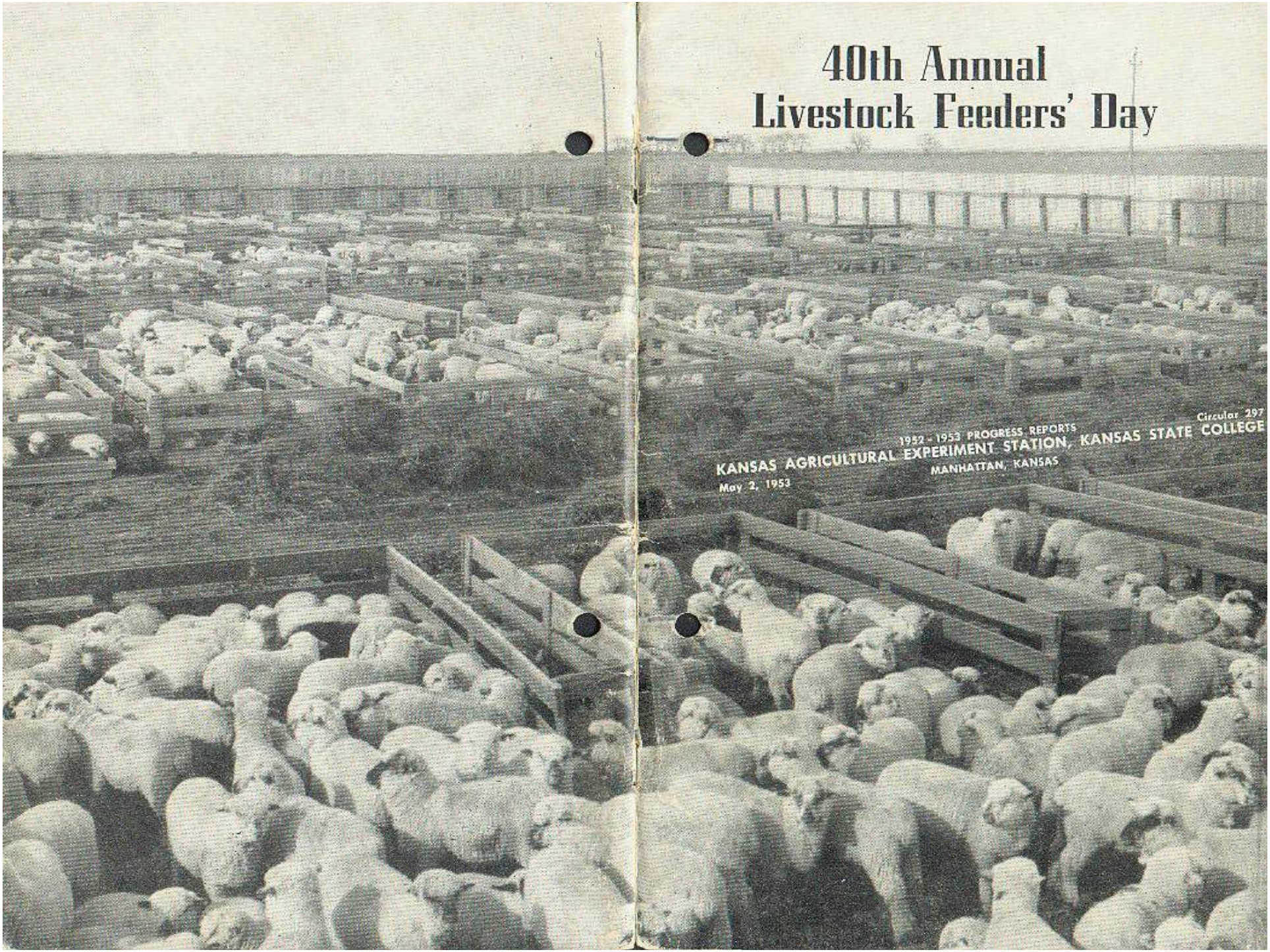


40th Annual Livestock Feeders' Day

1952-1953 PROGRESS REPORTS

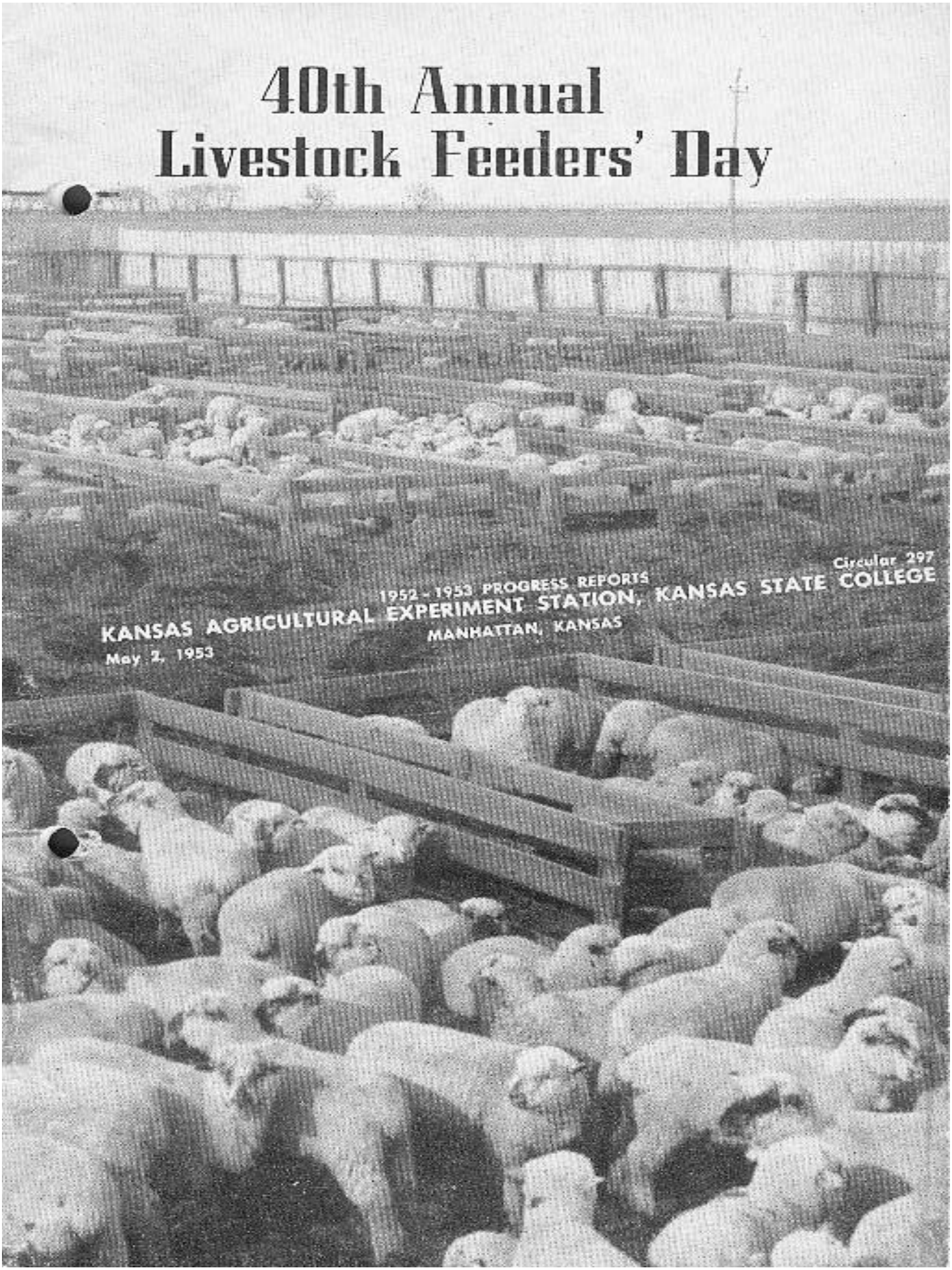
Circular 297

KANSAS AGRICULTURAL EXPERIMENT STATION, KANSAS STATE COLLEGE

MANHATTAN, KANSAS

May 2, 1953

40th Annual Livestock Feeders' Day



1952 - 1953 PROGRESS REPORTS

KANSAS AGRICULTURAL EXPERIMENT STATION, KANSAS STATE COLLEGE

Circular 297

MANHATTAN, KANSAS

May 2, 1953

40th Annual Livestock Feeders' Day

Kansas State College

Manhattan, Kansas

SATURDAY, MAY 2, 1953

9:30 a.m.—Assemble at Experimental Feedlots.

Explanation of Plan of Experiments in Progress.

Inspection of Experimental Animals and Reporting of Results. Beef Cattle, Sheep, and Hogs.

11:30 a.m.—50c Plate Lunch—*Fieldhouse*—Served by student members of Block and Bridle Club.

1:30 p.m.—Afternoon Program—*Fieldhouse*

Presiding—Earl Kielhorn, Cambridge, Kansas.
President, Kansas Livestock Association.

Presentation of Portrait of Dr. Arthur D. Weber to Kansas State College by Dr. M. L. Baker, Lincoln, Nebraska, *President*, American Society of Animal Production.

Acceptance of Portrait—President James A. McCain, Kansas State College.

Response—Dr. Arthur D. Weber, *Dean of Agriculture and Director* of Agricultural Experiment Station.

Address of Guest Speaker—A. L. Ward, Dallas, Texas, *Director*, National Cottonseed Products Ass'n.

Presentation of Beef Production Contest Winners—Walter H. Atzenweiler, *Agricultural Commissioner*, Chamber of Commerce, Kansas City, Missouri. Assisted by Extension Livestock Specialists.

Question Box

FOR THE LADIES

Friday, May 1—7:30 p.m.—Dutch Treat Dinner, Kansas Cow Belles, Gillett Hotel. Presiding, Mrs. Floyd Casement, Sedan, Kansas. *President*.

Saturday, May 2—9:30 a.m.—Coffee Hour, Calvin Lounge (*Home Economics Building*, College).

11:30 a.m.—50c Plate Lunch—*Fieldhouse*—Served by student members of Block and Bridle Club.

1:30 p.m.—Special Program for the Ladies. *Engineering Lecture Room*. Sponsored by School of Home Economics and Department of Animal Husbandry.

Animal Husbandry Investigations

1952-53 PROGRESS REPORTS*

40th Annual
LIVESTOCK FEEDERS' DAY

Kansas Agricultural Experiment Station

KANSAS STATE COLLEGE
OF
AGRICULTURE AND APPLIED SCIENCE

ARTHUR D. WEBER, Director

* Contribution No. 197, Department of Animal Husbandry

Contents

Project 111 GC: Lamb Feeding Experiments

Feedlot and Milo Stubble Fattening Tests with Feeder Lambs. Studies Carried On by the Department of Animal Husbandry and the Garden City Branch Experiment Station.

T. Donald Bell and A. B. Erhart

The tests this year compared whole milo with steam rolled milo, and with ground milo when fed with a standard roughage ration of ground sorghum stover plus a protein supplement and supplemental salt and limestone. The roughage comparisons included: (1) all sorghum stover, (2) all alfalfa hay, (3) one-half alfalfa hay and one-half sorghum stover (with and without a protein supplement), and (4) part sorghum stover and part sorghum silage.

One lot of lambs received no supplemental salt; another lot received antibiotics with the standard ration of ground sorghum stover, milo grain, soybean pellets, ground limestone, and salt. In another lot receiving the standard ration all of the lambs received implants of stilbestrol. One lot of lambs was pastured for most of the feeding period on sorghum stubble plus a small amount of alfalfa.

One-half the lambs in all the lots were vaccinated against overeating disease and one-half the lambs in all lots (except the lot where all lambs received stilbestrol implants) were given stilbestrol implants at the beginning of the feeding period. A portion of these treated lambs received a second implant after they had been on feed approximately 70 days.

Lambs

Whiteface fine wool lambs from New Mexico were used in this year's tests. They were quite uniform in type and quality, weighing about 67 pounds. After a short preliminary period in dry lot, they were started on the tests.

Feed Prices for Lamb Feeding Experiments

Milo	$ 2.50 cwt.
Grinding	.10 cwt.
Steam rolling	.15 cwt.
Soybean pellets	100.00 ton.
Alfalfa hay	46.00 ton
Axtell stover	15.00 ton
Axtell silage	10.00 ton
Sorghum stubble $40.00 for 80 acres (furnished 92 days pasture for 47 lambs)	
Limestone	1.00 cwt.
Salt	.90 cwt.
Stilbestrol	.02½ per head
Vaccine	.15 per head
Aurofac 2 A	.50 per pound

Table 1.—Feedlot Tests

1. Lot number	1	2	3	4
2. Ration fed	Milo (whole) Axtell stover Protein Limestone Salt	Milo (ground) Axtell stover Protein Limestone Salt	Milo (rolled) Axtell stover Protein Limestone Salt	Milo (whole) Alfalfa Salt
3. Number of lambs per lot	47	47	47	47
4. Number of days on feed	112	112	112	112

5. Initial weight per lamb	66.8	68.8	68.7	67.9
6. Final weight per lamb	103.5	105.5	108.4	120.4
7. Total gain per lamb	36.7	36.7	39.7	52.5
8. Daily gain per lamb	.327	.327	.354	.468
9. Feed per lamb daily				
Milo grain	1.27	1.29	1.29	1.33
Axtell stover	2.48	2.41	2.69	
Alfalfa hay				2.60
Soybean pellets	.204	.204	.204	
Ground limestone	.013	.013	.013	
Salt	.026	.022	.028	.012
10. Feed per cwt. gain				
Milo grain	388	394	364	284
Axtell stover	758	737	740	
Alfalfa hay				555
Soybean pellets	62	62	58	
Ground limestone	4	4	4	
Salt	8	7	8	3.9
11. Feed cost per cwt. gain....	$18.59	$18.97	$18.20	$19.89
12. Feed cost per lamb	$ 6.82	$ 6.96	$ 7.22	$10.44
13. Initial cost per lamb	$15.22	$15.67	$15.65	$15.47
14. Number of lambs lost	3	0	2	0
15. Total cost	$22.04	$22.63	$22.87	$25.91
16. Final cost per cwt.	$21.29	$21.45	$21.09	$21.51

Table 2.—Feedlot Tests

1. Lot number	5	6	7	8
2. Ration fed	Milo ½ Alfalfa ½ Stover Limestone Salt	Milo ½ Alfalfa ½ Stover Limestone Protein Salt	Milo Silage Stover Protein Limestone Salt	Milo Axtell Stover Protein Limestone Antibiotics Salt
3. Number of lambs per lot	47	47	47	47
4. Number of days on feed	112	112	112	112
5. Initial weight per lamb	67.6	68.7	67.2	67.4
6. Final weight per lamb	114.4	115.9	104.9	105.1
7. Total gain per lamb	46.8	47.2	37.7	37.7
8. Daily gain per lamb	.417	.421	.336	.336
9. Feed per lamb daily				
Milo grain	1.33	1.33	1.33	1.28
Axtell stover	1.52	1.42	1.03	2.52
Axtell silage			2.95	
Alfalfa hay	1.52	1.42		
Soybean pellets		.204	.204	.204
Ground limestone	.013	.013	.013	.013
Salt	.019	.013	.024	
Aurofac 2 A				7.2mg
10. Feed per cwt. gain				
Milo grain	319	315	396	380

Axtell stover	364	337	306	750
Axtell silage			878	
Alfalfa hay	364	337		
Soybean pellets		48	60	60
Ground limestone	3	3	4	4
Salt	4	3	7	
Aurofac 2 A				2gm.
11. Feed cost per cwt. gain...	$19.14	$20.61	$19.68	$18.22
12. Feed cost per lamb	$ 8.96	$ 9.72	$ 7.41	$ 6.86
13. Initial cost per lamb	$15.40	$15.65	$15.33	$15.35
14. Number of lambs lost	0	0	0	0
15. Total cost	$24.36	$25.37	$22.74	$22.21
16. Final cost per cwt.	$21.29	$21.88	$21.67	$21.13

Table 3.—Sorghum Pasture Feedlot Tests

1. Lot number	9	10	11
2. Ration fed	Milo stubble plus alfalfa Salt	Milo Axtell stover Protein Limestone Salt (All lambs given stilbestrol implants)	Milo Axtell stover Protein Limestone No salt
3. Number of lambs per lot	47	47	47
4. Number of days on feed	112	112	112
5. Initial weight per lamb	67.9	66.8	69.1
6. Final weight per lamb	112.5	108.4	95.2
7. Total gain per lamb	44.6	41.6	26.1
8. Daily gain per lamb	.398	.371	.233
9. Feed per lamb daily			
Milo grain	.61	1.49	1.24
Axtell stover	.12	2.88	2.21
Alfalfa hay	.92		
Soybean pellets		.204	.204
Ground limestone		.013	.013
Salt	.014	.018	.013
Sorghum stubble pasture*			
10. Feed per cwt. gain			
Milo grain	153	402	532
Axtell stover	30	776	948
Alfalfa hay	231		
Soybean pellets		55	87
Ground limestone		4	6
Salt	4	5	6
Milo stubble			
11. Feed cost per cwt. of gain	$11.34	$18.70	$24.87
12. Feed cost per lamb	$ 5.06	$ 7.78	$ 6.49
13. Initial cost per lamb	$15.47	$15.22	$15.74

14. Number of lambs lost	0	1	1
15. Total cost	$20.53	$23.00	$22.22
16. Final cost per cwt.	$18.24	$21.21	$23.34

* On pasture for 92 days where .64 pound of alfalfa hay was fed daily per lamb. Remainder of feeding period in dry lot.

Observations

1. Slightly larger gains were made by the lambs receiving steam rolled milo than those made by the lambs receiving either whole or ground milo and, while the lambs on rolled milo ate a little more roughage, they still produced their gains at a slightly lower cost than the other two groups. The differences, however, are small and may be due entirely to chance.

2. Alfalfa fed as the sole roughage or as a part of the roughage speeded up the gain but also increased the cost of gains. Silage also increased the rate of gain when it replaced a large portion of the stover, but at current prices the gains were more expensive in the silage-fed group.

3. The addition of a protein supplement to a ration, including one-half alfalfa and one-half sorghum stover, increased the rate of gain slightly but also increased the cost of gain slightly.

4. The lot of lambs receiving Aurofac 2 A with the standard ration of milo grain, Axtell stover, protein, limestone, and salt gained slightly more at a little less cost than the lot of lambs given the standard ration alone. The differences were small, however, and are probably not statistically significant.

