49 pounds more per head than the calves in lot 1.
4. The carcasses were graded by a government grader. In lot 2, four carcasses graded choice and six graded good. In lot 1, one carcass graded choice and nine graded good.
5. This test indicates that feeder cattle can be selected which in addition to making faster gains in the feedlot, will also utilize a greater proportion of roughages to concentrates during the fattening period. It also indicates that these advantages in economy of gains can be combined with a higher market value of the beef produced.

Project 78—Factors Influencing Rate of Gain, Quantity of Feed Consumed and Carcass Grade.

F. W. Bell - D. L. Mackintosh - A. G. Pickett

Preliminary Report - 1948-49

INTRODUCTION

This report is on two lots of heifer calves now on test in the study of the characteristics of feeder calves which are associated with differences in:

1. Rate of gain
2. Kind and amount of feeds required to produce gains.
3. Value of the carcass.

EXPERIMENTAL PROCEDURE

The two lots were selected from 100 heifer calves purchased in November 1948 for feeding tests. These calves graded good to choice as feeders. There was more difference in the condition of the calves when received than there was in those used in the similar trial of 1947-48. This fact may account in part for the differences in results to date as compared with last year's results.

The two lots in this trial were sorted by the same method used last year, on the basis of differences in body capacity, chest room, fleshing, form and general appearance. The ten calves in lot 1 are those which were somewhat deficient in one or more of the above characteristics as compared to those in lot 2. All calves were graded individually by using a standard feeder cattle chart.

Differences in the initial weight of the calves was not considered in sorting the two lots, since the object of this experiment is to determine the relation of the various body features to rate of gain, kind and amount of feeds consumed, and the value of the carcass produced.

The calves in both lots are receiving the same kinds of feed, consist-

ing of all the ground corn and silage they will eat plus two pounds of prairie hay, one and three fourths pounds of soybean meal and .07 of a pound of ground limestone per head daily.

PRELIMINARY REPORT

November 15, 1948 to April 18, 1949—154 Days

1—Lot Number	1	2
2—Number of heifers in lot	10	10
3—Average daily ration:		
Ground shelled Corn	8.81	9.48
Atlas Sorgo Silage	9.41	10.50
Soybean Meal	1.79	1.78
Prairie hay	2.04	2.04
Ground Limestone	.07	.07
4—Average Initial Weight	403	492
5—Average Final Weight	738	814
6—Average Total Gain	335	322
7—Average Daily Gain	2.17	2.09

OBSERVATIONS

1. Heifers in lot 1 have gained 13 pounds more per head than the heifers in lot 2.

2. Consumption both of corn and silage, has been nearly the same in the two lots considering the difference in initial weight of the calves.

3. The heifers in lot 2 appear to be more nearly finished and, if this difference continues, the heifers in lot 1 will require a longer fattening period to reach the same degree of finish.

Project 222-2—Fundamental Nutrition Studies of Sorghum Roughages and Grains. II—A Study of the Digestibility of Sorghum Silage.

EFFECT OF GRINDING ON THE NUTRITIVE VALUE OF GRAIN SORGHUMS FOR FATTENING STEER CALVES

Ed F. Smith - D. B. Parrish - A. G. Pickett

I. Digestibility study of Milo Grain.

A digestion trial was conducted with twelve steers which were allotted into three lots of four steers each. A ration of Atlas sorgo silage, cottonseed meal and milo grain was fed in all lots. Whole grain was fed in lot 1, coarsely ground grain to lot 2, and finely ground grain to lot 3.

Table I shows that the coefficients of digestibility of the dry matter, crude protein, ether extract, and nitrogen-free extract were highest for the steers in lot 3, and lowest for those in lot 1. Crude fiber was digested most efficiently by the steers in lot 1. These results confirm those of previous work done at this station.

It may be concluded from the results of this test that so far as digestibility is concerned milo grain is best utilized when finely ground. However the question of how fine milo grain should be ground for fattening cattle cannot be fully answered until feed lot trials are conducted and such factors as palatability, rate of gain and efficiency of gain are investigated.

TABLE I
Effect of Grinding on the Digestibility of Milo Grain

Lot Number	1	2	3
Ration	Whole Milo Atlas Silage Cottonseed Meal Salt Gr. Limestone	Coarsely Ground Milo Atlas Silage Cottonseed Meal Salt Gr. Limestone	Finely Ground Milo Atlas Silage Cottonseed Meal Salt Gr. Limestone
Average Percentage of Each Nutrient Digested:			
Dry Matter	48.04	52.34	60.19
Crude Protein	42.72	46.81	54.93
Ether Extract	50.10	64.63	72.46
Crude Fiber	56.42	50.34	50.96
Nitrogen Free Extract	51.39	57.29	65.05

II. Coarsely Ground vs. Finely Ground Milo Grain in the Fattening Ration.

The twelve steers used in part 1 of this experiment were divided into two lots of six steers each at the close of the digestion trial. Lot 1 was fed coarsely ground milo grain, one and one-half pounds of cottonseed meal, alfalfa and prairie hay. Lot 2 was fed the same except the milo was finely ground. The alfalfa and prairie hay fed to both lots were of poor quality and much of it was wasted by the steers.

Observations

1. There was little difference between the two lots in amount of gain or efficiency of gain.

2. Lot 1, fed coarsely ground milo crowded the bunk at feeding time while lot 2, fed finely ground milo ate more reluctantly. This would indicate either that the steers fed the finely ground milo found it unpalatable, or that they derived more value from their feed and therefore did not have as great an appetite.

3. The steers in lot 2 were fatter at the close of the experiment than those in lot 1 and were appraised $1.00 per hundred weight higher.

TABLE II—Full Feeding
May 25 to September 24, 1948—122 Days

	1	2
1—Lot Number		
2—Number of steers per lot	6	6
3—Daily ration per steer, pounds		
Coarsely ground Milo grain	13.02	
Finely ground Milo grain		13.02
Cottonseed meal	1.50	1.50
Alfalfa hay	7.12	7.41
Prairie hay	6.81	6.37
4—Initial weight per steer	540.	540.
5—Gain per steer	295.	303.
6—Final weight per steer	835.	843.
7—Daily gain per steer	2.42	2.48
8—Feed required for 100 pounds grain:		
Coarsely ground Milo grain	538.59	
Finely ground Milo grain		524.37
Cottonseed meal	61.86	60.23
Alfalfa hay	294.52	298.18

(Continued from preceding page)

Prairie hay.....	281.52	256.49
9—Appraisal value per cwt., Sept. 24, 1948..	$ 29.00	$ 30.00

Project Commercial 68: Factors Influencing the Salt Requirements of Beef Cattle.