5. Excellent gains were made by the lambs on sorghum stubble plus alfalfa hay and at a cost of approximately 60 percent of cost of gains made in the feedlot. The pasture-fed lambs probably are not carrying quite as much finish as those kept in the dry lot, however.

6. The lambs given no salt with their standard ration made the poorest gains and at the greatest cost of any of the groups.

7. Table 4 shows the average daily gains by lots of the lambs receiving one and two hormone implants either with or without vaccination against enterotoxemia compared to the gains made by the untreated lambs.

Table 4.—Average Daily Gains of Vaccinated, Hormone Treated, and Untreated Lambs (Wethers).

	No treatment	Vaccinated	One hormone implant	One hormone implant and vaccine	Two hormone implants	Two hormone implants and vaccine
Lot 1	.295	.291	.335	.419	.358	.328
2	.257	.283	.512	.335	.388	.383
3	.330	.325	.353	.404	.379	.428
4	.403	.408	.497	.580	.445	.546
5	.350	.369	.478	.405	.487	.542
6	.375	.362	.518	.451	.467	.515
7	.289	.291	.369	.402	.371	.397
8	.324	.292	.365	.389	.349	.375
9	.348	.343	.456	.425	.489	.445
10	.....	.....	.324	.389	.371	.391
11	.174	.238	.285	.284	.203	.236
All Lots	.312	.322	.402	.406	.390	.415

Gains were approximately one-third larger in the lambs receiving the hormone implants. The rate of gain was not increased by giving a second implant after 70 days of feeding. In Lot 10, where all of the lambs received the hormone, increased rate of gain was apparently due to greater feed consumption and the amount of feed per pound of gain was actually just as high or a little higher than in the lot of lambs receiving the same standard ration and where only half the lambs were given implants.

These findings differ from reports from other stations, indicating that the hormones produce larger gains because of better feed utilization. Most of the stations also have reported the lambs grow rather than fatten, producing poorer carcasses. The lambs vaccinated for overeating gained a little more than those unvaccinated. This same slight difference was shown last year but still may be due entirely to chance.

Seven lambs died during the tests—two from enterotoxemia and the remaining five apparently from urinary calculi. Both lambs dying of overeating disease had been vaccinated. Four of the five lambs dying from urinary calculi, and one of the two dying from overeating had received two implants of stilbestrol. (See supplementary report below.)

At the conclusion of the feeding period, 151 lambs were selected as high good, and choice slaughter lambs, and the number selected from the various lots were as follows: Lots 1-11; Lots 2-9; Lots 3-15; Lots 4-32; Lots 5-10; Lots 6-32; Lots 7-22; Lots 8-2; Lots 10-12; and Lots 11-2.

A smaller percentage of the lambs given stilbestrol were selected for slaughter as compared to those given no implants. Carcass quality and yields also were lower for the lambs receiving implants. Abnormal development of the reproductive organs was found in the wether lambs given the implants and these abnormalities were capable of producing prolapse of the rectum as well as symptoms of urinary calculi. A high incidence of these difficulties has been reported in several commercial feedlots where the lambs have been given stilbestrol implants.

Project 111 GC: Lamb Feeding Experiments

Supplemental Report Concerning the Use of Stilbestrol[1]

T. Donald Bell, Walter H. Smith, and A. B. Erhart

Since the preparation of the original report on the lamb feeding studies at the Garden City Station, additional information has been obtained concerning the effect of stilbestrol upon the reproductive organs of wether lambs which may result in serious malfunction of the excretory system and possible death of the treated animals.

The use of stilbestrol implants in fattening lambs or cattle has not been approved by the Food and Drug Administration, but reports of increased rates of gain in experimental tests have encouraged the use of the material by commercial feeders. The extent of this use is not completely known but apparently a fairly large number of lamb feeders in Kansas have given their lambs stilbestrol implants. There have been reports of rather heavy losses in several groups of lambs where the hormone-like material has been used but the cause

1. Assistance in preparation of the anatomical specimens was given by Dr. W. M. McLeod, head of the Anatomy Department of the School of Veterinary Medicine, Kansas State College, Manhattan, Kansas.

of the losses has never been attributed directly to the stilbestrol implants.

Symptoms reported were of two types: (1) conditions similar to that of urinary calculi (water belly) and (2) prolapse of the rectum (piles) and excessive swelling in the rectal region.

In the experiments at Garden City, five lambs were lost following the administration of the second stilbestrol implant and the cause of death in four of these lambs was from symptoms similar to those found in lambs dying from urinary calculi.

Approximately one-third of the lambs were marketed at the conclusion of the tests on March 7 and the remainder were shorn and continued on feed. Since that time six lambs, all of which had received two stilbestrol implants, died from "piles" or conditions resulting from the excessive swelling in the rectal region. Several more are exhibiting the same symptoms at the time this paper is being written (April 14). Figures 1 and 2 show lambs exhibiting typical swelling of the rectal region and Figure 3 shows a lamb with prolapse of the rectum without excessive swelling.

A number of the treated and untreated lambs, all apparently in good health, were brought to Manhattan where they were slaughtered and further observations were made. The lambs receiving the implants were difficult to butcher because the pelts adhered so tightly to the carcass. The treated lambs shrank more in the cooler and had lower dressing percentages than the untreated lambs. The carcasses from the treated lambs also appeared to be more watery and had a slimy appearance.

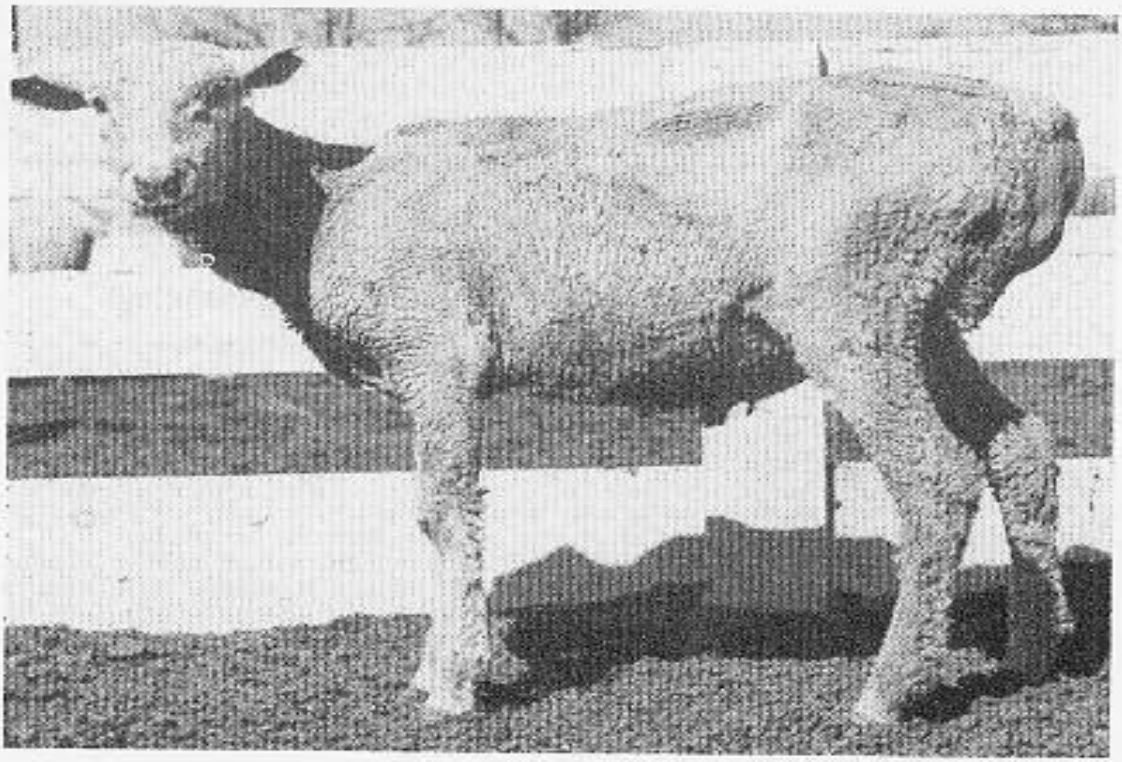


Fig. 1.—Wether lamb that had received two implants of stilbestrol, one at the beginning of the test and another in 70 days. Note the swelling in the rectal region.

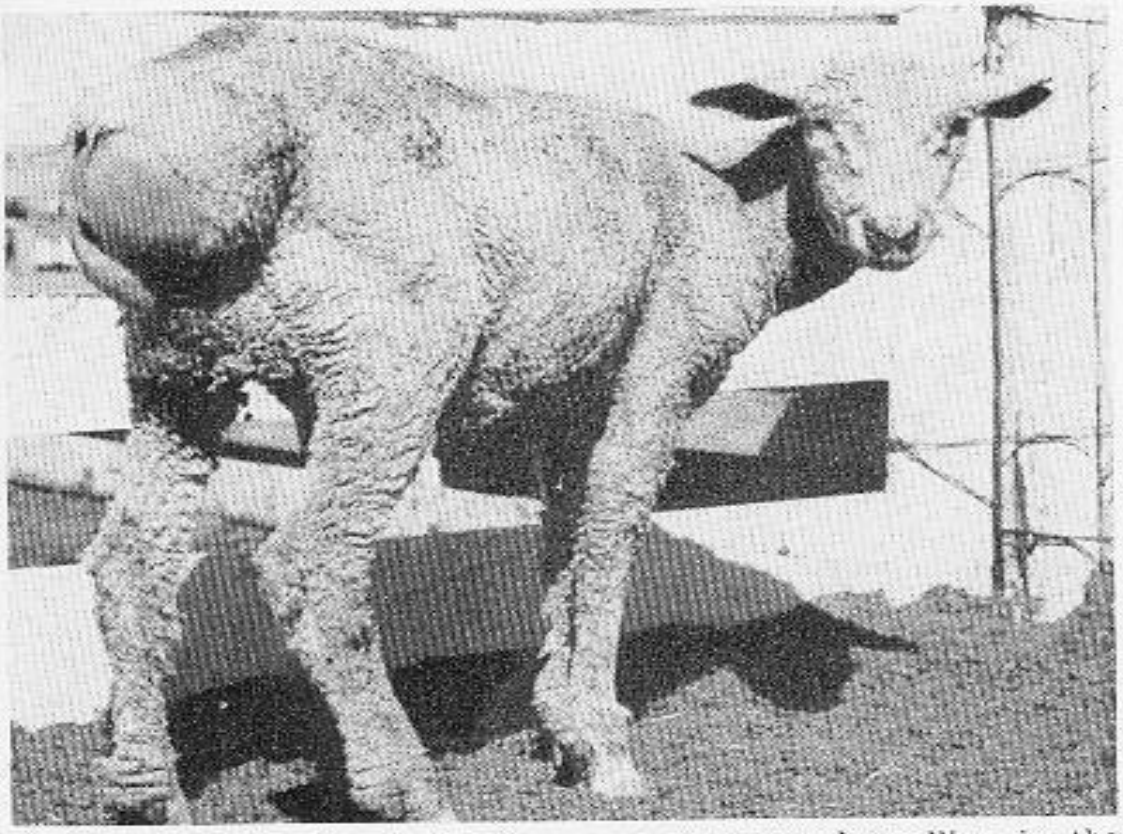


Fig. 2.—Wether lamb showing more pronounced swelling in the rectal region. This lamb also had received two implants of stilbestrol.

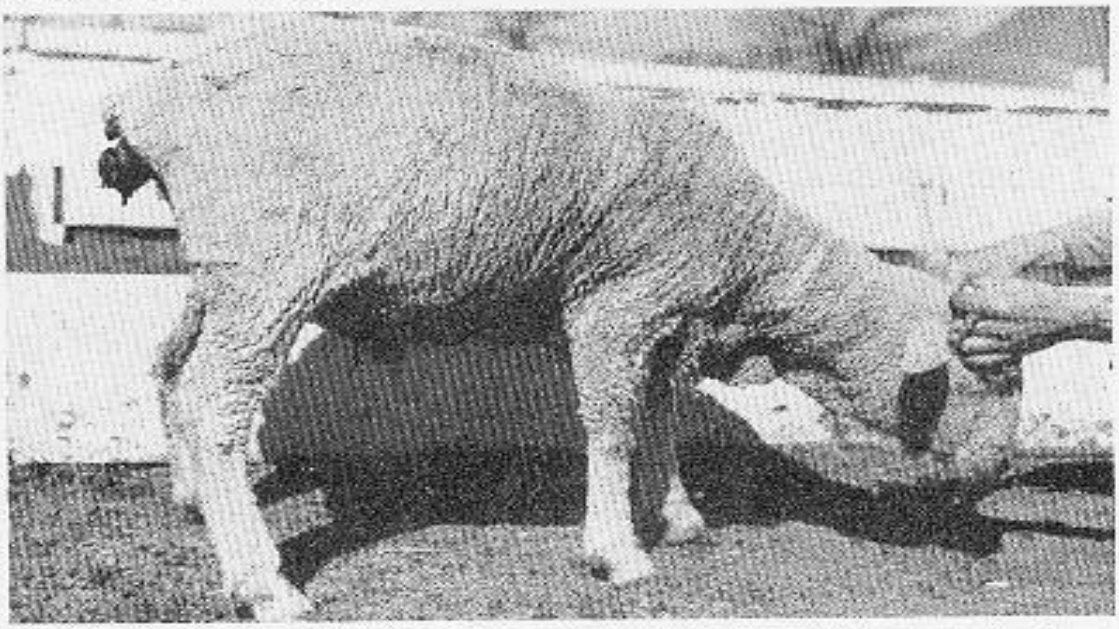


Fig. 3.—Wether lamb that had received two stilbestrol implants exhibiting symptoms of prolapse of the rectum (piles).

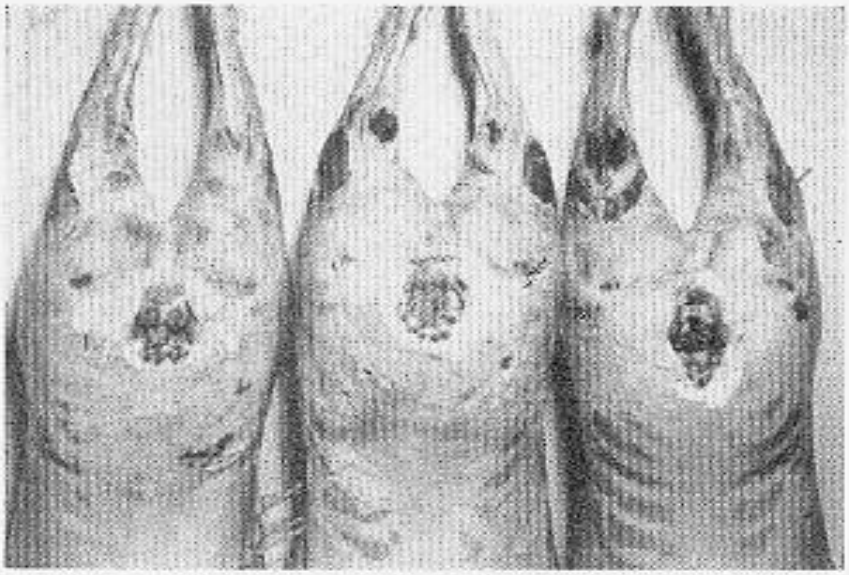


Fig. 4.—Carcasses with the tails removed, from treated and untreated lambs; left to right, the carcass from a lamb receiving the implant at the beginning of the test and another after 70 days on the test; the carcass from a lamb receiving one implant at the beginning of the tests; and the carcass from an untreated lamb. Note the enlarged gland and urethral tracts in the two lambs on the left.

An examination of the reproductive organs revealed that the implants resulted in an enlargement of reproductive organs of the wethers. These enlargements are shown in Figures 4, 5, and 6. Figure 4 shows, from left to right: the carcass from a lamb receiving the implant at the beginning of the test and another after 70 days on the test; the carcass from a lamb receiving one implant at the beginning of the tests; and the carcass from an untreated lamb. The tails have been removed to give a better view of the rectal region. In the carcass at the left the two large round Cowper's glands may be clearly seen as well as the enlarged urethra extending down from them. In the middle carcass the glands and urethra are still plainly visible, although the development isn't too great. In the control lambs on the right, the Cowper's glands do not show enough development to be noticeable and the urethra is much smaller than in either of the two lambs receiving implants.

Figure 5 shows a portion of the reproductive tracts removed. Number I is the organs from the control or untreated lamb; Number II is from the lamb receiving one implant; and Number III is from the lamb receiving two implants. The numeral 1 on each of the three pictures indicates the urethra surrounded by the prostate gland and the numeral 2 shows the location of the Cowper's or bulbo-urethral glands.

Figure 6 shows a cross section through the urethra and surrounding prostatic tissue. Number I is from the untreated lamb; Number II from the lamb receiving one implant; and Number III from the lamb receiving the two implants. A study of the lumen of the urethra in each specimen reveals a fairly large and unimpaired opening in the control lamb; a smaller and partially closed opening in the lamb receiving one implant; and an almost entirely closed lumen in the lamb receiving the two implants. While these animals had shown

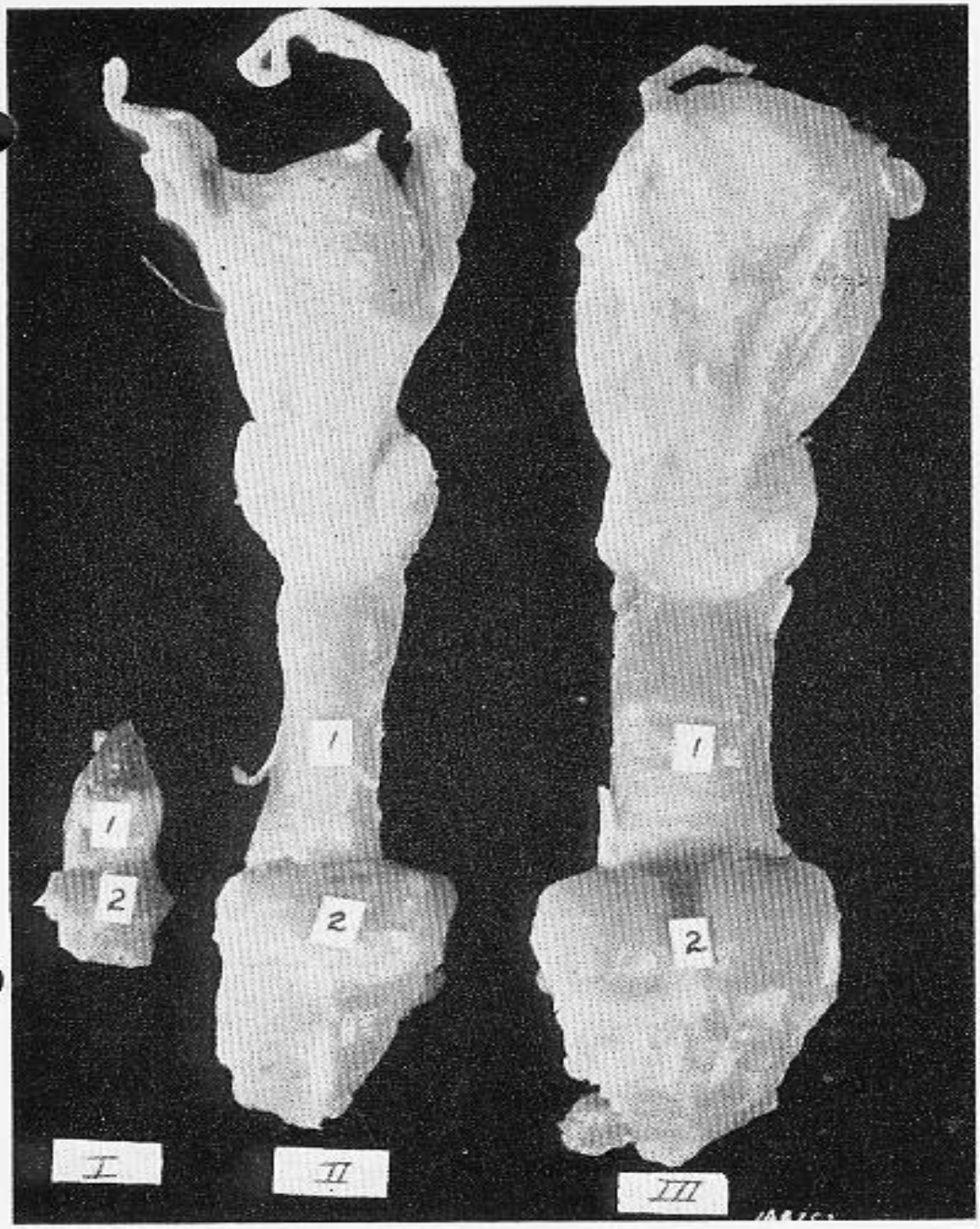


Fig. 5.—Portions of the reproductive organs from (I) an untreated lamb; (II) a lamb receiving a single implant at the beginning of the feeding period; and (III) a lamb receiving the initial implant plus an additional implant after 70 days on feed. Number 1 on each specimen indicates the urethra with the surrounding prostate; Number 2 indicates the Cowper's or bulbo-urethral glands.

no external visible symptoms of distress, it would appear logical that further closure of the urinary passage might result in symptoms similar to that produced by a blockage of the passage by urinary calculi. The extreme swelling of the Cowper's glands may be responsible for difficulty in passage of fecal material and could possibly result in considerable straining with resulting prolapse of the rectum. Further studies are being continued on those animals either dying from the symptoms indicated or showing symptoms sufficient to cause death. The possible serious effect of the indiscriminate use of this hormone-like material in lamb fattening should deter any commercial feeders from using it until further experimental work has indicated that it can be used safely without danger from heavy losses.

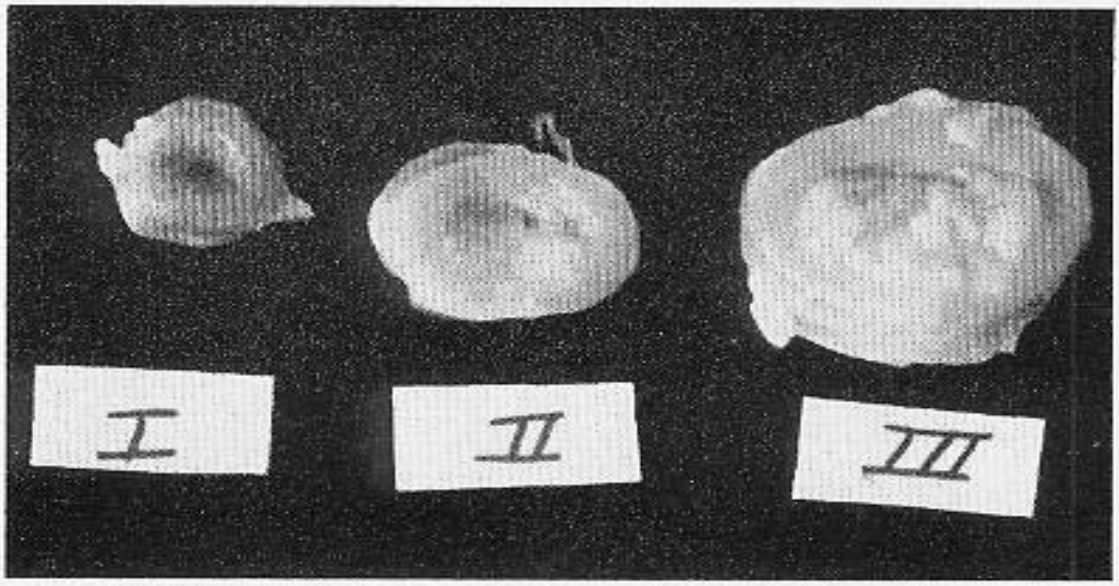


Fig. 6.—Cross section through the urethra and surrounding prostate tissue of lambs; (I) receiving no treatment; (II) receiving one stilbestrol implant; and (III) receiving two stilbestrol implants. Note the almost complete closure of the lumen of the urethra in the treated lambs.

Project Commercial 108: Salt Research with Feeder Lambs

T. D. Bell, E. L. Hix, A. B. Erhart, D. B. Parrish, and G. K. L. Underbjerg

Experiments designed to test the need and value of salt in the rations of feeder lambs have been conducted by the Kansas Agricultural Experiment Station for the past three years. The tests have shown that feedlot gains and feedlot efficiency are reduced when supplemental salt is withheld from the rations of fattening lambs in the feedlot. When the lambs were all slaughtered after a uniform feeding period, the lambs receiving no salt had lower yielding and lower grading carcasses than the lambs given salt.

Digestion trials and mineral balance studies have shown that the deprivation of supplemental salt slightly lowers feed digestibility of all feed components other than fat; depletes the animal body of sodium;

decreases water consumption and urine excretion; and dehydrates the body fluids.

Most range feeder lambs haven't had salt during their movement from the range to the feedlot and should be gradually accustomed to salt. Since many lamb feeders have felt that salt wasn't necessary during the 80 to 120 day feeding period, they haven't provided supplemental salt for their lambs. The tests at Kansas State College clearly demonstrate the need and advisability of salt in lamb-fattening rations even though the feeding period is of short duration.

Project State 347: Adaptability of Breeds of Rams and Breed Types of Range Ewes to Market Lamb Production in Kansas

T. Donald Bell and Lewis A. Holland

During the fall of 1951, ewe lambs representing the three types of ewes commonly used in Kansas were secured from southern Utah. One-third of these 140 lambs were of straight Rambouillet or fine-wool breeding and similar to Texas ewes; one-third of the lambs were sired by Columbia rams out of Columbia x Rambouillet ewes and were similar to the Northwestern whiteface crossbred ewes commonly obtained from the Northwestern range area; and one-third of the lambs were sired by Suffolk rams and out of whiteface crossbred ewes and were similar to Northwestern blackface ewes. These ewes will be maintained at the College as long as their productive life will permit and careful records will be kept of their wool production as well as their lamb production when mated to different breeds of rams. Other factors of economic importance, such as longevity and the ability to produce early lambs, will be studied.

During the summer of 1952, the ewes of each of the three types were randomly divided into four groups and bred to Hampshire, Suffolk, Southdown, and Shropshire yearling rams. During the summer of 1953 the breeding procedure will be repeated but a new set of yearling rams of all breeds will be used and the ewes will be rotated so they are bred to different breeds of rams.

The data obtained from the different types of ewes and different breeds of rams are summarized in the two following tables. Lamb production figures are subject to tremendous variation and there should be no definite conclusions drawn from these preliminary findings. Additional information concerning final market weights and market grades will be obtained from this year's lamb crop and similar information will be gathered from the lamb crops of the several following years before any definite conclusions are drawn.

Grease fleece weights are less subject to variation and the yearling grease fleece weights should be a fairly good estimate of future wool production. Date of lambing figures also should be fairly reliable indicators of comparative ability to breed and lamb early. Most sheepmen have believed that the finewools would lamb earlier than the other types but they have thought also that the whiteface crossbreds would probably lamb earlier than the blackface crossbreds. This year's data failed to confirm this opinion.

Table 5.—Comparative Wool and Lamb Production of Ewes of Three Different Types.

Types of ewes	Grease fleece weight	Average lambing date	Average birth weight of lambs—Single	Twins	Average weight of lambs on April 8
Blackface crossbreds	6.8	Jan. 20	10.0	8.1	50.3

Rambouillets (Finewools)	8.5	Jan. 21	10.1	8.4	58.5
Whiteface crossbreds ..	10.0	Feb. 3	10.6	10.5	51.9

Table 6.—Comparative Lamb Production of Rams of Different Breeds

Breed of sire of lambs	Birth weight		Average weight of lambs on April 8
	Single	Twins	
Hampshire	11.1	7.9	60.3
Suffolk	10.8	9.0	58.2
Southdown	9.3	——	53.6
Shropshire	10.1	8.1	49.5

Project 110: Swine Feeding Investigations

EXPERIMENT I

The Effect of Antibiotics (Aureomycin-B_{12} Supplement) on Weanling Pigs in the Dry Lot

C. E. Aubel

The use of antibiotics in swine nutrition has received much attention the last few years. Research has shown that different vitamin B_{12}-antibiotic supplements stimulate gains and improve feed efficiency in growing and fattening swine. One problem arising from its use is the relative efficiency of the B_{12}-antibiotic supplement in plant protein supplement diets and in mixed plant and animal protein supplement diets.

An experiment was recently conducted at this station to supply information on two points. First, how much does the addition of an antibiotic improve an all-plant protein supplement or diet, and how much does it improve a mixed protein supplement of plant and animal protein for weanling pigs? The second point to get information on was whether it was necessary to feed the antibiotics to pigs after they weighed 100 pounds.

The antibiotic used in this experiment was aureomycin fed as Aurofac and it was mixed in the protein supplements at the rate of 3 pounds to 100 pounds. Six lots of 42-pound fall pigs were fed in the dry lot. They were self-fed free choice on shelled corn, a protein supplement, and a mineral mixture. The mineral mixture was made up of equal parts ground limestone, steamed bonemeal, and salt.

Lots 1, 2, and 3 received only soybean meal as a protein supplement; Lot 2 received aureomycin in the supplement until the pigs reached 100 pounds in weight and then they were fed only the soybean meal. Lot 3 received aureomycin in their protein supplement throughout the experiment, until the pigs were finished at a weight of 200 pounds.

Lots 4, 5, and 6 received as a protein supplement a mixture of 4 parts tankage, 4 parts soybean meal, 1 part linseed meal, and 1 part alfalfa meal. Lot 5 received aureomycin in the supplement until the pigs reached 100 pounds in weight, and then they were fed only the mixed protein supplement; Lot 6 received aureomycin in their protein supplement throughout the experiment until the pigs were finished.

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

Table 7.—The Effect of Antibiotics (Aureomycin-B_{12} Supplement) on Weanling Pigs in the Drylot

Ration fed	(self-fed) Shelled corn, alfalfa hay, mineral mixture					
	Soybean oil meal	Soybean oil meal, aureo-B_{12} to 100 lbs.	Soybean oil meal, aureo-B_{12} to finish	Protein mixed supplt.	Protein mixed supplt., aureo-B_{12} to 100 lbs.	Protein mixed supplt., aureo-B_{12} to finish
Lot number	1	2	3	4	5	6
No. pigs in lot	9	10	10	10	10	10
Av. initial wt./pig	Lbs. 43.95	Lbs. 42.85	Lbs. 43.00	Lbs. 42.35	Lbs. 42.65	Lbs. 42.50
Av. final wt./pig	179.88	200.30	205.00	196.90	196.60	210.30
Av. total gain per pig	135.96	157.45	162.00	154.55	153.95	167.80
Av. daily gain per pig	1.40	1.62	1.67	1.59	1.58	1.72
Av. daily ration per pig:						
Corn	3.55	4.78	4.72	5.20	4.98	5.34
Alfalfa hay	.05	.03	.05	.03	.04	.04
Protein supplt.	1.03	1.15	1.12	.85	.80	.82
Feed consumed per 100 lbs. gain:						
Corn	253.33	294.65	283.02	326.43	314.38	308.99
Alfalfa hay	.36	.21	.32	.22	.25	.23
Protein supplt.	73.95	71.45	67.28	53.38	50.99	47.67
Mineral mix ..	.13	.12	.08	.06	.05	.05
Feed cost per 100 lbs. gain	$11.60	$13.22	$13.01	$13.24	$13.05	$12.94

Feed prices charged: Shelled corn, $1.86 per bushel; soybean meal, $86 per ton; soybean oil meal with Aurofac, $110 per ton; alfalfa hay, $50 per ton; mixed protein supplement in Lots 5 and 6, $90.80 per ton; mineral mixture, 3c per lb.; mixed protein supplement with Aurofac in Lots 5 and 6, $112.20 per ton; Aurofac, 43c per lb.

Observations

When aureomycin was added to a soybean meal protein supplement ration and fed to pigs only until they reached a weight of 100 pounds, the rate of gain was increased, as was also the feed required per 100 pounds gain. When the antibiotic was fed in the supplement throughout the experiment, it further increased the gains and slightly lowered the feed requirements. The gains were satisfactory in both lots receiving the antibiotics.

The mixed plant and animal protein supplement without an antibiotic as fed in Lot 4 produced more rapid daily gains than did the plant protein supplement alone, soybean meal, as fed in Lot 1.

When the antibiotic was added to the mixed protein supplement in Lot 5, until the pigs reached 100 pounds, the rate of gain was unchanged but the feed requirements were slightly lowered. When the antibiotic was fed in the supplement throughout the experiment, the rate of gain was markedly increased and the feed requirements decreased.

It is evident from these results that aureomycin added to the ration,

either for a limited time or for the duration of the feeding period, increased the rate of gain, and this was therefore its chief effect; the effect of the antibiotic was most marked when it was fed throughout the experiment.

The effect of the antibiotic was more apparent in the all-plant protein-fed pigs and not so effective where a mixed protein supplement was fed.

EXPERIMENT II—Summer, 1952

The Effect of Varying Amounts of Antibiotics (Aureomycin-B_{12} Supplement) in the Protein Supplement for Swine on Sudan Pasture

C. E. Aubel

Antibiotics have been shown to be effective in stimulating rate of gain as much as 18 percent and improving the feed efficiency up to 10 percent when fed in the rations of swine. Not as conclusive evidence has been obtained, however, to show that mere inclusion of an antibiotic in a feed insures this improvement in the well-doing of the pig unless the antibiotic is fed in adequate amounts, which is from 5.0-7.5 mg. per pound of total feed.

Most swine feeders self-feed grain and a supplement which contains the rest of the feed, such as protein, vitamins, and minerals. The ratio of corn to protein supplement consumed becomes wider as the pigs mature; therefore, the amount of antibiotic furnished daily by a protein supplement fed free choice with corn will be different from the amount supplied by feeding an antibiotic in a complete ration. Usually pigs will eat daily a fairly constant amount of a protein supplement throughout the feeding period, but the amount of grain will increase in proportion to weight of the pigs.

This experiment was designed to determine the optimum level of antibiotic required in the protein supplement for growing and fattening pigs. Aurofac, the aureomycin-B_{12} supplement manufactured by Lederle Laboratories, New York, was used as the source of antibiotic. This contained approximately 1.8 mg. of vitamin B_{12} and 1.8 grams aureomycin hydrochloride per pound.

The problem in feeding the antibiotic in this manner is to determine how much antibiotic supplement to put in a ton of protein supplement to supply 5 milligrams per pound of total feed consumed, as has been recommended from nutrition studies with swine. If we assume that pigs eat their feed at a ratio of 1 pound of protein supplement to 3.5 pounds of grain, then 27 pounds of Aurofac per ton of supplement should supply approximately 5 milligrams of aureomycin hydrochloride per pound of feed consumed.

Five lots of 10 pigs each were started on Sudan grass pasture at a weight of about 56 pounds and fed free choice on shelled corn and a protein supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal. This had a protein content of about 50 percent. A mineral mixture was also supplied which was made up of equal parts ground limestone, steamed bonemeal, and salt.

The following levels of Aurofac were added to the protein supplement:

Lot I—no Aurofac
Lot II—15 pounds/ton
Lot III—25 pounds/ton
Lot IV—35 pounds/ton
Lot V—45 pounds/ton

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

Table 8.—The Effect of Varying Amounts of Antibiotics (Aureomycin-B_{12} Supplement) in the Protein Supplement on Weanling Pigs on Sudan Pasture

(June 11, 1952, to Sept. 10, 1952—91 days)

	—(self-fed) Shelled corn, sudan grass pasture, min. mixture—,				
Ration fed	Protein mixed supplt.	Protein mixed supplt., 15 lbs. aureo-B_{12} to 1 ton	Protein mixed supplt., 25 lbs. aureo-B_{12} to 1 ton	Protein mixed supplt., 35 lbs. aureo-B_{12} to 1 ton	Protein mixed supplt., 45 lbs. aureo-B_{12} to 1 ton
Lot number	1	2	3	4	5
No. pigs in lot	10	10	10	9	10
Av. initial wt./pig	57.70	56.40	63.90	56.00	57.85
Av. final wt./pig	194.00	195.30	209.50	201.90	205.50
Av. total gain/pig	136.30	136.90	145.60	145.90	147.65
Av. daily gain/pig	1.49	1.50	1.60	1.60	1.62
Av. daily ration/pig:					
Corn	4.07	4.31	4.01	4.12	4.54
Protein supplt.	1.05	1.00	1.22	1.00	1.06
Feed consumed/100 lbs. gain:					
Corn	272.19	287.07	251.03	256.34	280.39
Protein supplt.	70.35	66.76	76.51	63.26	65.35
Mineral mixture	.14	.27	.12	.12	.17
Feed cost/100 lbs. gain	$11.32	$11.78	$11.27	$10.75	$11.86

Feed prices charged: Shelled corn, $1.68 per bu.; mixed protein supplements in Lot 1, $90 per ton; mixed protein supplements with Aurofac in Lot 2, $95.25, Lot 3, $98.75, Lot 4, $102.25, and Lot 5, $105.75 per ton; Aurofac, 35c per lb.; mineral mixture, 3c per lb.