SELF FEEDING COTTONSEED MEAL MIXED WITH SALT TO STEERS AS A PROTEIN SUPPLEMENT ON BLUESTEM GRASS*

A. G. Pickett and Ed. F. Smith

Considerable interest has developed in the possibilities of self feeding a protein supplement to cattle on grass. Self feeding is a labor saving and eliminates the need for rounding up cattle every day. Under usual circumstances, it is impossible to control the amount of supplement consumed when it is self-fed. In an attempt to overcome this limitation a few cattlemen have self-fed a mixture of salt and cottonseed meal. It was found that the salt limited the amount consumed and that by varying the proportion of salt in the mixture it was possible to obtain the desired consumption of cottonseed meal.

Preliminary tests were conducted in 1948-49 with two-year old steers on bluestem grass during the last 90 days of the summer grazing season and during the winter with one lot of yearling steers wintered on dry bluestem grass.

Experimental Procedure

Lot 1 - A mixture of 30 poounds of salt and 100 pounds of cottonseed meal was self fed from July 15 to October 15.

Lot 2 - Three pounds of cottonseed cake was fed daily from July 15 to October 15

Lot 3 - Yearling steers wintered on bluestem grass December 1, 1948 to April 18, 1949.

When this test was started a mixture of 30 pounds of salt and 100 pounds of cottonseed meal was self fed. The salt content of the mixture was increased from time to time until it reached 40 pounds salt to 100 pounds of cottonseed meal. This was done to limit the consumption of cottonseed meal.

RESULTS OF SELF FEEDING COTTONSEED MEAL MIXED WITH SALT TO STEERS ON BLUESTEM GRASS

1—Lot Number	1	2	3
2—Ration self fed	30 lbs. salt Mixed with 100 lbs. cottonseed meal	Cottonseed cake	30 to 40 lbs. salt mixed with 100 lbs. Cottonseed Meal
3—When Fed	Summer July 15 to October 15		Winter Dec. 1, '48 to to Apr. 18, '49
4—Length of feeding period	94	94	138
5—No. Steers per lot	6	6	10
6—Initial weight per steer	963	960	755
7—Final weight per steer.	1093	1130	786

*Financed in part by a grant from the Salt Producers Association.

(Continued from preceding page)

8—Total gain per steer	130	170	31
9—Daily gain per steer	1.38	1.81	.22
10—Feed consumed per steer daily:			
Cottonseed Meal	3.54	3.00	2.83
Salt	1.09	--	.89
11—Total feed consumed			
Cottonseed meal	333.3	282.00	391.00
Salt	103.3	--	123.00

Observations

1. Self feeding a salt-cottonseed meal mixture to steers on grass in the summer was not profitable in this test. The steers in lot 2 which were hand fed cottonseed meal gained .43 of a pound more per day on .54 of a pound less of cottonseed cake, than those self fed the mixture.
2. The extra gain of the steers which were hand fed was sufficient just about to pay for the three pounds cottonseed cake fed per steer daily or 12 cents using prices prevailing at the close of this test.
3. The hair on the steers getting the salt mixture was rough and they were not as fleshy as those which were hand fed cottonseed cake.
4. While grazing on green grass the steers ate slightly over one pound of salt daily.
5. Lots 1 and 2 were fed out at the close of this test and made practically the same daily gains.
6. Lot 3 wintered on dry grass, did not eat as much salt per day as the steers on green grass.
7. The lot 3 steers wintered in strong, thrifty condition.
8. Lot 3 does not have a comparison in the foregoing table but appears as lot 2 in the test entitled, "Wintering Yearling Steers on Bluestem Grass."
9. This should be considered as only a preliminary test and no definite conclusions are justified at this time.

Project Commercial 68—Factors Influencing the Salt Requirements of Beef Cattle *

PART I—THE EFFECT OF WITHHOLDING SALT ON GROWTH AND CONDITION OF BEEF CATTLE AND ON DIGESTIBILITY OF FEED CONSTITUENTS

Ed F. Smith and D. B. Parrish

The first phase of this experiment pertaining to the effect of withholding salt on growth and condition of steer calves has been completed. The second phase dealing with the effect of withholding salt on the digestibility of the feed nutrients, is in progress.

Twelve steer calves, six having free access to salt and six not having access to salt were wintered on bluestem pasture. Each lot received one and one-half pounds of soybean pellets per head daily. Prairie hay was fed when snow covered the grass.

*—Financed in part by a grant from the Salt Producers Association.

THE EFFECT OF WITHHOLDING SALT ON GAINS OF STEER CALVES

December 18, 1948 to April 18, 1949—122 Days

Lot Number	1	2
Number of Steers per lot	6	6
Average Daily rations:		
Soybean Pellets	1.50	1.50
Salt	.04	
Bluestem grass	ad lib.	ad lib.
Prairie hay**		
Initial weight per steer	477.00	473.00
Final weight per steer	527.00	466.00
Gain or Loss per steer	50.00	—7.00
Daily gain or loss per steer	.41	—.06

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 old salting grounds to prevent the steers from eating the dirt around them.
2. The steers having free access to salt gained 50 pounds per head while those receiving no salt lost 7 pounds per head during the winter phase of 122 days.
3. The only evidence of salt deficiency in the calves of lot 2 was the loss of weight, thin condition, and rougher appearance, compared with those of lot 1.

PART II—THE EFFECT OF THE COMPOSITION OF THE RATION ON SALT CONSUMPTION BY BEEF CATTLE

Salt consumption was checked in 17 lots of cattle being fed various rations in the dry lot, to determine what factors influence the salt consumption. Fourteen of these lots were divided into four groups depending on the ration they received. A complete analysis will be made of all feeds used, to determine whether any differences in salt consumption appear to be related to the composition of the feeds.

The results of this first test indicate that the greater the consumption of silage and prairie hay in relation to corn, the higher is the consumption of salt.

CONSUMPTION OF SALT BY CALVES FED VARIOUS RATIONS

Group	1	2	3	4
Number per group	30	50	30	30
Age and Sex	Steer Calves	Heifer Calves	Steer Calves	Steer Calves
Daily ration per animal, lbs.				
Silage	19.74	20.00	19.70	10.02
Prairie hay	5.00	4.12	3.53	2.04
Protein concentrate	1.00	1.00	1.00	2.00
Corn		2.00	3.81	8.51
Gr. Limestone				.10
Salt consumed per head monthly (ounces)	27.36	21.12	25.44	6.24
Initial weight per steer	441.00	456.00	440.00	442.00
Final weight per steer	580.00	619.00	650.00	746.00
Gain per steer	139.00	163.00	210.00	304.00
Daily gain per steer	.99	1.16	1.50	2.17

**—Prairie hay was fed only when snow covered the grass. A total of 266 pounds of hay was consumed by each steers.

Project 111GC—Lamb Feeding Investigations

Department of Animal Husbandry and Garden City Branch Agricultural Experiment Station Cooperating.