Observations

1. Feeding amounts of Aurofac at 15 pounds to the ton produced no better response with the pigs than where no antibiotic was fed.

2. If the antibiotic was fed at near the recommended level or over it, the daily gains were increased and the efficiency of the feed was increased except in Lot V where 45 pounds of antibiotic to the ton were fed. The amount of feed required per 100 pounds gain in this lot was about that when no antibiotic was fed, and only slightly higher than those getting nearer the recommended allowance.

3. The pigs receiving 25 pounds of Aurofac per ton of protein supplement consumed less corn and more protein supplement per 100 pounds gain than any other lot.

4. It would seem from this experiment that feeding the Aurofac mixed in the protein supplement and self-fed free choice with grain is a practical way to administer the antibiotic to growing fattening pigs.

5. It would seem from this experiment that about 25-35 pounds of Aurofac to a ton of mixed protein supplement is about right. This amount is consistent with that recommended put in a complete or total feed, namely 5 milligrams per pound of feed.

EXPERIMENT III—Winter, 1953

The Effect of Varying Amounts of Antibiotics (Aureomycin-B_{12} Supplement) in the Protein Supplement for Swine in the Drylot

C. E. Aubel

The previous experiment, summer, 1952, showed that mixing the antibiotic in the protein supplement at the level of 25-35 pounds to a ton gave significant improvement in the well-doing of growing fattening swine on Sudan grass pasture, but when mixed at a lower level of 15 pounds, no improvement manifested itself over hogs that received no antibiotic in the protein supplement.

An experiment was conducted this past winter with fall pigs in the drylot. It was designed, as was the former experiment, to study the effect of varying amounts of antibiotic added to the protein supplement for pigs in the drylot.

The antibiotic used in this experiment of five lots was aureomycin fed as Aurofac and the following levels were added to the protein supplement:

Lot 1—no antibiotic
Lot 2—15 pounds/ton
Lot 3—25 pounds/ton
Lot 4—30 pounds/ton
Lot 5—40 pounds/ton

The pigs were started at an average weight of 33 pounds and fed free choice in drylot on shelled corn and the same protein supplement as the previous experiment and a similar mineral mixture.

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

Table 9.—The Effect of Varying Amounts of Antibiotics (Aureomycin-B_{12} Supplement) in the Protein Supplement for Swine in the Drylot

(December 9, 1952, to March 23, 1953—104 days)

Ration fed	Shelled corn, alfalfa hay, mineral mixture self-fed				
	Protein mixed supplt.	Protein mixed supplt., 15 lbs. aureo-B_{12} to ton	Protein mixed supplt., 25 lbs. aureo-B_{12} to ton	Protein mixed supplt., 30 lbs. aureo-B_{12} to ton	Protein mixed supplt., 40 lbs. aureo-B_{12} to ton
Lot number	1	2	3	4	5
No. pigs in lot	10	10	10	10	10
Av. initial wt./pig	33.30	33.10	31.30	31.90	30.30
Av. final wt./pig	193.70	215.90	207.00	209.50	213.80
Av. total gain/pig	160.40	181.95	175.70	177.60	183.41
Av. daily gain/pig	1.54	1.74	1.72	1.70	1.75
Av. daily ration/pig:					
Corn	4.54	5.01	4.80	4.72	4.78
Protein supplt.	.76	.97	1.02	.95	.97
Alfalfa hay	.12	.11	.12	.14	.12
Feed consumed/100 lbs. gain:					
Corn	294.57	286.89	284.57	276.46	271.25
Protein supplt.	49.87	55.78	60.61	55.74	55.07
Alfalfa hay	.82	.66	.77	.87	.74
Mineral mixture	.12	.21	.17	.17	.21

Feed cost/100 lbs. gain	$11.08	$11.12	$11.26	$10.80	$10.62

Feed prices charged: Shelled corn, $1.68 per bu.; mixed protein supplements in Lot 1, $90 per ton; mixed protein supplements with Aurofac in Lot 2, $95.25, Lot 3, $98.75, Lot 4, $100.50 per ton. Lot 5, $104 per ton; alfalfa hay, $32 per ton; Aurofac, 35c per lb.; minerals, 3c per lb.

Observations

1. In each case where the antibiotic was added to the ration, a significant improvement in the well-doing of the pigs was observed both in rate of gain and saving of feed per 100 pounds gain, especially the former.
2. The costs of gains were lowest also where the antibiotic was fed at levels of 30 pounds and 40 pounds to the ton.
3. The rates of gain were exceedingly good in all the antibiotic-fed lots. This probably could be explained by the fact that the pigs were started at such an early weight (33 pounds).
4. The same explanation could account for the splendid gains by Lot 2, which received the low level 15 pounds per ton.
5. Again in this experiment, excellent results were obtained when the levels fed were close to the recommended amounts for inclusion in a total feed (5 mg. per pound of feed).

Project 361: Comparison of Antibiotics Implanted Under the Skin and Fed in the Ration of Fattening Pigs

D. Richardson and M. J. Swenson

Certain antibiotics have generally been accepted as beneficial from the standpoint of increased rate of growth and feed efficiency when added to a ration for fattening pigs. The University of Arkansas reported that the subcutaneous implanting of bacitracin in newborn pigs increased their weaning weights. The purpose of this experiment was to observe the results on weaned pigs with antibiotic pellets implanted subcutaneously and to compare these results with pigs receiving a ration with and without antibiotics mixed in the ration.

Experimental Procedure

Twenty-five purebred female Poland-China pigs about 10 weeks of age were divided into five lots of five pigs each. The pigs were self-fed in pens having concrete floors. Water barrels with automatic watering cups were used. Since this experiment was conducted during the summer, the pigs were sprayed with water once a day. The basal ration consisted of 72.5 percent milo grain, 15 percent soybean oil meal, 5 percent alfalfa meal, 5 percent tankage, 2 percent steamed bonemeal, and 5 percent salt. All pigs received this ration. The difference in the various treatments was the kind of antibiotic and how it was given to the pigs. A summary of the treatments and the results is given in the accompanying table.

Table 10.—Results with Antibiotics Implanted and Mixed in Ration

	Basal	Basal and 2000 units bacit. implanted	Basal and 1000 units bacit. and 10000 units penicillin implanted	Basal and 1 lb. penbac[1]/ ton feed	Basal and 3 lbs. Aurofac[2]A/ ton feed
No. pigs per lot	5	5	5	5	5
No. days fed	91	91	91	91	91

Av. initial weight	39.2	42.0	44.0	41.4	43.8
Av. final weight	175.4	184.0	197.0	189.6	195.4
Av. daily gain	1.50	1.56	1.68	1.63	1.67
Feed/100 lbs. gain ..	377	354	364	368	364

(1) Supplied approximately 2.5 mg. bacitracin and .32 mg. penicillin G per pound of feed.
(2) Supplied approximately 5.4 mg. aureomycin HC1 per pound of feed.

Observations

1. About two weeks after the pellets containing bacitracin alone were implanted, the pigs showed evidence of toxicity in that they did not eat as well and did not appear as thrifty as the other pigs; however, these symptoms had disappeared by the end of the fifth week. The bacitracin-penicillin pellet did not cause any adverse symptoms.

2. Even though these results indicate that the combination of bacitracin-penicillin pellet may give similar results as when a combination of bacitracin and penicillin or aureomycin is mixed in the feed, it should be kept in mind that a relatively small number of animals were used. Considerably more work should be done before one should recommend the implantation of antibiotic pellets as a general practice in promoting growth.

3. The efficiency of feed utilization was considered good in all lots. There were slight but not significant differences.

4. These results give further proof of the value of milo grain when properly supplemented for fattening swine.

Project 242: Swine Breeding Investigations

Some Studies on Breeding Market Pigs by Crossing Duroc with Beltsville No. 1

C. E. Aubel

There has been much discussion in Kansas as to the desirability of cross-breeding inbred breeds (so-called hybrids) with other breeds. Consequently, a Beltsville No. 1 (Poland x Landrace origin) was secured and matings planned with the Duroc. The purpose was to study the vigor and size of the litter produced and their ultimate performance in the feedlot as compared with purebred Duroc pigs raised under comparable conditions.

In the winter of 1952, nine purebred Duroc sows were mated to a Duroc boar and five Duroc sows were mated to a Beltsville No. 1 boar. The following table gives a summary of the results of this experiment.

Table 11.—Some Studies on Breeding Market Pigs by Crossing Durocs with a Beltsville No. 1 Boar

Farrowing Data—Spring, 1952

	Purebred Duroc	Beltsville No. 1 x Duroc
Lot number	1	2
No. sows farrowed	9	5
Av. no. pigs/litter	7.6	10.0
Av. birth wt. of pigs	2.4	2.4
Av. strong pigs/litter	6.6	8.4
Av. weak pigs/litter	.7	1.0

Av. born dead/litter	.1	.6
Av. 5-day wt. pigs in litter	3.4	3.8
Av. 56-day wt. pigs in litter	21.9	26.2
Av. pigs weaned/litter	6.4	8.4

From these data, it is seen that the crossbred pigs farrowed with a better record in almost every respect than did the purebred pigs.

From the pigs farrowed, 20 purebred Duroc pigs and 30 crossbred Beltsville No. 1 x Duroc pigs were selected to be fed out for market. They were fed in separate groups, self-fed corn and tankage on Sudan grass pasture. Their initial weight was 37.35 pounds for the purebred Durocs and 44.6 pounds for the crossbred. The following data show the results of this feeding test.

Table 12.—Some Studies on Breeding Market Pigs by Crossing

(June 18, 1952, to September 26, 1952—100 days)

	Shelled corn, tankage (self-fed on Sudan past.)	
	Purebred Duroc	Beltsville No. 1 x Duroc
Lot number	1	2
Number pigs in lot	20	30
Av. birth wt. of pigs	2.4	2.4
Av. 56-day wt. of pigs	21.9	26.2
Av. initial wt. on feed	37.35	44.60
Av. final wt. on feed	161.35	174.41
Av. total gain/pig	124.00	129.81
Av. daily gain/pig	1.24	1.29
Feed/day/pig:		
Shelled corn	3.88	3.38
Tankage	.40	.60
Feed for 100 lb. gain/pig:		
Shelled corn	313.50	261.02
Tankage	32.25	46.22
Cost of gains	$10.85	$ 9.90

Feed prices charged: Corn, $1.68 per bu., tankage, $80 per ton.

Observations

From these data, it is seen that the purebred pigs at the end of 100 days feeding gained 124 pounds at the rate of 1.24 pounds daily with a feed consumption of 346.7 pounds of feed for 100 pounds gain, while the crossbred pigs gained 130 pounds in the 100 days at the rate of 1.29 pounds per day and a feed consumption per 100 pounds gain of 307.2 pounds. Thus the crossbred pigs fed out a little better than the purebred.

Project 93: Animal Breeding (Guinea Pigs)

Bacitracin Pellet Experiments with Guinea Pigs

L. A. Holland and M. J. Swenson

Two experiments were conducted to determine if bacitracin pellets implanted subcutaneously back of the right ear would stimulate gain

in weight of young male guinea pigs. Eight pairs of pigs under two months of age were started in each experiment. One member of each pair served as a control while the other member of the pair received one pellet containing 1,000 units of bacitracin, implanted subcutaneously. The control and treated member of each pair were caged together and were fed the standard ration used in the laboratory. Average daily gains during the eight weeks feeding periods are shown in Table 13. In the first experiment, the bacitracin pigs gained an average of 0.06 gram more per day than did the control pigs. In the second experiment, the control pigs gained an average of 0.29 gram more per day than did the bacitracin pigs. It was concluded that the bacitracin pellet did not alter the weight gain of the guinea pigs.

Table 13.—Average Daily Gains in Weight (grams) Made by Pairs of Guinea Pigs, One Member of Each Pair Having Had a Subcutaneous Implantation of One Pellet Containing 1,000 Units of Bacitracin.

First experiment			Second experiment		
Pair	Control	Bacitracin	Pair	Control	Bacitracin
1	5.52	5.64	1	6.61	5.23
2	2.60	4.97	2	died	.....
3	4.10	4.75	3	4.40	4.99
4	6.01	4.70	4	5.30	4.77
5	5.25	4.77	5	5.72	4.65
6	5.59	4.97	6	4.76	4.68
7	5.66	5.22	7	.....	died
8	3.11	3.29	8	4.37	5.12
Average	4.73	4.79	Average	5.19	4.91

Project 253-1: Wintering and Grazing Steer Calves

Methods of Wintering Steer Calves That Are To Be Grazed a Full Season and Sold Off Grass, 1952-53.

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

This is a report on the wintering phase of this test. Following the wintering period the steers will all be grazed together on bluestem pasture until the fall of 1953 at which time they will be sold off grass as feeder or stocker yearlings. The different methods of winter treatment will be measured by their effect on the combined winter and summer performance of the steers.

This test makes the following comparisons:

1. Wintering in drylot compared to wintering on dry bluestem pasture.
2. Level of protein feeding on dry bluestem pasture.
3. The value of a grain and protein combination fed on dry bluestem pasture.

Experimental Procedure

Four lots of 10 Hereford steer calves per lot are being used in this study. They were part of 220 calves purchased from the Brite Ranch at Marfa, Texas. The cost was 29 cents per pound delivered to Manhattan, Kansas, on November 3, 1952. From the date received until they were placed on test December 18, 1952, they were fed prairie hay and 1 pound of soybean pellets per head daily.

All lots were wintered on dry bluestem pasture except lot 13 wintered in a drylot. The calves on pasture were rotated on pasture every 15 days to equalize any differences due to pasture. The pastures in which the steers grazed were stocked at a normal rate during the 1952

summer season; sufficient grass remained for winter grazing. The winter stocking rate ranged from 4 to 13 acres per steer, varying with the different sizes of pasture available for use.

Observations

1. The steers under all methods of feeding made very good gains. The winter was mild with the exception of three snowstorms; one the latter part of November covered the grass for about three weeks.
2. In this year's test, Lot 14 well demonstrates that calves wintered on dry bluestem pasture can compete successfully with calves wintered under feedlot conditions.
3. As a supplement to dry grass, 1 pound of soybean pellets and 1 pound of corn were not equal to 2 pounds of soybean pellets. Summer grazing may minimize the differences obtained here.
4. Lot 16, wintered on 1 pound of soybean pellets, came through the winter in a strong, healthy condition.
5. The results of the winter treatments studied here can best be evaluated after the summer grazing season.

Table 14.—Wintering and Grazing Steer Calves.

Phase I—Wintering—December 18, 1952, to April 1, 1953—104 days (for Lot 1 to April 9, 1953—112 days)

1. Lot number	13	14	15	16
2. Number steers per lot	10	10	10	10
3. Place of wintering	Drylot	Dry bluestem pasture	Dry bluestem pasture	Dry bluestem pasture
4. Initial weight per steer	417	417	416	416
5. Final weight per steer	548	511	488	476
6. Gain per steer	131	94	72	60
7. Daily gain per steer	1.17	.90	.69	.58
8. Daily ration per steer:				
Soybean oil meal pellets	1.00	2.00	1.00	1.00
Ground shelled corn	.....	.....	1.00	.....
Prairie hay	12.19	2.00	2.00	2.22
Salt	.09	.....	.....	.09
Mineral (bonemeal and salt)	.07	.20	.14	.20
Dry bluestem pasture	.....	ad lib	ad lib	ad lib
9. Total feed cost per steer[1]	$22.82	$15.63	$13.41	$11.03
10. Feed cost per 100 lbs. gain	17.42	16.62	18.62	18.38

1. Feed prices may be found on the last page of this publication.

Project 253-1: Wintering and Grazing Steer Calves

Methods of Wintering Steer Calves That Are To Be Grazed a Full Season and Sold Off Grass, 1951-52.

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

The primary objective of this test was to find the most satisfactory method or methods of wintering steer calves that are going to be grazed on bluestem pasture during the summer and sold off grass as feeder yearlings. This is the final test of a series of three tests; a summary of the three years work is included in this publication in another report.

Experimental Procedure

Five lots of good quality Hereford steer calves, 10 head to a lot, were used in this study. They were a part of the light end of a group of 150 steer calves originating at Marfa, Texas, and purchased for experimental purposes.

They were received November 8, 1951, and started on test December 22, 1951. Until they were started on test, they were fed sorghum silage, prairie hay, and 1 pound of cottonseed cake per head daily with free access to salt. During the experiment all were fed in drylot, except Lot 1, which was fed out on dry bluestem pasture. All lots had free access to a mineral mixture (bonemeal and salt) and salt during the winter. The different lots received the following rations from December 22, 1951, to May 2, 1952:

Lot 1—Bluestem pasture and 2 pounds cottonseed cake per head daily;
Lot 2—Sorghum silage and 1 pound cottonseed cake per head daily;
Lot 3—Prairie hay and 1 pound cottonseed cake per head daily;
Lot 4—Prairie hay, 2 pounds milo grain, and 1 pound cottonseed cake per head daily;
Lot 5—Prairie hay, 4 pounds milo grain, and 1 pound cottonseed cake per head daily.

All lots were grazed on bluestem pasture a full season in 1952 and sold as feeder or stocker yearlings in the fall.

A feedstuff analysis of the feeds used in the test may be found in the back of this publication.

The final weights are full weights and should be shrunk at least 3 percent for a more complete picture of steer gain.

Observations

1. The results of this test indicate that the most satisfactory method of wintering may be on prairie hay supplemented with 1 pound of cottonseed cake.

2. It was not profitable to add 2-4 pounds of grain to the ration in Lots 4 and 5.

3. Lot 2, fed sorghum silage and 1 pound of cottonseed cake, turned in the poorest performance of all lots. The primary cause for this in all probability was the poor quality of silage fed during the winter. Note the low consumption on line 8 in the table.

4. Wintering on dry bluestem pasture does not appear to have an advantage in this test as it has in previous tests. This is due to the lower yearly gain as compared to Lot 3 and the lower appraisal value.

5. The appraisal value of Lot 1 wintered on dry bluestem pasture and fed 2 pounds of cottonseed cake daily and Lot 2 wintered on sorghum silage and 1 pound of cottonseed cake was 50c per cwt. lower than the other lots (see line 25). This was due to a lack of bloom and somewhat of a thinner appearance which gave an impression of less quality as compared to the other lots.