1948 - 49

EXPERIMENTS WITH SODIUM BICARBONATE FOR THE CONTROL OF FEED LOT DEATH LOSSES.
SORGHUM GRAIN AND ROUGHAGE COMBINATIONS FOR FATTENING LAMBS

R. F. Cox and A. B. Erhart

Experiments in the use of bicarbonate of soda for the control of death losses in the feedlot were begun last year. Two small scale tests indicated that it was highly beneficial. In this years experiments, four lots of lambs were used to give further tests of the value of sodium bicarbonate in the feed and in the water.

Comparisons were also made of Westland milo grain, Axtell grain, immature Westland grain and a combination of Westland grain and beet molasses.

Roughage tests included comparisons of Axtell roughage, alfalfa hay and alfalfa straw.

Lambs:

The lambs in this years experiments were good quality, smooth finewool-type lambs from northern New Mexico. They weighed sixty pounds per head into the experiment.

Feed Prices:

Westland Milo and Axtell Grain	$ 2.00 per cwt.
Beet Molasses	38.00 per ton
Cottonseed Cake	90.00 per ton
Axtell Roughage	7.50 per ton
Alfalfa Hay	20.00 per ton
Alfalfa Straw	10.00 per ton
Sodium Bicarbonate	3.55 per cwt.
Ground Limestone	.70 per cwt.
Salt	.85 per cwt.

Death Loss:

Twenty-one lambs died out of a total of 525, a loss of 4%. Sixteen of these died from urinary calculi, one from enteritis, one from exposure following burial under snow and three from undetermined causes.

Garden City Branch
Kansas Agricultural Experiment Station
Garden City, Kansas

GRAIN AND ROUGHAGE COMPARISONS

Rufus F. Cox, A. B. Erhart

Table—November 20, 1948 to March 17, 1949—117 days

1—Lot Number	1	6	7	8	9	10
2—Ration fed	Westland Milo C. S. Cake Axtell Roughage Gr Limestone	Immature Westland C. S. Cake Axtell Roughage Gr Limestone	Axtell Grain C. S. Cake Axtell Roughage Gr Limestone	Westland & Molasses C. S. Cake Axtell Roughage Gr Limestone	Westland Milo C. S. Cake Alfalfa Straw	Westland Milo C. S. Cake Alfalfa Hay
3—Number of lambs per lot	48	50	50	48	49	50
4—Number of days on feed	117	117	117	117	117	117
5—Initial weight per lamb	60.70	60.76	60.48	60.44	60.52	60.68
6—Final weight per lamb	91.97	97.32	96.00	94.13	105.92	106.58
7—Total gain per lamb	31.27	36.56	35.52	33.69	45.40	45.90
8—Daily gain per lamb	.27	.31	.30	.29	.39	.39

(Continued on following page)

Continued from preceding page

9—Feed per lamb daily:						
Grain	1.11	1.14	1.09	.87	1.16	1.16
Molasses				.24		
Cotton Seed Cake	.24	.24	.24	.24	.25	.25
Roughage	2.07	2.04	2.66	2.10	1.93	2.20
Limestone	oz. .25	oz. .25	oz. .25	oz. .25		
10—Feed per cwt. of gain:						
Grain	413.53	363.92	362.08	300.59	299.45	296.19
Molasses				82.64		
Cotton Seed Cake	90.37	77.46	78.73	84.96	63.04	62.35
Roughage	771.86	652.35	678.89	729.47	497.14	559.91
Limestone	5.33	4.76	4.67	5.14		
11—Feed cost per cwt. gain	$15.33	$13.28	$13.44	$14.17	$11.32	$14.33
12—Initial cost per lamb into feedlot	$17.98	$17.98	$17.98	$17.98	$17.98	$17.98
13—Feed cost per lamb	$ 4.79	$ 4.85	$ 4.77	$ 4.77	$ 5.14	$ 6.58
14—Lamb cost plus feed cost	$22.77	$22.83	$22.75	$22.75	$23.12	$24.56
15—Final cost per cwt.	$24.76	$23.15	$23.70	$24.17	$21.83	$23.04

Garden City Branch Agri. Expt. Station—Garden City, Kansas

BICARBONATE OF SODA TESTS

Rufus F. Cox, A. B. Erhart

Table—November 20, 1948 to March 17, 1949—117 Days

1—lot Number	1	2	3	4	5
2—Ration fed	Westland Milo C. S. Cake Axtell Roughage Gr. Limestone	Westland Milo C. S. Cake Axtell Roughage Gr. Limestone	Westland Milo C. S. Cake Axtell Roughage Gr. Limestone Soda	Westland Milo C. S. Cake Axtell Roughage Gr. Limestone Soda in Water	Westland Milo C. S. Cake Axtell Roughage Gr. Limestone Soda
3—Number lambs per lot	48	44	41	40	44
4—Number of days on feed	117	117	117	117	117
5—Initial weight per lamb	60.70	60.56	60.50	60.64	60.50
6—Final weight per lamb	91.97	99.43	95.73	96.38	92.25
7—Total gain per lamb	31.27	38.87	35.23	35.74	31.75
8—Daily gain per lamb	.27	.33	.30	.31	.27
9—Feed per lamb daily:					
Grain	1.11	1.47	1.37	1.39	1.41
Cotton Seed Cake	.24	.24	.24	.34	.24
Roughage	3.07	1.24	1.25	1.25	1.18
Limestone	oz. .25	oz. .25	oz. .25	oz. .25	oz. .25
Soda			oz. .21	oz. .22	oz. .31
10—Feed per cwt. of gain:					
Grain	413.53	443.58	456.14	456.63	518.74
Cotton Seed Cake	90.57	72.36	80.39	79.24	89.19
Roughage	774.86	374.43	413.51	409.29	433.32
Limestone	5.53	4.45	4.91	4.84	5.45
Soda			4.40	4.42	4.83
11—Feed cost per cwt. gain	$15.33	$13.60	$14.56	$14.45	$16.24
12—Initial cost per lamb into feedlot	$17.98	$17.98	$17.98	$17.98	$17.98
13—Feed cost per lamb	$ 4.79	$ 5.27	$ 5.10	$ 5.16	$ 5.15
14—Lamb cost plus feed cost	$22.77	$23.26	$23.08	$23.14	$23.13
15—Final cost per cwt.	$24.76	$23.39	$24.11	$24.01	$25.07

SUMMARY

Table 1

1. Both immature Westland milo grain and Axtell grain produced larger and more economical gains than mature Westland milo in these tests. Compare lots 1, 6 and 7 and see chemical analysis in table below.
2. Beet molasses fed as approximately 20 percent of the concentrate allowance increased the rate and efficiency of gains on fattening lambs. This confirms results of several previous tests. Compare lots 1 and 8.

3. Alfalfa straw and alfalfa hay both proved much superior to Axtell roughage in the efficiency and rate of gains produced. See lots 1, 9 and 10.
4. Axtell roughage had approximately 70 percent the value of alfalfa hay or alfalfa straw in these tests, agreeing closely with tests of last year.