Table 15.—Wintering and Grazing Steer Calves

Phase 1—Wintering—December 22, 1951, to May 2, 1952—132 days[1]

1. Lot number	1	2	3	4	5
2. No. steers/lot	10	10	10	10	10
3. Place of wintering	Bluestem pasture	Drylot	Drylot	Drylot	Drylot
4. Initial wt./steer	388	389	389	390	391
5. Final wt./steer	461	476	516	551	572
6. Gain/steer	73	87	127	161	181
7. Daily gain/steer	.60	.66	.96	1.22	1.37

8. Daily ration/steer:					
Ground milo grain				2.00	4.00
Cottonseed cake	2.01	1.00	1.00	1.00	1.00
Prairie hay	1.17[2]		11.27	10.80	10.91
Sorghum silage		20.84			
Minerals[3]	.06	.13	.08	.09	.08
Salt	.06	.10	.06	.07	.04
Dry bluestem pasture	Free choice				
9. Feed required for 100 lbs. gain:					
Ground milo grain				163.98	291.71
Cottonseed cake	335.62	151.72	103.94	81.99	72.65
Prairie hay	195.89		1171.81	885.40	795.97
Sorghum silage		3161.49			
Minerals	9.52	18.89	8.27	7.36	6.08
Salt	9.45	15.75	5.91	5.47	3.15
Dry bluestem pasture	Free choice				
10. Feed cost/cwt. gain[4]	$20.32	$17.85	$14.05	$15.38	$17.81
11. Feed cost/steer	$15.38	$15.52	$17.83	$24.77	$32.21
Phase II—Grazing—May 2 to October 2, 1952—153 days[5]					
12. Initial wt./steer	461	476	516	551	572
13. Final wt./steer	696	686	727	743	746
14. Gain/steer	235	210	211	192	174
15. Daily gain/steer	1.44	1.37	1.38	1.26	1.14
16. Cost/100 lbs. pasture gain[4]	$10.64	$11.91	$11.85	$13.02	$14.37
Summary of Phases I and II					
December 22, 1951, to October 2, 1952—285 days					
17. Initial wt./steer	388	389	389	390	391
18. Final wt./steer	696	686	727	743	746
19. Gain/steer	308	297	338	353	355
20. Daily gain/steer	1.08	1.04	1.19	1.24	1.25
21. Feed cost/100 lbs. gain	$13.19	$13.64	$12.67	$14.10	$16.25
22. Feed cost/steer	$40.32	$40.52	$42.83	$49.77	$57.21
23. Initial cost/steer at $42 cwt.	$162.96	$163.38	$163.38	$163.80	$164.22
24. Total cost feed and steer	$203.28	$203.90	$206.21	$213.57	$221.43

25.	Appraised value/cwt.	$25.50	$25.50	$26.50	$26.50	$26.50
26.	Appraised value/steer	$177.48	$174.93	$192.66	$196.90	$197.69
27.	Loss/steer	$25.80	$28.97	$13.55	$16.67	$23.74

1. Lot was on dry bluestem pasture from December 22, 1951, to April 22, 1952—122 days.
2. Prairie hay was fed to Lot 1 only when snow covered the grass.
3. Minerals were two parts steamed bonemeal to one part salt.
4. Feed prices: Milo grain, $2.80/cwt.; cottonseed cake, $1/ton; prairie hay, $15/ton; sorghum silage, $6.50/ton; minerals, $5/cwt.; salt, $12/ton; dry bluestem pasture, 50c/head/month; summer bluestem, $25 for summer season.

Three-Year Summary—1949-50, 1950-51, 1951-52

Methods of Wintering Steer Calves That Are To Be Grazed a Full Season and Sold Off Grass.

This test was to determine the most satisfactory method or methods for wintering steer calves that will be summer grazed and sold off grass as stocker or feeder yearlings. The use of dry bluestem pasture as one of the methods of wintering has been of particular interest.

Experimental Procedure

Each year five lots of good quality Hereford steer calves, 10 head to a lot, were used in this study. All were fed in drylot except Lot 1, which was fed on dry bluestem pasture. The different lots received the following rations during the wintering period.

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

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

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

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

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

At the close of the wintering period the steers were grazed together on bluestem pasture until fall, when sold.

Observations

1. All methods of wintering proved satisfactory. Lot 2 fed sorghum silage and protein failed to perform as well as the other lots due to the poor quality of silage fed in each of the three years. In all probability, otherwise this lot would have at least equaled Lot 3 fed prairie hay and protein.

2. Lot 1, wintered on dry bluestem pasture and 2 pounds of soybean pellets, compared very favorably with the other lots and under some conditions would represent the most desirable method of wintering. The first two winters the calves were wintered in a creek bottom bluestem pasture with considerable bluegrass in it. The third winter they were wintered under more typical bluestem conditions. This method of wintering is receiving further study.

3. The feeding of 2 to 4 pounds of grain during the winter in addition to prairie hay and protein does not appear desirable under the conditions of this test.

Table 16.—Summary—Wintering and Grazing Steer Calves—1949-50, 1950-51, 1951-52.

Phase I—Wintering—148 days (138 days for Lot 1)					
1. Lot number	1	2	3	4	5
2. Number steers per lot	30	30	29	31	30
3. Place wintered..	Dry bluestem pasture	Drylot	Drylot	Drylot	
4. Initial weight per steer	413	413	414	413	414
5. Final weight per steer	524	531	561	589	633
6. Gain per steer ..	111	118	147	176	219
7. Daily gain per steer	.80	.80	1.00	1.19	1.49
8. Daily ration per steer:					
Grain[1]				2.00	4.00
Soybean oil meal pellets ..	2.00	1.00	1.00	1.00	1.00
Prairie hay	.52[2]		12.29	10.98	10.43
Sorghum silage		26.35			
Salt	.05	.10	.06	.06	.06
Mineral[3]	.03	.04	.03	.03	.03
Dry bluestem pasture	Free choice				
9. Feed required for 100 lbs. gain:					
Grain				168.63	269.30
Soybean oil meal pellets ..	248.35	124.93	100.34	84.36	67.25
Prairie hay	64.80		1232.20	924.73	702.36
Sorghum silage		3288.34			
Salt	6.19	13.06	5.89	5.38	3.82
Mineral	3.08	5.10	2.60	2.44	1.82
10. Feed cost per 100 lbs. gain[1] ..	$13.32	$16.44	$12.76	$14.15	$14.48
11. Feed cost per steer	$14.79	$19.45	$18.81	$24.90	$31.71
Phase II—Grazing—151 days (161 days for Lot 1)					
12. Initial weight per steer	524	531	561	589	633
13. Final weight per steer	789	776	793	806	827
14. Gain per steer..	266	245	232	217	194
15. Daily gain per steer	1.65	1.62	1.53	1.44	1.28
Summary of Phases I and II—299 days					
16. Total gain per steer (all phases)	376	363	379	393	413

17. Daily gain per steer (all phases)	1.26	1.21	1.27	1.31	1.38
18. Feed cost per 100 lbs. gain	$8.55	$10.13	$9.53	$10.74	$11.87
19. Total cost of feed	$32.12	$36.78	$36.14	$42.23	$49.04
20. Initial cost/steer @ $32.33 cwt.	$133.52	$133.52	$133.85	$133.52	$133.85
21. Selling price per steer @ $29.67 cwt. for Lots 3, 4, 5; $29.33 for Lots 1 and 2	$231.41	$227.60	$235.28	$239.14	$245.37
22. Return/steer above steer and feed cost	$65.77	$57.30	$65.29	$63.39	$62.48

1. In 1949-50, ground shelled corn was fed; in 1950-51 and 1951-52, ground milo grain was fed.
2. Prairie hay was fed to Lot 1 only when snow covered the grass.
3. Mineral fed last two years only; 2 parts steamed bonemeal to 1 part salt.
4. Feed prices: corn, $1.25 bu.; milo, $2.45 cwt.; soybean pellets, $83.33 ton; prairie hay, $13.67 ton; sorghum silage, $6.50 ton; salt, $12.00 ton; mineral, $5.25 cwt.; dry bluestem pasture, $.50 per head per month; summer bluestem pasture, $17.33 per head for season.

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

Wintering Heifer Calves That Are To Be Fattened for the Fall Market, 1952-53.

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

This is a report of the wintering phase. Following this phase the heifers will be grazed until July 15 and full-fed grain 100 days in the drylot. The object of this test is to compare different methods of wintering heifer calves that are going to be full-fed after a summer grazing period.

Experimental Procedure

Thirty good quality Hereford heifer calves, 10 head to a lot, are being used in this study. They were delivered to Manhattan, Kansas, on September 15, 1952, at a cost of 29 cents per pound. They originated in the Sterling City, Texas, area. From delivery date until November 15, 1952, they were fed prairie hay and 1 pound of soybean oil meal pellets per head daily. The system of management planned for each lot follows.

Lot 19—Wintered on brome pasture supplemented when necessary with protein; grazed on brome pasture until July 15; full-fed in the drylot 100 days.

Lot 7—Wintered on dry bluestem pasture supplemented with 1½ to 2 pounds of concentrate feed per head daily; grazed on bluestem pasture until July 15; full-fed in drylot 100 days.

Lot 8—Wintered on Atlas sorgo silage, prairie hay, 1 pound of soybean pellets and 2 pounds of corn per head daily; grazed on bluestem pasture May 1 to July 15; full-fed in drylot 100 days.

A bonemeal and salt mixture and salt were offered free choice to all lots.

It was necessary to move Lot 19 to drylot on January 1 due to a shortage of grass which resulted from a lack of moisture during the summer and fall. They will be returned to pasture in April, 1953.

Prairie hay was fed to Lot 7 only when snow covered the grass.

Observations

1. The winter in general was mild and favorable for wintering on grass with the exception of three storms; one in the latter part of November left snow on the ground covering the grass for three weeks.
2. The heifers wintered on dry bluestem pasture, Lot 7, made a very favorable gain at a rather low feed cost. They had sufficient dry grass to winter on in pastures that were normally stocked during the previous summer.
3. The heifers in Lot 8 made an exceptionally good gain of 1.64 pounds per head daily and show considerable "fleshing."

Table 17.—Wintering Heifer Calves That Are To Be Fattened for the Early Fall Market.

Phase I—Wintering—November 15, 1952, to April 9, 1953—145 days (for Lot 7 to April 1, 1953—137 days)

1. Lot number	19 on brome pasture	7	8
2. Place of wintering	On brome to January 1 then to drylot	Dry bluestem pasture	Drylot
3. Number of heifers per lot	10	10	10
4. Initial weight per heifer	446	443	445
5. Final weight per heifer	625	546	683
6. Gain per heifer	179	103	238
7. Daily gain per heifer	1.24	.75	1.64
8. Daily ration per heifer:			
Soybean oil meal pellets	1.00	1.28	1.00
Ground shelled corn	.....	.32	1.92
Atlas sorgo silage	17.76	.....	20.21
Prairie hay	6.66	2.29	5.84
Salt	.09	.05	.04
Mineral (bonemeal and salt)	.18	.04	.07
Dry bluestem pasture	.....	ad lib	.....
Brome pasture	ad lib		
9. Feed cost per heifer[1]	$38.20	$16.33	$40.59
10. Feed cost per 100 lbs. gain	$21.34	$15.85	$17.05

1. Feed prices may be found on the last page of this publication.

Project 253-2: Wintering, Grazing, and Fattening Heifers, 1951-52

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

The objective of this test is to compare different methods of wintering heifer calves that are to be grazed until mid-summer and then finished for fall marketing. Of particular interest is the influence of

the wintering treatment on the finishing ability of the heifers.

Experimental Procedure

Forty-five good quality Hereford heifer calves were purchased in south-central Kansas for use in this test. They were fed silage, prairie hay, 1 pound of protein, and 2 pounds of milo grain per head daily until the test started December 11, 1951. The five lightest heifers were discarded and the 40 remaining were divided into four lots of 10 heifers each. The system of management for each lot follows:

Lot 1—Wintered on sorghum silage, prairie hay, 1 pound of cottonseed cake, and 2 pounds of milo grain per head daily, free access to mineral (bonemeal and salt) and salt; grazed on bluestem pasture May 1 to July 15; full-fed in dry lot to choice grade.

Lot 2—Wintered on dry bluestem pasture, 2 pounds cottonseed oil meal pellets per head daily, mineral (bonemeal and salt), and free access to salt; grazed on bluestem pasture until July 15; full-fed in dry lot to the choice grade.

Lot 3—Wintered on brome pasture supplemented when necessary with protein, free access to mineral (bonemeal and salt) and salt; grazed on brome pasture until July 15; full-fed in dry lot to the choice grade.

Observations

1. The heifers were in good "flesh" at the start of the test, which was probably a disadvantage for Lots 2 and 3 (Table 18) being wintered on a low plane of nutrition on grass. The weather was favorable for wintering out on dry grass except during the month of December and a storm the first week in March.

2. The heifers in Lot 2, Table 18, wintered on dry bluestem pasture were strong and healthy at the close of winter. They were wintered in a 190-acre bluestem pasture with 10 steer calves. The pasture was stocked during the previous summer at a normal rate, but plenty of dry dead grass remained.

3. The heifers in Lot 3 wintered on brome pasture were in strong condition and thin. They received no supplemental feed from the start of the test until February 1. From February on they were fed 2 pounds of cottonseed oil meal pellets daily; alfalfa hay was fed for a short period to break them into coming up for the cake. The brome was fertilized the previous winter with about 100 pounds of ammonium nitrate per acre. It was not grazed after July 1, and had a fair amount of dead top growth when the heifers were started on test December 11. The brome was stocked at the rate of 1½ to 2 acres per head.

4. The silage fed to Lot 1 during the winter was of poor quality. The first part of the winter it was Tennessee Orange, which was immature, excessively acid with very little grain. The second part of the winter, mixed Atlas Sorgo and volunteer Black Amber were fed. This was dry with hardly any grain.

5. Lot 3, wintered on brome pasture, were the poorest performers in the overall test. Lot 1, wintered inside, was equal to or better than the other lots in every respect except it lost more money than Lot 2 wintered on bluestem pasture, primarily because of the cheaper feed costs for Lot 2.

Table 18.—Wintering, Grazing, and Fattening Heifers.
Phase I—Wintering[1]

1. Lot number	1	2	3
2. Place of wintering	Dry lot	Bluestem pasture	Brome pasture
3. Number heifers per lot	10	10	10

4. Number of days in phase	146	133	137
5. Initial weight per heifer	482	480	479
6. Final weight per heifer	592	500	540
7. Gain per heifer	110	20	61
8. Daily gain per heifer	.75	.15	.44
9. Feed per heifer daily:			
Ground milo grain	2.00		
Cottonseed oil meal pellets	1.00	1.99	.87
Sorghum silage	19.21		
Prairie hay	1.30	.70[2]	.80[2]
Alfalfa hay			.83[3]
Pasture		ad lib	ad lib
Mineral[1]	.11	.03	.15
Salt	.11	.05	.12
10. Cost of feed per cwt. gain[3]	$23.60	$88.75	$22.02
11. Feed cost per heifer	$25.96	$17.75	$13.43

Phase II—Grazing

12. Place and time of grazing	Bluestem pasture May 5 to July 14, 1952	Bluestem pasture April 22 to July 14, 1952	Brome pasture April 26 to July 14, 1952
13. Number days grazed	71	84	79
14. Initial weight per heifer	592	500	540
15. Final weight per heifer	701	672	671
16. Gain per heifer	109	172	131
17. Daily gain per heifer	1.53	2.17	1.65

Phase III—Full Feeding—July 14, 1952, to November 8, 1952 —117 days

18. Initial weight per heifer	701	672	671
19. Final weight per heifer	985	958	929
20. Gain per heifer	274	286	258
21. Daily gain per heifer	2.34	2.44	2.21
22. Feed per heifer daily:			
Ground corn	16.07	15.18	14.76
Cottonseed oil meal pellets	1.91	1.91	1.91
Prairie hay	5.39	5.84	6.33
Ground limestone	.10	.10	.10
Salt	.03	.03	.03
23. Feed per cwt. gain:			
Ground corn	686.53	621.01	669.53
Cottonseed oil meal pellets	81.57	78.15	86.63
Prairie hay	232.77	238.92	287.17
Ground limestone	4.27	4.09	4.53
Salt	1.24	1.18	1.34
24. Feed cost per cwt. gain	$29.19	$26.83	$29.27
25. Total feed cost this phase	$79.96	$76.73	$75.51

Summary of Phases I, II, and III

26. Total gain per heifer (all phases)	504	478	450
27. Daily gain per heifer (all phases)	1.51	1.43	1.35
28. Feed cost per cwt. gain	$25.38	$25.00	$25.32
29. Total cost of feed per heifer	$130.96	$119.48	$113.94
30. Initial cost per heifer @ $40.00 cwt.	$192.80	$192.00	$191.60
31. Feed cost plus heifer cost	$323.76	$311.48	$305.54
32. Selling price per cwt. at market	$29.50	$29.50	$28.50
33. Selling price per heifer	$279.95	$273.76	$254.40
34. Loss per heifer	$43.81	$37.72	$51.14
35. Percent shrink in shipping to market	3.63	3.13	3.87
36. Dressing percent	60.8	59.8	59.1
37. Carcass grades, U.S.:			
Low prime	1	....	....
High choice	4	4	....
Average choice	1	1	2
Low choice	2	4	6
High good	2	....	....
Average good	....	1	1

1. Wintering period for Lot 1, December 11, 1951, to May 5, 1952; Lot 2, December 11, 1951, to April 22, 1952; Lot 3, December 11, 1951, to April 26, 1952.
2. Fed only when snow covered the grass.
3. Fed for about two weeks while breaking the heifers to eat pellets.
4. Mineral was 2 parts steamed bonemeal and 1 part salt.
5. Feed prices: Milo grain, $2.80 cwt.; Corn, $1.90 bu.; Cottonseed oil cake or pellets, $100.00 ton; Prairie hay, $15.00 ton; Alfalfa hay, $25.00 ton; Sorghum silage, $6.50 ton; Dry bluestem pasture, .50 per head per month; Winter brome pasture, $1.00 per head per month; Summer bluestem and brome, $25.00 per head for the summer season; Salt and limestone, $12.00 ton.

Project 253-4: Wintering and Grazing Yearling Steers

The Most Efficient Level of Winter Protein Feeding for Yearling Steers Wintered and Summer Grazed on Bluestem Pasture, 1952-53.

Ed F. Smith, R. F. Cox, and L. A. Holland

Yearling steers have been successfully wintered at this station on dry bluestem pasture for the past five winters by feeding 1½ to 2 pounds of cottonseed or soybean oil meal per head daily. The objective of this test is to determine if the level of protein feeding may be reduced without affecting the yearly performance of the steers. This is a report of only the wintering phase of this test. The steers will be grazed together during the summer of 1953 and will be sold off grass as feeder steers in the fall.

Experimental Procedure

Twenty head of good quality Hereford yearling steers, 10 head to a lot, were used in this study. They originated in southeastern Colorado and were purchased as calves in the fall of 1951 for 42 cents a pound. They were used in summer grazing tests on bluestem pasture in 1952. From November 1 until December 31, 1952, when this test started, they were on bluestem pasture supplemented with 1 pound of soybean pellets. During this test the steers were moved from pasture to pasture every 15 days to minimize any differences due to pastures. The pastures in which the steers were grazed were of such size as to vary the stocking rate from 6 to 19 acres per head. All pastures used in this winter test had sufficient grass remaining on them for winter use, although they were stocked at a normal rate for the summer of 1952.

Observations

The gain made by both lots of steers was larger than would be expected, compared with past years' results. The steers in Lot 12 fed 1 pound of soybean pellets per head daily gained considerably less than the Lot 6 steers fed 2 pounds. However, they wintered in strong, thrifty condition. The winter was mild with the exception of three snowstorms; one the latter part of November covered the grass for about three weeks. The results of the level of protein feeding studied here can best be evaluated at the close of the summer grazing season in 1953.

Table 19.—Wintering and Grazing Yearling Steers.

Phase 1—Wintering—December 31, 1952, to April 1, 1953—91 days.

1. Lot number	6	12
2. Number steers per lot	10	10
3. Method of feeding	2 pounds soybean pellets daily on dry grass	1 pound soybean pellets daily on dry grass
4. Initial weight per steer	720	718
5. Final weight per steer	816	785
6. Gain per steer	96	67
7. Daily gain per steer	1.06	.74
8. Daily ration per steer:		
Soybean oil meal pellets	2.01	1.00
Mineral (bonemeal and salt)	.19	.18
Salt	.05	.04
Dry bluestem pasture	ad lib	ad lib
Prairie hay	1.65	1.65
9. Feed cost per steer[1]	$13.71	$9.30

1. Feed prices may be found on the last page of this publication.

Project 253-3: The Effect of Grazing Systems on Livestock and Vegetation

Comparison of Different Methods of Managing Bluestem Pastures, 1952.

E. F. Smith and K. L. Anderson

The objectives of this experiment are to determine the effects of different stocking rates, deferred grazing, and burning on livestock gains, productivity of pastures, and the bluestem vegetation itself.

Table 20.—A Comparison of Different Methods of Managing Bluestem Pasture.

May 5, 1952, to October 1, 1952—149 days.

1. Pasture number	1	2	3	4, 5, 6	7	8	9
2. Management	Normal stocked	Over stocked	Under stocked	Deferred, rotated	Early spring burned 3/28	Medium spring burned 4/7	Late spring burned 4/25
3. No. head/pasture	18	27	12	54	13	13	13
4. Acres in pasture	60	60	60	3-60[1]	44	44	44
5. No. acres/head	3.3	2.2	5	3.3	3.4	3.4	3.4
6. Initial weight/steer	452	455	455	457[1]	455	452	451
7. Final weight/steer	698	664	683	654[1]	706	730	734
8. Gain/steer	246	209	228	197	251	278	283
9. Daily gain/steer	1.65	1.40	1.53	1.32	1.68	1.87	1.89
10. Gain/acre	74	94	46	57	74	82	84
11. Appraised value of steers/cwt. on October 1, 1952	$26.00	$25.25	$26.00	$25.00	$25.50	$25.50	$26.00
12. Loss/steer[2]	$11.70	$26.19	$16.52	$31.92	$14.13	$7.15	$2.25

[1] Three 60-acre pastures

1. In computing the weights and gains of steers in Pastures 4, 5, 6, two steers were omitted because of failure to gain due to unknown sickness.
2. The initial cost of the steers was estimated at $26 cwt., grass at $25/head for the season. The final weight was shrunk 3 percent to obtain a sale weight.

Results are reported here for the fourth year of the experiment. Only three years' results on burning and understocking have been obtained. In addition to the yearly report, a brief summary of the cattle gains for the past three years is included.

Experimental Procedure

Good quality thin Hereford yearling steers weighing about 450 pounds were used to stock the pastures. The method of management of each pasture was as follows:

Pasture 1—Normal rate of stocking, 3.3 acres/head;
Pasture 2—Overstocked, 2.2 acres/head;
Pasture 3—Understocked, 5 acres/head;
Pastures 4, 5, 6—Deferred and rotation grazing, 3.3 acres/head. All steers were held in two pastures until July 1, then turned in to the protected pasture until it was deemed advisable to allow them the run of all three pastures;
Pasture 7—Burned February 26, 1952; rate of stocking was 3.4 acres/head;
Pasture 8—Burned April 7, 1952; rate of stocking was 3.4 acres/head;
Pasture 9—Burned April 28, 1952; rate of stocking was 3.4 acres/head.

Observations

1. In this year's test, the pastures which produced the most results, particularly gain per head, were those burned in medium and late spring. The lowest daily gain occurred on the deferred and rotation grazed pastures.
2. Early spring burning allowed the same gains as no burning.
3. The understocked pasture failed to produce as much daily gain or gain per acre as the normal stocked. Overstocking resulted in extremely close utilization of the forage and proved unsatisfactory from every standpoint except gain per acre.
4. The season was extremely dry with only small amounts of moisture occurring in the late summer.
5. Detailed counts of the vegetation show that no significant trends in population have as yet developed.

Table 21.—Three-Year Summary—1950, 1951, 1952

Yearly Account of Cattle Gains Under Different Methods of Grazing Pastures

	Normal stocked	Over-stocked	Under-stocked	Deferred, rotation grazing
Gain/steer, lbs.				
1950	221	210	214	205
1951	242	256	290	234
1952	246	209	228	197
Average	236	225	244	212

Yearly Account of Cattle Gains on Burned and Nonburned Pastures

	Not burned	Early spring burned	Medium spring burned	Late spring burned
Gain/steer, lbs.				
1950	221	216	254	230
1951	258	243	265	259
1952	246	251	278	283
Average	242	237	266	257

Project 253-4: Wintering and Grazing Yearling Steers

Methods of Wintering Yearling Steers on Bluestem Pasture, 1951-52.

E. F. Smith, R. F. Cox, and S. B. Fansher

This test is to determine if yearling steers can be wintered satisfactorily on dry bluestem pasture. Different methods of feeding protein supplements are being tested.

Experimental Procedure

Thirty head of good quality, about 750-pound, Hereford yearling steers were used in the test which was started December 7, 1951. The steers were purchased in the spring of 1951 and had been grazed on bluestem pasture during the summer and fall. They carried a moderate amount of flesh. They lost some flesh during October and November when they were on grass alone prior to the start of winter tests. The steers were sprayed twice with B.H.C. for lice. All of the pastures in which the steers were wintered had been grazed the previous summer at normal stocking rates, but a plentiful supply of dry grass remained. From 6 to 13 acres of pasture were allowed each steer.

The 30 steers were divided into three lots of 10 steers each and received the following supplements in addition to dry bluestem pasture from December 7, 1951, to April 29, 1952.

Lot 1—2 pounds of cottonseed oil meal pellets daily, salt, and mineral (bonemeal and salt).

Lot 2—4 pounds of cottonseed oil meal pellets every other day (average 2 pounds a day), salt, and mineral (bonemeal and salt).

Lot 3—Cottonseed oil meal and salt self-fed, and mineral (bonemeal and salt). (The salt was mixed with the cottonseed oil meal to limit its consumption and make it possible to self-feed the cottonseed oil meal. This mixture was fed in a self-feeder.) The cottonseed oil meal pellets were fed on the ground.

Observations

1. The most satisfactory method of wintering in this test was feeding cottonseed oil meal pellets every day. Feeding every other day in Lot 2 resulted in slightly less winter and summer gain combined, as compared to feeding each day. Self-feeding a salt and protein mixture produced considerably less yearly gain and is of questionable value as measured here.

2. Steer gains for the winter period were low, although weather conditions were favorable for wintering on dry grass in 1951-52 except during the month of December and the first week in March.

Table 22.—Wintering and Grazing Yearling Steers

Phase I—Wintering—December 7, 1951, to April 29, 1952—144 days.

1. Lot number	1	2	3
2. Number of steers per lot	10	10	10
3. Management	Fed cottonseed pellets daily	Fed cottonseed pellets every other day	Self-fed cottonseed meal and salt mixed
4. Initial weight per steer	745	741	746
5. Final weight per steer	759	733	717
6. Gain or loss per steer	14	−8	−29
7. Daily gain or loss per steer	.10	−.06	−.20

8. Daily ration per steer:			
Cottonseed oil meal or pellets	2.01	2.01	2.03
Salt	.08	.09	.61
Mineral[1]	.14	.10	.04
Prairie hay[2]	1.28	1.24	1.20
Dry bluestem pasture	Free choice	Free choice	Free choice
9. Feed cost per steer[3]	$19.90	$19.60	$19.89
Phase II—Grazing—April 29 to July 21, 1952—85 days.			
10. Initial weight per steer	759	733	717
11. Final weight per steer	929	909	893
12. Gain per steer	170	176	176
13. Daily gain per steer	2.00	2.07	2.07
Summary of Phases I and II			
14. Initial weight per steer	745	741	746
15. Final weight per steer	929	909	893
16. Gain per steer	184	168	147
17. Daily gain per steer	.80	.73	.64
18. Total feed cost per steer	$49.90	$49.60	$49.89
19. Feed cost per 100 lbs. gain	$27.11	$29.52	$33.93
20. Appraised value per cwt.	$24.00	$24.00	$24.00
21 Loss per steer[4]	$87.69	$90.79	$96.67

1. Mineral was 2 parts steamed bonemeal to 1 part salt.
2. Prairie hay was fed only when snow covered the grass.
3. Feed prices: Cottonseed oil meal or pellets, $100.00 ton; salt, $12.00 ton; mineral, $5.00 cwt.; prairie hay, $15.00 ton; dry bluestem pasture, $.75 per head per month; bluestem pasture, $30.00 per head for summer season.
4. In computing loss per steer, initial cost was estimated at $35.00 cwt.

Project 253-4: Wintering and Grazing Yearling Steers

Methods of Wintering Yearling Steers on Dry Bluestem Pasture. Four-Year Summary, 1948-52.

E. F. Smith, R. F. Cox, and A. G. Pickett

The object of this test was to compare different protein supplements and methods of feeding them to yearling steers on dry bluestem pasture during the winter. The steers were good to choice quality Hereford yearlings. They were wintered in pastures that were stocked at a normal rate during the previous summer; however, a plentiful supply of dry dead grass was available for each of the lots during the years in which these tests were conducted. From 6 to 19 acres of grass were allowed per steer for the winter. In each year except 1951-52 the steers were purchased in the fall in moderately thin flesh. In 1951-52 the steers were purchased in the spring of 1951 and grazed on

bluestem pasture during the summer. In the fall of 1951 when started on this test they carried a moderate amount of flesh. The wintering period of the four-year test extended from mid-December until the latter part of April and averaged 138 days in length. Each lot received a supplement in addition to dry bluestem pasture as follows:

Lots 1 and 4: 2 pounds of soybean pellets per head daily except in 1948-49, Lot 1 received 1½ pounds; in 1951-52 Lot 4 was fed cottonseed cake;

Lots 2 and 5: 4 pounds of soybean pellets per head every other day—average 2 pounds per day—except in 1948-49, Lot 2 received 3 pounds; in 1951-52 Lot 5 was fed cottonseed cake;

Lot 3: 6.8 pounds of alfalfa hay per head daily (ranged from 6.1-7.32 pounds);

Lot 6: Soybean oil meal and salt self-fed; the salt was mixed with the soybean oil meal to limit its consumption and make it possible to self-feed the soybean oil meal. The proportions of soybean oil meal and salt varied from 100 pounds of soybean oil meal and 35 pounds of salt up to 45 pounds of salt per 100 pounds of meal to limit meal consumption to 2 pounds per head daily. In 1951-52 cottonseed oil meal was fed.

The summer grazing period extended from the latter part of April until mid-July and averaged 85 days in length. Following this early-summer grazing period, the steers were relotted and used in summer caking tests until about October 1. This has added about 100-125 pounds to the weight of each steer and is not reported here.

Observations

1. At the close of winter, the steers were in a healthy, strong but thin condition under all methods of wintering tested.

2. Feeding soybean pellets every other day appears to be as satisfactory as feeding every day in these tests as measured by winter and summer gains combined.

3. Neither alfalfa hay nor the self-fed soybean oil meal and salt mixture were quite the equal of soybean pellets fed each day or every other day.

Table 23.—Wintering and grazing Yearling Steers on Bluestem Pasture—Summary 1948-49, 1949-50, 1950-51, 1951-52.

Phase I—Wintering (1948-51, 139 days average) (1949-52, 137 days average)

1. Lot number	1	2	3	4	5	6
2. Number steers in lot	30	29	30	30	30	30
	1948-51			1948-52		
3. Management	Fed soybean pellets daily	Fed soybean pellets every other day	Fed alfalfa hay	Fed soybean pellets daily	Fed soybean pellets every other day	Self-fed soybean oilmeal and salt mixed together
4. Initial weight per steer	685	685	687	684	682	685
5. Final weight per steer	748	739	722	742	731	708
6. Gain per steer	63	54	35	58	49	23
7. Daily gain per steer	0.45	0.39	0.25	0.42	0.36	0.17
8. Daily ration per steer:						
Soybean oil meal pellets	1.83	1.85	.....	2.01	2.02	1.95
Alfalfa hay	.....	.....	6.77	.....	.....	.....
Prairie hay	.98	1.07	.58	.79	.78	.56
Salt	.10	.08	.04	.12	.11	.63
Mineral	.01	.01	.01	.05	.04	.03
Dry bluestem pasture	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib
9. Total feed cost per steer	$15.49	$15.69	$13.75	$16.31	$16.26	$16.24

Phase II—Grazing (1948-51, 86 days average) (1949-52, 84 days average)

10. Initial weight per steer	748	739	722	742	731	708
11. Final weight per steer	934	929	906	905	901	881
12. Gain per steer	186	190	184	163	170	173
13. Daily gain per steer	2.16	2.21	2.14	1.94	2.05	2.07

Phase III—Summary of Phases I and II

14. Total gain per steer (all phases)	249	244	219	221	219	196
15. Average daily gain per steer (all phases)	1.11	1.09	0.97	1.00	.99	.89
16. Total feed cost per steer[1]	$32.82	$33.02	$31.08	$33.64	$33.59	$33.57
17. Feed cost per 100 lbs. gain	13.18	$13.53	$14.14	$15.22	$15.34	$17.13

1. Feed prices: Soybean meal or pellets, $83.33 per ton; alfalfa hay, $20.00 per ton; prairie hay, $13.67 per ton; dry bluestem pasture, $.75 per head per month; summer bluestem, $17.33 per head for the season; salt, $12.00 per ton; mineral (2 parts steamed bonemeal to 1 part salt), $5.25 cwt.

Project 253-5: Wintering and Grazing Yearling Steers

Effect of Feeding a Protein Supplement During the Latter Part of the Grazing Season to Two-Year-Old Steers on Bluestem Pasture, 1952.

E. F. Smith and R. F. Cox

The nutritive value of bluestem pasture usually begins to decline rapidly after mid-summer. This test is concerned with the effect the feeding of a protein supplement after mid-summer will have on cattle gains and condition. It is hoped that by starting the feeding at different times, the most opportune time to start feeding may be determined.

A summary of three years' work is included with this report.

Experimental Procedure

Forty head of good quality two-year-old Hereford steers were used in this test. They were wintered on dry bluestem pasture and then grazed together until July 21, when this test started.

The steers were divided into four uniform lots and grazed on bluestem pasture with the following treatment from July 21, 1952, to September 30, 1952:

Lot 1—July 21 to September 30—received 2 pounds of cottonseed cake per head daily;

Lot 2—August 12 to September 30—received 2 pounds of cottonseed cake per head daily;

Lot 3—September 4 to September 30—received 2 pounds of cottonseed cake per head daily;

Lot 4—received no supplemental feed.

Observations

1. In this test, the feeding of a protein supplement on bluestem pasture after mid-summer was not profitable.

2. The average protein content of bluestem pasture grasses in July[1] was 6.4 percent, in August, 7.7 percent, and in September, 8.6 percent.

3. No difference in degree of fleshing among the lots was noted.

(1) The samples selected were of immature grasses or regrowth after grazing in an attempt to take samples of grass comparable to what the cattle were consuming.

Table 24.—Effect of Feeding a Protein Supplement During the Latter Part of the Grazing Season to Two-Year-Old Steers on Bluestem Pasture, July 21 to September 30, 1952—71 days.

1. Lot number	1	2	3	4
2. No. steers/lot	10	10	10	10
3. Management	Fed 2 lbs. cottonseed cake daily from 7/21 to 9/30	Fed 2 lbs. cottonseed cake daily from 8/12 to 9/30	Fed 2 lbs. cottonseed cake daily from 9/4 to 9/30	No cottonseed cake fed
4. Initial weight/steer	913	908	910	915
5. Final weight/steer	1039	1031	1024	1026
6. Gain/steer	126	123	114	111
7. Daily gain/steer	1.77	1.73	1.61	1.56
8. Gain in weight contributed to feeding cottonseed cake	75	12	3	0

9. Total cottonseed cake fed/steer, lbs.	142	98	52	0
10. Appraised value/cwt.	$24.00	$24.00	$24.00	$24.00
11. Gain/steer by periods:				
July 21-August 12	19	18	22	24
August 12-September 4..	46	52	46	45
September 4-September 30	61	53	46	42
12. Total gain, July 21-September 30	126	123	114	111

Three-Year Summary

1. Feeding 2 to 3 pounds of a 40 percent protein concentrate did not increase cattle gains appreciably in any period of any year. This is not conclusive. A response to protein feeding has been obtained in the past at this station. Tests planned for the future intend to give this problem more study. Perhaps one reason for a lack of response to protein is that the two-year-old steers used in these tests were wintered the previous winter on dry grass and were very thin at grass time.