CHEMICAL ANALYSIS OF FEEDS USED

FEED	Protein	Ether Extract	Crude Fiber	Moisture	Ash	Nit.-Free Extract
Axtell Grain	11.36	3.95	1.61	10.09	1.59	71.38
Westland Milo	8.81	3.29	1.73	11.00	1.64	73.56
Immature Westland Milo	10.69	2.75	2.56	10.45	1.74	71.81
Axtell Roughage	3.06	1.34	22.97	7.36	9.85	55.42
Alfalfa Straw	11.25	1.30	41.27	7.18	6.57	32.43
Alfalfa Hay	13.56	1.27	36.96	8.10	9.42	30.69

Table II

5. Feeding of highly concentrated rations reaching 2.4 pounds of corn per lamb daily at intervals, in this year's experiments failed to produce enterotoxemia or any other form of serious digestive disturbance. Because of this, the tests of the value of bicarbonate of soda for reducing digestive disorders were inconclusive.
6. There was evidence that soda feeding resulted in decreasing total feed consumption and gains in this year's tests. This is directly opposed to last year's results and indicates the need for more experimental work on this subject.
7. No difference in response was noted where soda was fed to lambs mixed dry with the feed compared with supplying it in the drinking water.
8. Moderately heavy losses from urinary calculi resulted in the experimental lambs fed highly concentrated rations, lending support to the belief that forcing lambs for rapid gains predisposes them to losses from apparently unrelated maladies.
9. The level of soda feeding in these tests was approximately 1/5 ounce per lamb daily. Expressed otherwise this averaged about 1.3 pounds per 100 lambs daily, or slightly less than 1 percent of the concentrates or ½ percent of the total feed.

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

Kansas Agricultural Experiment Station—Manhattan, Kansas
1947-48

THE RELATIONSHIP OF PHYSICAL BALANCE OF THE RATION TO ENERGY VALUE AND TISSUE FORMATION IN FAT LAMBS

Rufus F. Cox, D. L. Mackintosh, Ed F. Smith, J. S. Hughes

Many tests have been completed at this station bearing on some phase of physical balance in sheep rations. Differences in gains consistently have favored a medium proportion of concentrates to roughage over either more concentrated or more bulky rations. It was deemed advisable to determine whether this difference in gains would be expressed in the distribution of fat throughout the carcass.

Sixty Wyoming lambs of the long-wool crossbred type used for this study, were divided into six lots. Lots 1, 2 and 3 were fed corn and alfalfa hay in amounts such that the ratios of crude fiber to digestible nutrients were 1 to 3; 1 to 4; and 1 to 5 respectively. Lots

4, 5 and 6 received oat groast (hulled oats) and alfalfa with the crude fiber: digestible nutrient ratios corresponding to those of lots 1, 2 and 3 respectively.

At the end of the feeding period all the lambs were slaughtered, carcasses graded and physical and chemical studies made on certain tissues. The boiled rack which is considered the most representative cut of the lamb carcass, was taken from the carcasses of three representative lambs from each lot. Manual separation of fat, muscle and bone was made on these cuts and a chemical analysis of the rib-eye muscle made to determine the amount of fat present.

The tables and summary on the following pages give detailed results of these tests.

Kansas Agricultural Experiment Station—Manhattan, Kansas

Crude Fiber: Total Digestible Nutrient Ratios in Lamb Fattening Rations

Rufus F. Cox, D. L. Mackintosh, Ed F. Smith, J. S. Hughes

Table—March 17, 1948 to May 31, 1948—75 Days

Lot Number	1	2	3	4	5	6
Ration Fed	Corn Alfalfa Hay	Corn Alfalfa Hay	Corn Alfalfa Hay	Oats Groats Alfalfa Hay	Oats Groats Alfalfa Hay	Oats Groats Alfalfa Hay
Ratio (Crude fiber to T. D. N.	1 to 3	1 to 4	1 to 5	1 to 3	1 to 4	1 to 5
No. Lambs per lot	10	10	10	10	10	10
Number days on feed	75	75	75	75	75	75
Initial weight per lamb	75.50	77.51	75.60	76.00	77.30	75.70
Final weight per lamb	96.10	100.22	95.30	96.60	95.50	94.10
Total gain per lamb	20.60	23.71	19.70	20.60	17.70	18.40
Daily gain per lamb	.27	.30	.26	.27	.24	.25
Feed per lamb daily:						
Grain	1.04	1.39	1.44	.86	1.09	1.23
Hay	1.70	1.20	.93	2.01	1.41	1.09
Feed per cwt. gain:						
Grain	380.10	426.51	546.90	313.30	460.51	502.93
Hay	620.97	398.06	352.64	732.57	598.81	444.78
Dry matter per lamb daily	3.51	2.27	2.16	3.65	3.31	2.15
T. D. N. per lamb daily	1.76	1.71	1.70	1.85	1.76	1.72
Gain per 100 lbs. T. D. N.	15.34	17.54	15.39	14.59	13.64	14.53
Carcass grades:						
Choice	1					
Good	4	7	6	3	3	5
Commercial	4	2	2	7	1	5
Utility	1		2		1	
Coordinated carcass grade	35	28	24	23	27	25
Dressing, percent	49.3	50.0	49.6	48.1	49.8	50.4

Kansas Agricultural Experiment Station—Manhattan, Kansas

PHYSICAL AND CHEMICAL ANALYSES OF HOTEL RACK OF LAMB CARCASSES

Rufus F. Cox, D. L. Mackintosh, Ed F. Smith, J. S. Hughes

Table—(All weights are averages for the lots expressed in grams.)

Lot No.	Total Weight Rack	Weight Eye Muscle	Percent Eye Muscle	Weight Outside Fat	Percent Outside Fat	Weight Total Fat	Percent Total Fat	Percent Rib-Eye Muscle Fat	Weight Bone	Percent Bone	Weight Total Lean	Percent Total Lean	Weight Misc.
I	2378.67	330.67	13.9	517	21.76	811.33	34.12	6.0	411.67	17.36	776.33	32.63	12
II	2291	338	14.78	495.33	21.17	752.33	32.75	5.0	390.33	17.02	778.33	34.03	9.33
III	2425.33	344.67	14.23	478	19.73	745.67	30.57	6.5	422	17.51	876.67	36.16	9.67
IV	2131	326.67	15.16	395.67	17.99	592	27.76	5.0	406.33	19.04	774.67	36.37	7.67
V	2199.67	313.67	14.27	484.67	21.84	717.67	32.44	5.3	420	19.15	728.33	33.21	10.33
VI	2464.67	302	15.54	525.33	21.13	785.33	31.72	4.9	448	18.24	824.33	33.59	11

OBSERVATIONS

1. Lambs fed corn and alfalfa in medium concentration (crude fiber: digestible nutrient ratio of 1:4) gained more than lambs fed either more concentrated or more bulky combinations of the same feeds.
2. Lambs fed the ration of medium concentration also made more efficient gains, as measured by the gain per 100 pounds of digestible nutrients consumed, than lambs on more, or on less concentrated rations.
3. The carcass grading of the lambs, while revealing no great differences, was somewhat higher for those fed the rations of medium concentration.
4. No consistent differences in dressing percentages was indicated in these different levels of feeding.
5. The differences shown in tissue deposition did not appear to justify definite conclusions.
6. The mechanical separation of lean and fat of the hotel racks and the chemical analyses of the rib-eye muscles gave no evidence that the lambs fed the more concentrated rations were any better finished than those fed the more bulky rations.