2. Evidently grass protein content as reported here must drop below 6.5 to 7 percent to get an increase in gain from protein feeding.

Table 25.—Average Gain per Steer by Caking Periods for 1950, 1951, 1952.

	1950	1951	1952	Ave.
July 15-August 10[1]				
Fed 2-3 lbs. protein .....lbs.	47	35	19	34
Fed no protein .....lbs.	44	46	21	37
Protein in grass .....%	8.5	9.0	6.4	7.9
August 10-September 1[1]				
Fed 2-3 lbs. protein .....lbs.	29	43	49	40
Fed no protein .....lbs.	32	49	46	42
Protein in grass .....%	8.0	8.7	7.7	8.0
September 1-October 1[1]				
Fed 2-3 lbs. protein .....lbs.	39	17	53	36
Fed no protein .....lbs.	26	17	42	28
Protein in grass .....%	7.3	7.1	8.6	7.7

1. Represents in general the weigh period; it varied slightly each year.

Project 253-6: Wintering, Grazing, and Fattening Steer Calves

1. The Value of Trace Minerals in a Wintering and a Fattening Ration.
2. Self-Feeding Grain in Drylot vs. Self-Feeding on Bluestem Pasture, 1951-52.

E. F. Smith and R. F. Cox

Chemical analysis of the feeds commonly fed in this area has revealed no deficiency in the trace minerals, copper, cobalt, iron, manganese, and iodine, in view of what we know of the requirements of cattle for these minerals. It is possible that for some reason the minerals present are not available to the animal in sufficient quantity and perhaps not in the proper ratio. One of the objectives of this test

is to determine the effect of introducing trace minerals at a commonly used level into standard Kansas wintering and fattening rations.

Another phase of the test is to compare self-feeding grain in drylot to self-feeding grain on grass for calves handled in the deferred full-feeding program. The system of deferred full-feeding, using good quality steer calves, consists of three phases: (1) producing 225-250 pounds of gain during the winter; (2) grazing 90 days without grain; (3) full-feeding 100 days in the drylot.

Experimental Procedure

Thirty head of good quality Hereford steer calves were used in this test in three lots, 10 head to a lot. They were part of a shipment of 150 steer calves from Marfa, Texas. They were received November 8, 1952, and fed silage, prairie hay, and 1 pound of a protein concentrate per head daily until December 22, 1952, when they were started on test. The system of management for each lot follows:

Lot 1—Wintered on sorghum silage, prairie hay, 5 pounds of ground grain and 1 pound of 41 percent protein concentrate per head daily, free access to mineral (bonemeal and salt) and salt; bluestem pasture May 1 to August 1; self-fed grain on bluestem pasture after August 1 to choice grade.

Lot 2—Wintered on sorghum silage, prairie hay, 5 pounds of grain and 1 pound of protein concentrate per head daily, free access to mineral (bonemeal and salt) and salt; grazed on bluestem pasture May 1 to August 1; self-fed grain in drylot after August 1 to choice grade.

Lot 3—Wintered on sorghum silage, prairie hay, 5 pounds of grain, and 1 pound of protein concentrate per head daily; free access to mineral (bonemeal and salt) and trace mineralized salt; grazed on bluestem pasture, May 1 to August 1; self-fed grain in drylot after August 1 to grade choice with free access to trace mineral salt.

Observations

1. Poor quality sorghum silage contributed to low winter gains of all lots; silage consumption was very low (Table 26).

2. Trace minerals fed to Lot 3 (Table 26) did not affect the gain. The carcasses of Lot 3 graded lower than Lot 2 which did not receive trace minerals. Due to the increased selling price of Lot 3 they lost considerable less money than Lot 2. The most reasonable explanation for the increased selling price of Lot 3 over Lot 2 was the unsettled condition of the market.

3. Lot 1, self-fed grain on grass compared favorably in every respect with Lot 2, self-fed grain in drylot except they sold for $1.00 per cwt. less. The fat on the carcasses of Lot 1 was of a light yellow color as compared to the whiter carcasses of Lot 2.

Table 26.—Wintering, Grazing, and Fattening Steer Calves.

Phase I—Wintering—December 22, 1951, to May 5, 1952—135 days.

1. Lot number	1	2	3
2. Number steers in lot	10	10	10
3. Management	Standard ration	Standard ration	Standard ration plus trace mineral
4. Initial weight per steer	444	443	443
5. Final weight per steer	633	613	627
6. Gain per steer	189	170	184
7. Daily gain per steer	1.40	1.26	1.36

8. Daily ration per steer:			
Ground milo	5.31	5.31	5.31
Cottonseed oilmeal pellets	1.00	1.00	1.00
Sorghum silage	20.26	20.26	20.01
Prairie hay	.26	.21	.22
Mineral[1]	.11	.11	.08
Trace mineral salt[2]	.....	.....	.08
Salt	.10	.11	.....
9. Feed cost per cwt. gain[3]	$19.41	$21.53	$19.80
10. Feed cost per steer	$36.69	$36.61	$36.44

Phase II—Grazing—May 5 to August 1, 1952—88 days.

11. Initial weight per steer	633	613	627
12. Final weight per steer	721	702	714
13. Gain per steer	88	89	87
14. Daily gain per steer	1.00	1.01	.98

Phase III—Full-feeding—August 1 to December 6, 1952—127 days.

	Self-fed grain on bluestem pasture	Self-fed grain in drylot	Self-fed grain in drylot plus trace minerals
15. Management			
16. Initial weight per steer	721	702	714
17. Final weight per steer	1058	1039	1045
18. Gain per steer	337	337	331
19. Daily gain per steer	2.65	2.65	2.60
20. Daily ration per steer:			
Ground milo grain	19.33	19.31	19.08
Cottonseed oilmeal pellets	1.72	2.00	2.00
Prairie hay	.....	5.90	5.92
Ground limestone	.09	.10	.10
Trace mineral salt	.....	.....	.02
Salt	.02	.....	.....
21. Feed per cwt. gain:			
Ground milo grain	728.37	726.63	732.20
Cottonseed oilmeal pellets	64.93	75.25	76.73
Prairie hay	.....	222.19	227.40
Ground limestone	3.50	3.76	3.83
Salt	.59	1.02	.92
22. Cost of feed per cwt. gain	$23.91	$25.96	$26.25
23. Total feed cost this phase	$80.61	$87.65	$86.90

Summary of Phases I, II, and III

24. Total gain per steer (all phases)	614	597	602
25. Daily gain per steer (all phases)	1.75	1.70	1.72
26. Feed cost per cwt. gain (all phases)	$23.17	$24.99	$24.64
27. Total cost of feed per steer	$142.28	$149.19	$148.34
28. Initial cost per steer @ $42.00 cwt.	$186.48	$186.06	$186.06
29. Feed cost plus steer cost	$328.76	$335.25	$334.40
30. Selling price per cwt. at market	$26.50	$27.50	$29.00

31. Selling price per steer	$270.56	$268.40	$285.36
32. Loss per steer	$58.20	$66.85	$49.04
33. Percent shrink in shipping to market	3.50	6.63	5.83
34. Dressing percent	60.2	60.1	60.6
35. Carcass grades: U.S.[4]			
Average choice	1	4	1
Low choice	4	3	3
High good	4	2	1
Average good	1	1	3
Low good	.....	.....	2

1. Mineral was 2 parts steamed bonemeal to 1 part salt.
2. The trace mineral salt contained the following minerals: Manganese carbonate, .400 percent; iron oxide, .250 percent; copper carbonate, .060 percent; sodium thiosulphate, .100 percent; sodium carbonate, .100 percent; cobalt carbonate, .022 percent; potassium iodide, .010 percent; sodium chloride, 99.058 percent.
3. Feed prices: Milo grain, $2.80 cwt.; cottonseed oilmeal pellets, $100.00 ton; prairie hay, $15.00 ton; sorghum silage, $6.50 ton; mineral, $5.00 cwt.; trace mineral salt, $2.00 cwt.; salt and ground limestone, $12.00 ton; bluestem pasture, $25.00 per head for season.
4. The carcasses were graded the following day as follows: Lot 1, 1 prime, 7 choice, 3 good; Lot 2, 7 choice and 3 good; Lot 3, 5 choice and 5 good.

Project 370: Adapting Roughages Varying in Quality and Curing Processes to the Nutrition of Beef Cattle

A Comparison of Alfalfa Silage and Alfalfa Hay; Prairie Hay and Corn Cobs; a Special Supplement vs. Corn and Soybean Oilmeal, 1952-53.

E. F. Smith, D. Richardson, R. B. Cathcart, and R. F. Cox

The increased use of such feeds as alfalfa silage, corn cobs, and special cattle supplements has prompted this test. The objective of the test is to compare the following feeds:

1. Wilted and non-wilted alfalfa silage with alfalfa hay.
2. Ground corn cobs with prairie hay.
3. Three pounds per head daily of a special cattle supplement with 2 pounds of corn and 1 pound of soybean oilmeal per head daily.

Experimental Procedure

The Hereford heifers used in this test were of good to choice quality from the Brite Ranch at Marfa, Texas. They were delivered to Manhattan, Kansas, November 3, 1952, at a cost of 23 cents per pound. From that date until started on test December 22, 1952, they were fed prairie hay and 1 pound of soybean pellets per head daily.

The first cutting alfalfa fed to Lots 1, 2, and 3 came from the same field. No preservative was used in making the silage. The wilted alfalfa was left in the field from 30 minutes to 3 hours. The non-wilted was cut, raked, picked up with a silage cutter, and hauled to the silo as rapidly as possible.

The special supplement fed to Lot 5 at the rate of 3 pounds per head daily was of the following composition: soybean oilmeal, 2.25 pounds; molasses, 0.50 pound; steamed bonemeal, 0.18 pound; salt, 0.06 pound; vitamin supplement, 0.01 pound (2,250 A and 400 D per gram).

An attempt was made in Lots 17 and 18, where prairie hay and corn cobs were compared, to eliminate as many variables as possible,

leaving a comparison of the two roughages. An average of 4.90 pounds of corn and soybean meal per head daily was fed to each lot. The protein intake of each lot was maintained at about the same level. In the case of the corn cob lot, more of the protein had to come from the soybean meal to compensate for the low protein content of corn cobs as compared to prairie hay. Since the prairie hay lot received less concentrate feed on this basis, their corn allowance was increased so that each lot received the same number of pounds of corn and soybean meal combined. The prairie hay and corn cobs were fed in amounts the animal would clean up. The corn and soybean meal was fed to both lots twice daily and was mixed with the corn cobs in Lot 18. Synthetic vitamin A concentrate furnishing 10,000 I.U. per gram was mixed with the soybean meal fed to Lot 18 so as to furnish 50,000 I.U. of vitamin A per head daily to this lot.

Molasses was fed at the rate of 1 pound per head daily to Lots 17 and 18 for five days at the start of the test. It was discontinued with the objective of including it in future tests in a study of its value when fed with low quality roughage rations.

Observations

1. Wilted and non-wilted alfalfa silage appear equal in value in this test and definitely inferior to alfalfa hay for calves.
2. Two pounds of corn and 1 pound of soybean pellets fed to Lot 4 produced about the same gain as the special supplement fed to Lot 5 at a lower feed cost per 100 pounds of gain.
3. Prairie hay fed to Lot 17 produced 0.17 pound more gain per head daily than corn cobs fed to Lot 18 at only slightly less feed cost per 100 pounds of gain.
4. Some of the heifers in Lot 18, fed corn cobs, coughed the cobs up for about three weeks at the start of the test. With this exception the cobs appeared satisfactory as the only roughage for wintering calves in this test.

Supplementing Wheat Straw in the Wintering Ration of Beef Calves.

D. Richardson, Ed F. Smith, and R. F. Cox

Wheat straw is a very poor roughage and under normal conditions should never be used as the entire roughage for cattle; however, there are times when wheat straw has to make up most or all of the roughage. It is desirable to know how to supplement this poor quality roughage when one is forced to use it. The purpose of this preliminary experiment was to observe the value of vitamin A and dehydrated alfalfa pellets when added to a wintering ration for beef calves in which wheat straw was the only roughage.

Experimental Procedure

Twelve Hereford steer calves purchased in Texas were divided into three lots of four calves each. All calves received all the wheat straw they would consume. The daily ration for each animal in the various lots is shown in Table 28. A preliminary period of 25 days was used to get the calves used to eating the straw. After the experiment started, the calves were fed individually.

Observations

1. No vitamin A deficiency symptoms were observed. There was no source of vitamin A in Lot 1.
2. The calves did not like the straw but at no time did they completely refuse to eat it. The total amount consumed was lower than the amount of roughage which would be normally consumed if it were of better quality.

Table 27.—A Comparison of Roughages and Supplements for Wintering Heifer Calves.

December 22, 1952, to April 9, 1953—108 days.

1. Lot number	1	2	3	4	5	17	18
2. Number heifers per lot	8	8	5	10	10	10	10
3. Treatment	Non-wilted alfalfa silage	Wilted alfalfa silage	Alfalfa hay	Atlas sorgo silage, 2 lbs. corn, 1 lb. soybean pellets	Atlas sorgo silage, 3 lbs. special supplement	Prairie hay plus 4.9 lbs. corn and soybean pellets	Corn cobs plus 4.9 lbs. corn and soybean pellets
4. Initial weight per heifer	420	420	420	424	419	419	419
5. Final weight per heifer	434	433	550	610	602	592	573
6. Gain per heifer	14	13	134	186	183	173	154
7. Daily gain per heifer	.10	.12	1.24	1.72	1.69	1.60	1.43
8. Daily ration per heifer:							
Soybean oilmeal or pellets	.....	.....	.....	1.00	.....	1.25	1.90
Ground shelled corn	.....	.....	.....	2.00	.....	3.65	3.00
Special supplement	.....	.....	.....	.....	3.00	.....	.....
Non-wilted alfalfa silage	35.04	.....	.....	.....	.....	.....	.....
Wilted alfalfa silage	.....	26.33	.....	.....	.....	.....	.....
Alfalfa hay	.....	.....	14.71	.....	.....	.....	.....
Atlas sorgo silage	.....	.....	.....	30.37	30.65	.....	.....
Prairie hay	.....	.....	.....	.....	.....	9.80	.....
Corn cobs	.....	.....	.....	.....	.....	.....	8.41
Mineral (bonemeal and salt)	.11	.08	.06	.11	.10	.13	.07
Salt	.16	.11	.05	.04	.06	.02	.04
9. Feed per cwt. gain:							
Soybean oilmeal or pellets	.....	.....	.....	58.06	.....	77.51	133.13
Ground shelled corn	.....	.....	.....	116.13	.....	228.32	210.39
Special supplement	.....	.....	.....	.....	177.04	.....	.....
Atlas sorgo silage	.....	.....	.....	1762.41	1808.74	.....	.....
Prairie hay	.....	.....	.....	.....	.....	611.84	.....
Corn cobs	.....	.....	.....	.....	.....	.....	590.13
Mineral (bonemeal and salt)	.....	.....	.....	6.08	6.17	8.09	5.13
Salt	.....	.....	.....	2.37	3.77	1.33	2.80
10. Feed cost per 100 lbs. gain[1]	.....	.....	.....	$15.20	$16.63	$18	$19.68

1 Feed prices may be found on the last page of this publication.

3. The addition of 50,000 units of vitamin A per head daily apparently increased the rate of gain and feed efficiency.
4. The addition of 1 pound of dehydrated alfalfa pellets apparently greatly increased the rate of gain and feed efficiency.

Table 28.—Supplementing Wheat Straw in the Wintering Ration of Beef Calves, January 6, 1953-April 13, 1953.

Lot number	1	2	3
Number animals	4	4	4
Number days on feed	97	97	97
Daily ration—pounds:*			
Wheat straw	3.8	3.9	4.3
Ground milo grain	2	2	3
Soybean oilmeal pellets	2	2	1.5
Dehydrated alfalfa pellets	.....	.....	1.0
Vitamin A	.....	50,000 units	.....
Average initial weight	441	447	443
Average final weight	499	514	526
Average gain	58	67	83
Average daily gain	.59	.69	.86
Feed per 100 pounds gain:			
Wheat straw	639	568	501
Ground milo grain	336	292	234
Soybean oilmeal pellets	336	292	175
Dehydrated alfalfa pellets	.....	.....	117
Vitamin A supplement	.....	1.6	.....
Cost per 100 lbs. gain	$29.20	$27.34	$22.31

* Mineral mixture of equal parts steamed bonemeal and salt kept in a box before calves.

Project 147: The Effect of Feeding Alfalfa Straw Sprayed with a Curing Agent to Heifer Calves,[1] 1952-53

E. F. Smith, D. Richardson, L. M. Roderick, and R. F. Cox

According to Circular 290[2] from the Kansas Agricultural Experiment Station, "chemically curing the alfalfa seed crop is a practical and economical method of harvesting. Four years of research at this station and actual farm experiences have shown that there is a heavy loss of seed from the old method of harvesting by mowing, windrowing, and combining."

The objective of this test was to determine if the straw remaining after the seed was removed is poisonous to livestock because of the presence of the curing agent (Di-Nitro-Ortho-Secondary Butyl Phenol), one of the di-nitro phenols.

1. This project is being partially supported by a grant from the Dow Chemical Company, Midland, Michigan. The material used was Dow General Weed Killer.
2. Grandfield, C. O., and W. W. Franklin, 1952. Alfalfa Seed Production in Kansas. Kansas Agr. Expt. Sta. Cir. 290.

Experimental Procedure

Ten good quality Hereford heifer calves were divided into two lots of five calves each for use in this test. They were the lightest heifers of 80 head purchased from the Brite Ranch at Marfa, Texas. They were fed prairie hay and 1 pound of soybean pellets per head daily until started on test December 22, 1952.

The alfalfa straw used in the test was obtained in the vicinity of the College. The sprayed straw came from Dr. N. D. Harwood and was produced on a farm a few miles west of Manhattan, Kansas. It was stemmy but had a good green color. The non-sprayed straw was obtained from Mr. Floyd Cederberg's farm a few miles south of Manhattan, Kansas. It was not as stemmy or as green in color as the Harwood straw. It appeared to have more leaves. The two straws were not comparable in some respects but it was not possible to find more suitable straw, sprayed and non-sprayed. Other data, such as effect of the chemical on the alimentary tract, various organs, tissue, and the extent of its presence in the animal body, will be collected when the animals are slaughtered.