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

Rufus F. Cox - J. S. Hughes

1948-49 Progress Report

INTRODUCTION

It has been demonstrated that the rate of gains and the efficiency of feed utilization by fattening lambs are associated closely with the physical nature of the ration. The manner in which physical balance affects feed utilization however is not known.

The objects of the experiments now in progress are:

1. To study additional factors associated with the physical balance of the ration, and,
2. To make further tests of the efficiency of bicarbonate of soda in reducing losses arising from the feeding of rations which are improperly balanced physically.

EXPERIMENTAL PROCEDURE

Lot 1 - Corn and alfalfa hay - medium concentration. (Crude Fiber: Total Digestible Nutrient Ration - CF:TDN - 1:4)
Lot 2 - Corn and alfalfa hay - highly concentrated. (CF:TDN Ratio 1:55.)
Lot 3 - Corn and alfalfa hay plus Bicarbonate of Soda (CF:TDN Ratio 1:55.)
Lot 4 - Corn and alfalfa hay (Lambs vaccinated against enterotoxemia) (CF:TDN Ratio 1:55)
Lot 5 - Corn and Pelleted alfalfa (CF:TDN Ratio 1:55.)
Lot 6 - Corn and Pelleted alfalfa plus Bicarbonate of Soda (CF:TDN Ratio 1:55.)

Results are being measured by weight gains and by observations of response to feeding. Clinical studies will be made of any cases of digestive disturbances which may occur.

Certain other determinations also are being made such as the pH of the blood, urine and rumen contents and the CO_2 content of the blood as affected by the physical nature of the ration.

This experiment has not progressed sufficiently to justify any con-

clusion at this time (April 20, 1949). It is becoming evident however that the lambs which are receiving their roughage in pelleted form are ruminating little or none, in contrast to those which are receiving coarsely ground hay. They also are consuming less concentrated feed. Bicarbonate of soda appears to have stimulated the appetite of the lambs receiving corn and alfalfa pellets.

The old digestive disturbances which have occurred to date have been of a mild form, evidenced by vomiting of corn by the lambs in lot 2 receiving the highly concentrated ration without soda.

Project 110: Swine Feeding Investigations

EXPERIMENT I—SUMMER 1948

C. E. Aubel

THE VALUE OF MUSTARD SEED OIL MEAL* AS A PROTEIN SUPPLEMENT FOR FATTENING PIGS ON ALFALFA PASTURE

Last year at the Livestock Feeders' Day, results of experiments were given on the use of mustard seed oil meal as a protein supplement for fattening pigs on alfalfa pasture. The results showed that mustard seed oil meal was an excellent protein feed when mixed with tankage and other protein supplements and self-fed free choice. Generally the gains were as cheap or cheaper than where tankage alone was fed and the daily gain were somewhat more rapid with a lower feed consumption.

In the tests reported last year the mustard seed oil meal made up as much as 50 percent of the protein mixtures with tankage in some of the lots and at this level proved to be entirely palatable. The results of feeding it in such large proportions were so satisfactory that it was desired to ascertain whether it were possible to increase further the amount of mustard seed meal in the mixture with tankage and still get good results. Consequently two lots of pigs were fed this past summer with an increased percentage of the mustard seed oil meal.

EXPERIMENTAL PROCEDURE

In the experiment reported herein, three lots of pigs were self-fed shelled corn, on a good stand of alfalfa pasture. Lot 1, the control lot, received 60 percent tankage self-fed. Lot 2 was self-fed a protein mixture of tankage 25 percent, mustard seed oil meal 75 percent. Lot 3 was self-fed a protein mixture of tankage 15 percent, mustard seed oil meal 85 percent. The alfalfa pasture was of excellent quality and ample at all times.

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

EXPERIMENT I—SUMMER 1948

THE VALUE OF MUSTARD SEED OIL MEAL IN PROTEIN FEED MIXTURES AS A SUPPLEMENT TO SHELLED CORN FOR FATTENING SPRING PIGS ON ALFALFA PASTURE

C. E. Aubel

* The mustard seed oil meal used in this experiment was furnished through the courtesy of the Kansas Soybean Mills Inc., Emporia, Kansas.

(June 10, 1948 to September 24, 1948—106 Days)

Shelled Corn (Self-fed) Alfalfa Pasture

Ration	Tankage (Self-fed)	Tankage 25% Mustard Seed 75% (Self-fed)	Tankage 15% Mustard Seed 85% (Self-fed)
Lot number:	1	2	3
Number pigs in lot:	10	10	9
Average Initial Weight per pig:	54.40 lbs.	58.00 lbs.	59.11 lbs.
Average Final Weight per pig:	250.20	231.75	206.33
Average Total Gain per pig	195.80	173.75	147.22
Average Daily Gain per pig:	1.84	1.63	1.38
Average Daily ration per pig:			
Shelled corn	6.41	5.84	5.33
Tankage	.42	.12	.06
Mustard Seed Meal		.38	.37
Feed Consumed per 100 pounds gain:			
Shelled Corn	347.03	356.83	395.26
Tankage	22.93	7.75	4.70
Mustard Seed Meal		23.27	26.69
Feed Cost per 100 pounds gain:	$16.11	$16.40	$18.10

FEED PRICES CHARGED: Shelled corn, $2.40 per bushel;
Tankage, $110.00 per ton;
Mustard Seed Meal, $70.00 per ton.

METHODS OF FEEDING: All lots were self-fed shelled corn. The protein supplements were mixed in the proportions indicated and self-fed in a separate compartment.

OBSERVATIONS AND CONCLUSIONS

(1) Mustard seed oil meal when mixed with tankage at the rate of 75 percent mustard seed oil meal and 25 percent tankage and fed as a protein supplement did not make as rapid daily gains as was made by pigs receiving tankage as the only supplement. The tankage-alone fed pigs gained 1.85 pounds daily and the 75 percent-25 percent-supplement fed pigs gained 1.63 pounds. The amount of feed consumed per 100 pounds gain was larger with the 75-25 mixture than on tankage alone. The cost of gains likewise was a little greater because of this increased consumption. However, the gains were satisfactory.

(2) When the supplementary mixture consisted of 85 percent mustard seed oil meal and 15 percent tankage, the rapidity of gains was further decreased, and the feed consumption was increased with a corresponding increased cost of 100 pounds gain.

(3) From the results of this experiment it can be said that although feeding mustard seed oil meal up to 50 percent of the protein mixture gave excellent results, increasing it further to 75 and 85 percent had the affect of slowing the daily gains and increasing the amount of feed required for 100 pounds gain and increasing the

cost of those gains to such an extent that the use of such high percentages of mustard meal is not advisable in rations for fattening pigs on alfalfa pasture.

Project 110: Swine Feeding Investigations

Experiment II—Summer 1948

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

Spring pigs were fed from an average weight of about 55 pounds in four lots for a period of 106 days on alfalfa pasture, starting on June 10, 1948. Ten pigs were fed in each lot. All pigs were provided with plenty of good alfalfa pasture during the entire feeding period and had shelled corn, self-fed, free choice.

The difference in treatment was the feeding of a 60 per cent protein tankage supplement during different periods of growth and fattening in the four lots. The tankage was self-fed, free choice with the corn.

The Tankage Supplement Allowance

Lot 1. No supplement during the feeding period.
Lot 2. Sixty percent tankage, until the pigs had an average weight of 100 pounds (first 32 days on feed)—none thereafter.
Lot 3. Sixty percent tankage until the pigs had an average weight of 150 pounds (first 61 days on feed)—none thereafter.
Lot 4. Sixty percent tankage during the entire feeding period of 106 days.

A summary of the results follows:

Experiment II—Summer 1948

THE LIMITED FEEDING OF TANKAGE IN THE RATION OF FATTENING PIGS WHEN SELF-FED CORN ON ALFALFA PASTURE

C. E. Aubel

(June 10, 1948 to September 4, 1948—106 Days)

Rations		Tankage (Self-fed) First 32 Days, Weight 100 lbs.	Tankage (Self-fed) First 61 Days, Weight 150 lbs.	Tankage (Self-fed) Throughout Entire Period.
Lot Number	1	2	3	4
Number of pigs per lot	10	10	10	10
	Pounds	Pounds	Pounds	Pounds
Average Initial Weight per pig	55.90	57.15	56.40	54.40
Average Final Weight per pig	158.95	201.55	224.90	250.20
Average Total Gain per pig	103.05	144.40	168.50	195.80

(Continued from preceding page)

Average Daily Gain per pig	.97	1.36	1.58	1.84
Average Daily Ration per pig:				
Corn	3.57	4.11	5.85	6.41
Tankage		.25*	.32†	.42x
Feed Required for 100 pounds gain				
Corn	367.78	301.93	368.24	347.03
Tankage		5.74x	11.86x	22.98
Feed cost per 100 pounds gain	$15.74	$13.24	$16.41	$16.11

*—Figured on 33 day basis
†—Figured on 61 day basis
x—Figured on 106 day basis

FEED PRICES CHARGED: Shelled corn, $2.40 per bushel; 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 showing in the table, then the pigs received only shelled corn.

Observations

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

(2) Full feeding the 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 shorter 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 these experiments show 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 pounds.

The results show further that the feed cost of gains can be kept at a comparatively low figure by omitting the protein supplement from the ration in the beginning. The rate of gain, however, is reduced with this plan of feeding.

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

Project 217—Meat Investigations.—I. Chemical and Physical Properties of Meat and Their Relationship to Palatability Factors.

Project 260—Factors Influencing the Keeping Qualities and Nutritional Value of Frozen Meat.

MEAT INVESTIGATIONS

David L. Mackintosh and D. B. Watt

The enormous increase in the use of frozen foods and in the num-

ber of frozen locker plants offering freezer storage to the individual, together, have emphasized the need for more research in the field of frozen meat preservation. In order to meet this need a greater part of the research program on meat at the Kansas Agricultural Experiment Station has been devoted to this field of study for seceral years.

It was recognized early in the history of the frozen food industry that foods stored in the frozen condition tend to dry out rapidly unless well protected. Consequently there has been hwork done toward the improvement of wrapping materials. During the past few years, work has been in progress at this station on the relative merits of existing wrapping materials. The following objectives were sought: (1) Classification of the available materials according to the degree of moisture loss, measured by shrinkage in weight. (2) Direct comparison of the butcher and confectioners's styles of wrapping and, (3) Comparison of single and double wrapping.

Following are some of the conclusions:

1. Wax dip, aluminum foil, aluminum laminate and cellophane with stockinette and other wrapping materials of this type afforded a maximum protection against dehydration, permitting less than one-half of one percent loss in weight during 12 months storage.

2. The improved wax paper and glassine laminated paper provided adequate protection against dehydration for six to nine months, after which there is a marked increase in the rate of moisture loss.

3. The ordinary wax papers should not be used for storage periods exceeding three to four months. Ordinary kraft paper is not suitable as a wrapping material for frozen meat.

4. The confectioner's style of wrapping offers no advantage over the butcher style as far as protection against dehydration is concerned, if the wrapping materials is properly applied.

5. There is no practical advantage to double wrapping when using the ordinary wax or kraft papers. A single wrap, properly applied offers as much protection against moisture loss as double wrapping.

Other studies in progress at the present time include the influence of anti-oxidants fed to hogs upon the storage life of the fresh pork, and the methods of handling pork prior to storage upon the keeping quality of the fresh pork. Only slight difference in favor of the pork from hogs receiving the anti-oxidant have been noted to date, and then only after six to nine months storage. Likewise only slight differences favoring the rapid chilling of hog carcasses have been noted.

Additional observations from studies now in progress indicate that fresh pork, properly packaged can be stored satisfactorily for a period of six to nine months at 0°F. After six months storage there is a marked drop in the palatability of the product and a still greater drop after nine months storage. When the storage temperature is -10° F. or lower the quality of the pork is preserved for a longer period. Under present storage conditions it is recommended that all fresh frozen pork be consumed within six months or a maximum of nine months.

Project 260—Factors Influencing the Keeping Qualities and Nutritional Value of Frozen Meat.

SOME BACTERIAL OBSERVATIONS IN FROZEN PORK SAUSAGE PROGRESS REPORT—1948-49—Based in Part on Above Project

Robert L. Hendrickson

The preservation of food by freezing depends upon retarding the rate of microbial, enzymatic, and chemical changes. It is generally agreed that meat and meat products should be sharp-frozen at -10°F. (-23.3°C), and stored at 0°F. (-17.8°C) or lower to retard such changes. Work conducted by the Kansas Agricultural Experiment Station indicates that the quality of fresh pork is preserved for a longer period when frozen and stored at the lower temperature.

The general usage of locker plants by individual families, for the storage of perishable products such as meat, poultry, fruits and vegetables, represents one of the most recent developments in the field of food distribution and preservation.

The presence of micro-organisms in frozen meat may not be important from a pathogenic standpoint, but their presence may be influential in determining the storage life of meat or meat products. The presence of large numbers of bacteria may be due to the method of handling the meat prior to freezing, such as careless management or improper aging. It is a recognized fact that psychrophilic organisms will continue to multiply at chill room temperatures. High Bacterial counts in meat have raised a question in regard to the possible relationship of these micro-organisms to the keeping quality and storage life of the product. Since the locker industry has grown so rapidly, it was felt there is need for further study on the effect of the bacterial flora upon the quality of such meats when frozen. In this study fresh pork sausage was used to determine the influence of bacteria upon the keeping quality.

The sausage was made from fresh pork trimmings composed of approximately 75 percent lean and 25 percent fat, and seasoned with 1 pound salt, 2 ounces pepper, and 2 ounces sage for each 50 pounds of meat. This formula is recommended by the Kansas Agricultural Experiment Station. Four trays of trimmings were prepared and designated as M, N, O, and P. Each tray of trimmings was made from pork carcasses which were aged in the cooler for varying lengths of time. The aging period allowed time for the bacterial flora common to each carcass to multiply.

The four blocks of sausage were prepared and placed in a 34°F. cooler for 34 hours due to packaging. T series of one pound packages was made from each block of sausage, using cellophane (MSAT87) with an outer wrapping of wax paper as the protective covering. Each series was frozen in an air blast freezer and stored at 0°F.

A bacterial count was made of the seasoning ingredients used in order to determine how many bacteria were added to the meat by the ingredients. It has been found that nearly all of the common spices contain large numbers of bacteria. Platings were therefore made of the black pepper, sage, and salt used in this study. The counts indicated the presence of 2,000,000 bacteria per gram in black pepper, 27,000 per gram in sage and 10 per gram in salt. When these ingredients are used in the ratio of 1 gram of seasoning to one pound of meat as indicated in the above formula, pepper was found to contribute 30,000 bacteria per gram of meat, sage 60 per gram and salt less than 1 per gram.

A study was made of the packaging materials used to determine

what they may contribute to the sausage in the way of bacterial contamination. Contact plates made from the waxed paper showed the presence of 1 to 3 colonies per square inch. The cellophane had 2 colonies of mold per square inch in addition to 2 colonies of bacteria. The present methods used by paper manufacturers almost insure a sterile product. Therefore, it is evident that most any of the recommended locker wrapping materials are nearly free of bacteria.

A 50 gram sample was taken from each series at the time of packaging, after 24 hours in the freezer, 17 days storage, 28 days storage, and each 28 day period thereafter for 310 days. The sample to be used for bacterial plating was cut from the center of each one pound package with a sterile knife. By transferring the sample to a sterile petri dish it was possible to avoid further bacterial contamination. The specimen from each series was mixed in a wearing blender and plated immeriately for bacterial content. Difco's nutrient agar was used as the bacterial medium. It was found that sharp freezing does not materially decrease the bacterial content of the sausage. In fact, a slight increase in numbers was noted. This was thought to be due to two factors. Freezing of the ice crystals caused rupturing of the bacterial groups, thus breaking them into smaller fragments, and giving an increased number of colonies when the frozen sample was plated. It is also possible that some growth may have taken place during the freezing process. Unpublished data compiled at the Kansas Agricultural Experiment Station indicates that it requires 9 hours to completely freeze a two pound package of pork sausage in an air blast freezer at 0°F. This would seem to allow ample time for some growth to take place in the center of the package.

Experiments conducted elsewhere with garden peas and sweet corn showed that during rapid freezing, the water in the cells was not changed to ice crystals, but to a glass-like amorphous mass which resulted in less injury to the cell than when foods are frozen at a slower rate. Therefore, if slow freezing causes injury to the meat cells by the ice crystals, it may also break up the bacterial groups present, thus accounting for the slight increase in number of bacteria during freezing. A slower rate of freezing would also provide a greater opportunity for growth. These observations would seem to further justify rapid freezing. This potential growth period may be of considerable importance in the case of farm and home freezers or some locker plants where the rate of freezing is relatively slow.

Series M contained the largest number of organisms. The flora showed the evidence of some spore forming colonies, but the predominating organisms were of the non-sport forming type. This dominant type of organism was found to grow well at room temperature (70°F) but made little or no growth at body temperature (98°F). When a sample was allowed to remain in the chill room at 32°F. to 34°F. multiplication took place slowly after 24 hours. This organism is a non-spore forming, gram-negative, rod shaped psychrophilic organism. It has been reported that organisms of this description are common in fresh meat.

Observations from this study indicate that nearly 75 percent of the organisms naturally present die during the first two months of storage, after which the death rate for the remaining 25 percent is much slower. The vegetative and non-spore forming bacteria are most susceptible to low temperatures and therefore die early in the storage period. The spore formers being more resistant to freezing

were still present in large numbers after 310 days in storage.

Series N, O, and P contained relatively small numbers of the predominating organism, but about an equal amount of the spore forming colonies. Observations from this study indicate that during the 310 days storage period the total number of bacteria in the four series tended to become equalized, with the spore-forming type predominating at the end of the period. The bacteria added by the seasoning ingredients were of this type. This would seem to indicate that many of the spores were probably added during the seasoning and grinding process, and only a few spore forming organisms were actually present in the meat. The non-spore forming bacteria were found to die off more rapidly in the high count samples, than in the less populated samples, during the early part of the storage period. This was probably due to the presence of younger less resistant cells.

A portion of each pound package removed from storage was cooked and rated by a palatability committee. The scoring was based upon the following factors: color, texture, juiciness, flavor, and evidence of oxidation. The cooking samples were taken at the same time as the bacteriological sample in order to give a check on the quality.

The scoring showed a gradual loss of quality, but the difference between the four series is too small to be significant. It was unanimously agreed by the committee that series M, was the least desirable after 310 days storage. While the drop in palatability can not be attributed entirely to the influence of bacteria, it is belived that the presence of large numbers of bacteria may be a contributing factor in reducing the quality and shortening the storage life of fresh pork sausage. It is felt that a product with a higher initial bacterial count would have reflected a truer picture of the bacterial influence upon keeping quality. Sausage frequently contains much higher bacterial counts than were present in these samples. Sausage containing 25 to 100 million bacteria per gram might have given entirely different results. The study is being continued using sausage with higher bacterial count.

Miscellaneous Project

HOW MUCH MEAT FROM A STEER?

D. L. Mackintosh – R. W. Henrickson – D. R. Watt

How much meat should I have in my locker from a 1000 pound steer? This is the type of question that is asked most frequently by locker patrons. Many people, now using frozen food lockers have little conception of how much meat, the number of pieces, or the type of cuts that they should expect from one carcass. Neither do they realize what happens to a large part of a steer before reaching the locker. Actually a 1000 pound steer will yield approximately 180 pounds of steaks of varied kinds, 180 pounds of roast and pot roasts, and 90 pounds of stew and ground meat making a total of 450 pounds of table meat which is 45 percent of the live weight of the animal. A comparable shrinkage occurs when a hog or a lamb is butchered.

In order to familarize locker patrons with such facts, numerous studies have been made in the college meat laboratory and the resulting figures distributed where those who are interested may find them. The accompanying tables entitled "What Becomes of a Side of Beef?" "Suggested Breakdown of a Lamb Carcass," and "Suggested Breakdown of a Hog Carcass" are included here as a means of disseminating further this information. These tables are taken from class records at Kansas State College and are considered typical for each type of

animal. Some differences will result from different methods of breaking down the carcass, but on the average one will find that approximately 45 per cent of a steer will reach the locker, 40 per cent of a lamb and 65 per cent of a hog. In the case of the hog, about 50 percent of the products will be in meat cuts and 15 percent in rendered lard.

When in doubt as to the amount of meat placed in your locker by the locker operator, reference to these tables may prove of value in removing that doubt. They also may prove of some value in anticipating just how many T-Bone, or sirloin steaks to expect from a beef, how many pounds of cured or fresh meat to expect from a hog, or how many chops to expect from a lamb.

WHAT BECOMES OF A SIDE OF BEEF?

January 1, 1949

Animal No. 18—Live weight 790 lbs.—Dressing Percent (Hot) 58%

Grade U. S. Good Hot Wt.—Left Side.....224 Lbs.
Chilled Wt.—Left Side....212 Lbs.
Shrinkage—(14 days—.... 6 Lbs.—2.7%

Hind Qr.—102 Lbs.—47%—

Fore Qr. 116 Lbs.—53%—Cut New York Style—Partial Boning

Hind Qr -102 lbs	No. Pces	Cut	Wt. lbs	Fore Qr. 116 lbs	No. Pces	Cut	Wt. lbs
Loin-32.0 lbs	3	Club Steaks	2.3	Rib-16.5 lbs	3	Roasts	14.6
	7	T-Bone	7.1			Bone	1.9
	3	Porterhouse	4.2	Plate-23 lbs	3	Short Rib	11.9
	7	Sirloin	15.8			Ground Beef	9.8
		Bone Rem'ed	2.0			Bone	1.2
Flank-12.3 lbs		Fat	6.5	Shank-8 lbs	3	Soup Bones	6.5
		Lean Trim	5.8			Waste	1.4
Rump-11.0 lbs	3	Rolled R'sts	8.1			Ground Beef	.3
		Bone	2.7	Chuck-36.5 lbs	3	Inside C'ck Roll	15.11
Round-38.5 lbs	6	Inside R.	9.2		3	O'tside C'ck Roll	9.2
	6	Outside R.	9.1		2	Swiss Steaks	5.0
	4	Tip	5.5			Ground Beef	7.9
	1	Heel	6.2			Bone	11.8
		Trim	1.8			Fat Trim	2.5
		Bone	6.6				
Kidney Knob			7.3				

	Pounds	Percent	Pounds	Percent
Steak	53.3	52.1	5.0	4.3
Roasts and Pot Roasts	14.3	14.0	57.0	49.0
Ground Beef	7.7	7.5	25.5	22.0
Soup Bone			6.5	5.5
Bones Removed	11.3	11.0	17.9	15.5
Fat Trim	13.8	13.5	2.5	1.8
Cutting Loss	1.7	1.6	2.4	2.1

Total Meat to Locker

Steak	58.2 Lbs.	27.0 Percent of Side
Roasts and Pot Roasts	71.3 Lbs.	33.0 Percent of Side
Ground Beef	33.4 Lbs.	15.5 Percent of Side
Soup Bone	6.5 Lbs.	3.9 Percent of Side
Grand Total	169.4 Lbs.	78.5 Percent of Side
Fat Trimmings	15.0 Lbs.	7.3 Percent of Side
Bone Removed	29.2 Lbs.	13.5 Percent of Side

SUGGESTED BREAK-DOWN OF LAMB CARCASS

January 1, 1949

Live Wt. 95 Lbs.—Dressed Wt. 49 Lbs.—Dressing Percent 52.

Grade—U. S. Good

Cut	No pieces	Trimmed Wt. Lbs.	Dr. Wt. Percent	Disposition of Cut
Leg—Am. Style	2	4.5	18.4	Roast
Leg end roll	1	4.35	8.7	Roast or chops
Loin roll	1	3.8	7.8	Roast or chops
Rib chops	16	3.8	7.8	Broiled chops
Shoulder Roll	2	4.2	17.1	Roast
Shanks	2	1.9	3.9	Braised
Riblets		1.9	3.9	Stew
Ground lamb		5.25	10.7	Broil lamburgers
Total wt. to Locker		38.3	78.3	
Bones Removed.		7.25	14.8	
Fat Trim		2.00	4.1	
Waste		1.4	2.8	
Total		48.95	100.	

Normal Expectancy—Dressing percent—50% to 52%; Meat to locker, 78% to 80%. Bone removed, 7.5%; Fat trim, 4% to 5%, (depending upon degree of finish). Leg end roll and Loin roll may cut into chops for broiling, just before cooking. Bones may be used for soup stock.

SUGGESTED BREAK DOWN OF HOG CARCASS

January 1, 1949

Live Wt., 245 Lbs.—Dressed Wt., 184 Lbs.—Dressing Percent, 75.

Cut	Trimmed Wt.	Live wt. Percent	Dr. Wt. Percent	Disposition of Cut
Hams	33.6	13.7	18.3	Fresh or cured
Picnics	15.7	6.4	8.5	Fresh or cured
Bellies	30.8	12.2	16.6	Cured
Bacon Squares	5.9	2.4	3.2	Cured
Total Cured	86.0	34.7	46.5	
Boston Butts	10.4	4.2	5.7	Roasts or chops
Loins	24.9	10.0	13.5	Roasts or chops
Spare Ribs	4.5	1.8	2.4	braised
Sausage Trimmings	7.3	3.1	4.0	
Neck Bone	3.1	1.3	1.7	Seasoning
Pigs Feet	4.4	1.7	2.4	Fresh or pickled
Total Fresh Meat.	44.6	22.1	29.7	
Fat Back	19.5	8.0	10.6	Rendered
Clear Plate	6.2	2.5	3.4	Rendered
Leaf Lard	6.2	2.5	3.4	Rendered
Fat Trimmings	8.1	3.3	4.4	Rendered
Total Fat for Lard	40.0	16.3	21.8	
Rendered Lard	30.0	12.3	16.3	

Normal Expectancy—55 pounds fresh meat and 15 pounds lard for each 100 pounds live weight. Of the 55 pounds fresh meat two-thirds is usually cured, leaving only 18 pounds of fresh meat per 100 pounds live weight, or only about 6 and 8 packages of fresh meat per 100 pounds of live hog.