Observations

The curing agent apparently has no detrimental effect on the gaining ability or efficiency of feed utilization. This is not conclusive and should be given further study with more animals.

Table 29.—The Effect of Feeding Alfalfa Straw Sprayed with a General Curing Chemical to Heifer Calves,

December 22, 1952, to April 9, 1953—108 days.

1. Lot number	20	21
2. Number of heifers per lot	5	5
3. Treatment	Alfalfa straw	Alfalfa straw sprayed with curing agent
4. Initial weight per heifer	338	336
5. Final weight per heifer	457	472
6. Gain per heifer	119	136
7. Daily gain per heifer	1.10	1.26
8. Daily ration per heifer:		
Soybean oilmeal pellets	1.22	1.22
Ground shelled corn	2.27	2.27
Alfalfa straw	8.14	7.61
Mineral (bonemeal and salt)	.19	.19
Salt	.06	.08
9. Feed per cwt. gain:		
Soybean oilmeal pellets	111.09	97.21
Ground shelled corn	205.80	180.07
Alfalfa straw	739.13	604.70
Mineral (bonemeal and salt)	17.48	15.29
Salt	5.38	6.61

Project 222: Fundamental Nutrition Studies of Sorghum Roughages and Grain

A Comparison of Rolled, Coarsely Ground and Finely Ground Milo Grain for Fattening Yearling Steers, 1952.

E. F. Smith and D. B. Parrish

Good to choice quality Hereford steers were used in this test. They were purchased in the fall of 1951 and used in winter feeding tests. For the test reported here, they were lotted as equally as possible in regard to previous treatment.

All lots were treated the same in this test except for the method of grain preparation. The grain was self-fed. The cottonseed oilmeal was fed in a separate bunk. Prairie hay was fed in quantities that would be readily cleaned up by each lot.

The rolled milo was dry rolled and appeared satisfactory upon emergence from the roller; however, after sacking and when it was finally fed to the cattle, it was broken into small particles and somewhat powdered. The coarsely ground or cracked milo was the product of a burr mill. A hammer mill was used to prepare the finely ground milo, which was ground to a coarse, mealy mixture.

Observations

1. The steers in Lot 3 fed rolled milo grain gained an average of .20 pound less per head daily than the lots fed the cracked and finely ground milo. They also consumed slightly less grain; this has been true in two other tests.
2. Steers fed finely ground milo were slightly more efficient in feed utilization with the lowest feed cost per 100 pounds of gain of the three lots.
3. The most reasonable explanation for the increased selling price of Lot 1 over Lots 2 and 3 was the unsettled condition of the market. However, Lot 1 did dress .6 percent higher than Lots 2 and 3. The carcass grades were about the same.

Table 30.—Comparison of Rolled, Coarsely Ground, and Finely Ground Milo Grain for Fattening Steers.

July 22 to December 6, 1952—137 days.

1. Lot number	1	2	3
2. Management	Finely ground milo	Coarsely ground milo	Rolled milo
3. Number steers/lot	10	8[1]	9
4. Initial weight/steer	607	620	613
5. Final weight/steer	934	941	909
6. Gain/steer	327	321	296
7. Daily gain/steer	2.38	2.34	2.16
8. Daily ration/steer:			
Milo grain	16.32	16.84	15.46
Cottonseed oilmeal	2.00	2.00	2.00
Prairie hay	4.18	5.20	5.98
Ground limestone	.10	.11	.11
Salt	.02	.01	.03
9. Feed required for 100 lbs. gain:			
Milo grain	683.79	718.93	715.72
Cottonseed oilmeal	83.79	85.36	92.56
Prairie hay	175.50	222.05	277.13

Ground limestone	4.18	4.74	5.14
Salt	.99	.47	1.56
10. Cost of feed/100 lbs. gain[2]	$24.68	$26.09	$26.79
11. Selling price/cwt.	$28.50	$25.00	$25.00
12. Dressing percent	60.5	59.9	59.9
13. Carcass grades, U.S.:			
Prime	1		1
Choice	9	8	8

1. One sick calf was omitted from Lot 2 in computing the results of this test.
2. Feed prices: Milo grain, $2.80/cwt.; cottonseed oilmeal, $100/ton; prairie hay, $15/ton; salt and ground limestone, $12/ton.

Project 222: Ratio of Roughage to Grain for Fattening Steer Calves, 1951-52

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

The physical balance or ratio of roughage to concentrates is an important factor to consider in the ration of fattening cattle. Beef cattle serve as one of the principal means of marketing roughage. Since a large amount of roughage is produced in Kansas and throughout the Midwest, it is desirable to have information concerning the maximum amount of roughage that can be used in fattening rations, consistent with maximum and economical production. This experiment was planned to secure information on the effects of different levels of roughage on average daily gain, feed requirement per unit of gain, quality of finish, carcass quality, and selling price.

Experimental Procedure

Thirty Hereford steer calves were divided into three lots of 10 each as equally as possible on the basis of weight, size, and conformation. They were self-fed a mixture of chopped alfalfa hay and coarsely ground milo grain. The feed for each group was gradually changed until on the ratio of roughage to concentrates as follows:

Lot 1—1 pound chopped alfalfa hay: 1 pound milo grain
Lot 2—1 pound chopped alfalfa hay: 3 pounds milo grain
Lot 3—1 pound chopped alfalfa hay: 5 pounds milo grain

The feeding period was from December 22, 1951, to July 12, 1952, or a total of 203 days. Salt and water were available to the animals at all times.

Table 31 gives a summary of the results.

Table 31.—Ratio of Roughage to Grain for Fattening Steer Calves.
(December 22, 1951, to July 12, 1952—203 days)

1. Lot number	1	2	3
2. Number steers per lot	10	10	9[1]
3. Average initial weight, lbs.	502	503	505
4. Average final weight, lbs.	934	949	933
5. Average gain per steer, lbs.	432	446	428
6. Average daily gain per steer, lbs.	2.13	2.20	2.10
7. Days from start until on ratio	34	45	65
8. Days on respective ratio	169	158	138
9. Total days on feed	203	203	203
10. Feed, lbs.:			
Total milo grain until start of ratio	1735	3335	5459

Total milo grain while on ratio....	20662	25443	20655
Total milo grain consumed	22397	28778	26114
Total alfalfa hay until start of ratio	4133	5935	5153
Total alfalfa hay while on ratio ..	20662	8472	4131
Total alfalfa hay consumed[2]	24795	13507	9284
11. Average grain per head per day on ratio	11.54	16.10	16.60
12. Average hay per head per day on ratio	11.54	5.36	3.30
13. Feed per 100 lbs. gain:			
Milo grain	519	644	678
Alfalfa hay	514	302	241
Salt	1.35	.98	1.46
14. Feed cost per 100 lbs. gain	$21.72	$21.81	$22.00
15. Percent shrink to market	2.4	1.9	3.0
16. Dressing percent (includes cooler shrink)	58.6	60.0	60.3
17. Carcass grades:			
Prime		1	
Top choice		6	2
Average choice	2		5
Low choice	6	1	2
Top good	1	2	
Average good	1		
18. Selling price per 100 lbs.	$32.50	$33.50	$34.00

1. One steer died.
2. 300 lbs. dehydrated alfalfa pellets fed.

Observations

1. All lots made satisfactory gains; however, Lot 2 receiving a ratio of 1 pound roughage to 3 of grain made the best average gain for the entire period.

2. The rate of gain for Lot 1 remained fairly constant throughout the entire feeding period. The gains were largely from the standpoint of growth as evidenced by greater size at the end of the feeding period; however, they were lacking in finish.

3. The rate of gain began to decline toward the end of the feeding period in Lots 2 and 3. This was probably the result of using poor quality alfalfa hay. Also, the amount consumed was small. One steer in Lot 3 went blind and others began to show evidence of poor eyesight. The feeding of dehydrated alfalfa pellets proved beneficial when fed to these animals.

4. As the level of grain in the ration was increased, the amount of grain per 100 pounds of gain increased. At the same time, the amount of hay was decreased.

5. Animals in Lot 3 receiving only 1 pound of hay to 5 pounds of grain consumed approximately the same amount of grain per day as those in Lot 2 receiving 1 pound of hay to 3 pounds of grain. The rate of grain consumption and rate of gain failed to increase with the increased concentration of the ration in Lot 3.

6. There was very little difference in feed cost per 100 pounds gain when existing feed costs at the time were used. This would vary with changes in hay and grain prices.

7. The average carcass grade was about the same for Lots 2 and 3. The carcass grades of Lot 1 were lower because of lack of finish.

Project 68: Factors Influencing the Salt Requirements of Beef Cattle,[1] 1951-52

The Effect of Withholding Salt on the Growth and Condition of Steers

E. F. Smith, D. B. Parrish, and E. J. Splitter

The object of this test was to learn what effect withholding salt has on fattening calves. Twenty good quality Hereford steer calves were divided into two lots of 10 steers each and were self-fed a mixture of 1 pound of chopped alfalfa hay to 3 pounds of ground milo grain for 203 days in 1951-52. The only difference in treatment was that salt was withheld from one lot and offered free choice in the other lot.

The gains, feed consumption, and efficiency were about the same for both lots.

Table 32.—The Value of Salt in Steer Rations.
December 22, 1951, to July 12, 1952—203 days.

1.	Lot number	1	2
2.	Number steers per lot	10	10
3.	Initial weight per steer, lbs.	502	503
4.	Final weight per steer, lbs.	933	949
5.	Gain per steer, lbs.	431	446
6.	Daily gain per steer	2.12	2.19
7.	Daily ration per steer:		
	Milo grain	14.20	14.17
	Alfalfa hay	6.77	6.66
	Salt	.....	.02
8.	Feed required per 100 lbs. gain, lbs.:		
	Milo grain	668.56	645.24
	Alfalfa hay	319.11	303.47
	Salt	.....	.98
9.	Cost of feed per 100 lbs. gain	$22.70	$21.86
10.	Initial cost per steer	$210.84	$211.25
11.	Feed cost per steer	$87.94	$83.98
12.	Steer cost plus feed cost	$298.78	$295.34
13.	Necessary selling price	$32.00	$31.02
14.	Selling price per cwt.	$34.00	$33.50
15.	Dressing percent	60.4	60.0
16.	Carcass grades:		
	Prime	1	1
	Choice	9	7
	Good	.....	2

Project 329: Factors Affecting Gains

F. W. Bell, E. F. Smith, and W. H. Smith

Introduction

When buying stocker or feeder cattle, the purchaser bids largely on the basis of his estimate of the probable gains the cattle will make.

1. This study was supported in part by the Salt Producers' Association of America, Detroit, Michigan.

In feeding trials at this station, where each animal is weighed at regular periods during the trials, the records show considerable difference in rate of gain of individuals in the same lot. These differences in ability to gain can be explained only by differences in characteristics of individual animals, since all are under like conditions of feeding and care. We are trying to determine what differences in thin cattle are reliable indications of future gaining ability.

Experimental Procedure

Each stocker or feeder steer or heifer is a factory for converting raw materials into beef. The rate of gain for each animal depends on how well it is equipped to perform the body functions which are necessary for increase in weight; therefore, we are studying characteristics which may be related to rate of gain. These characteristics include head, chest, body, flank, bone, natural fleshing, and estimate of gaining ability.

Each animal was rated separately for each of the various characteristics studied. A range of six ranks was used in order to evaluate each factor as compared to the same factor in all other animals. For instance, individuals which had the best bone were ranked first in bone, and those having the poorest bone were ranked sixth. Others were ranked second, third, fourth, or fifth according to the judgment of the three men who made the ratings. The same procedure was followed for the other characteristics of each animal.

Statistical Analysis

After the feeding and grazing trials were completed, the figures of total gain in weight for each animal and the ratings of characteristics made at the start of the feeding experiment were analyzed by the statistical laboratory under the direction of Dr. H. C. Fryer. This was done to determine what characteristics of feeder and stocker cattle appear to be the most reliable guides to follow in estimating probable gains.

The statistical analysis of the data shows that the ratings for chest, body, and probable gain as made at the start of the feeding trials were closely correlated with the actual gains made by the cattle for all the lots studied. Ratings on bone also were reported as reliable.

Standards for Rating Characteristics

In order to make ratings which are reasonably accurate in expressing differences, it is necessary to follow a definite standard. A brief statement follows regarding the standards used in determining rankings for the characteristics which appear to be reliable guides to follow in estimating gains.

Head: moderately short, with good width, wide muzzle;

Chest: since the chest region encloses the lungs, cattle were ranked highest which showed the most width and depth through the forequarters and carrying back into the body. Those ranked lowest were narrower in front and lacked fullness in the heart girth;

Bone: individuals rated higher on bone were those which had sufficient bone of good quality to indicate that the animal could make rapid increase in weight and had a frame strong enough to carry the weight. Those with light bone were ranked lower;

Body: the individuals ranked higher were those which were wider and deeper throughout. The ratings were determined according to differences in body capacity in relation to the size of the animal;

Probable Gain: this rating was made by each investigator according to his estimate of the ability of each animal to make daily gain in weight. In making this rating, it was necessary to observe each characteristic of the individual in relation to the animal as a whole. One animal might have a good head, be wide and deep in body and have enough bone, but lack somewhat in width of chest; therefore, could not rank first in probable gain.

Project 286: The Improvement of Beef Cattle Through Breeding Methods

Walter H. Smith, Lewis A. Holland, and H. L. Ibsen

The purebred Shorthorn cattle breeding project has proceeded according to plan this year. The project was planned to facilitate the collection of production data which will be used to devise testing and breeding procedures useful to cattlemen for the improvement of cattle.

Pedigree barriers were established in the original College herd for the development of two inbred lines. College Premier 29th, 2368167, and Gregg Farms Hoarfrost, 2492499, have been used as herd sires for this purpose and the inbred lines have been designated as the Wernacre Premier and Mercury lines for these respective sires. An inbreeding program was initiated for the Wernacre Premier line in 1949 and the first inbred calves were produced in 1950. Calves representing the second generation of inbreeding were produced in 1952. The inbreeding program for the Mercury line was initiated in 1952 and the first inbred calves for this line will be produced in 1953.

Data for a study of the feasibility and effects of inbreeding are being collected as the project progresses.

The females in the project are pasture-bred to calve in the spring of each year. The calves are not creep-fed during the suckling period while the cows are on grass. The calves are weaned at 182 days of age and placed on individual feeding trials for 182-day periods after a short adjustment period following weaning.

The full-feed ration for the bulls and steers consists of 75 percent corn and 25 percent chopped alfalfa hay, and that for the heifers 55 percent corn and 45 percent chopped alfalfa hay.

The steers are maintained on a fattening ration after the termination of the regular feeding trial and slaughtered in the College meats laboratory for detailed carcass studies.

The feeding trial data for the 1951 calf crop are summarized in Table 33, and a partial summary of the 1952 calf crop is presented in Table 34. The feeding trials for the 1952 calf crop have not been completed to date and the number of days of feeding are designated for each animal.

Table 33.—Summary of the 1951 Shorthorn Calves Representing the Wernacre Premier and Mercury Inbred Lines.

Tag number	Coefficient of inbreeding	Birth weight	Weaning weight	Weaning score	Days fed	Initial weight	Final weight	Total gain	Average daily gain	Final score	Lbs. per 100 lbs. gain	Lbs. silage per 100 lbs. gain
Wernacre Premier Line—Bulls												
81	6.25	78.0	470	2–	182	627	1117	480	2.64	2+	476	279
129	15.60	80.0	425	2–	182	534	904	370	2.03	2	496	291
189	14.06	71.0	515	2+	182	442	884	442	2.43	3+	503	252
Average	11.96	76.3	470	2	182	538	968	431	2.37	2–	492	274
Steers												
39	3.10	66.0	400	3+	182	533	824	291	1.60	3	711	405
61	18.75	81.0	400	3–	182	555	897	342	1.88	3	569	330
Average	11.00	73.5	400	3	182	544	861	317	1.74	3	640	368
Heifers												
154	0.00	69.9	410	2+	182	553	856	303	1.66	2+	461	403
14	14.10	69.0	405	2–	182	434	736	302	1.66	2	497	430
72	12.50	74.0	410	2+	182	485	856	371	2.04	2+	452	394
108	6.25	74.0	400	2+	182	372	683	311	1.71	3	510	437
58	15.60	66.0	358	2–	182	407	714	307	1.69	2–	559	482
105	18.75	74.0	310	3	182	328	619	291	1.60	3–	363	316
Average	11.20	71.0	382	2–	182	430	744	314	1.73	2–	474	410
Mercury Line—Bulls												
760	0.00	74.0	415	1–	182	537	982	445	2.45	2+	480	275
Steers												
92	0.00	67.0	410	2	182	422	862	422	2.32	3+	531	297
4	0.00	52.0	380	1–	182	425	794	369	2.03	3+	437	247
Average	0.00	59.5	395	2+	182	424	828	396	2.18	3+	484	272
Heifers												
53	0.00	53.0	340	2	182	375	725	350	1.92	1–	419	366
23	0.00	54.0	355	2	182	393	657	264	1.45	2	481	409
53	0.00	56.0	400	1–	182	471	758	287	1.58	2+	575	502
13	0.00	60.0	355	2	182	381	647	266	1.46	3–	493	436
2	0.00	71.0	440	1	182	454	765	311	1.71	1	439	379
87	0.00	58.0	325	2–	182	330	574	244	1.34	3	394	361
90	0.00	43.0	260	3–	182	280	550	270	1.48	3–	395	348
22	0.00	58.0	353	1–	182	353	610	257	1.41	2	489	420
56	0.00	59.0	343	1–	182	361	589	228	1.25	2+	443	356
180	0.00	56.0	300	2	182	295	611	316	1.74	2	466	399
Average	0.00	56.8	347	2–	182	369	646	279	1.53	2	459	401

Table 34.—Partial Summary of the 1952 Shorthorn Calves Representing the Wernacre Premier and Mercury Inbred Lines.

Tag number	Coefficient of inbreeding	Birth weight	Weaning weight	Weaning score	Initial weight	Weight on 4-10-53	Days on trial	Daily gain during trial
Wernacre Premier Line								
Bulls								
105	6.25	75	455	2	469	801	100	3.32
184	14.06	88	514	2	530	840	100	3.10
2	23.44	64	400	3+	473	572	25	3.60
Average	14.58	76	456	2—	491	738	.....	3.34
Steers								
37	14.06	78	386	2	403	640	100	2.37
7	12.50	91	365	2—	380	560	100	1.80
72	6.64	67	336	3+	371	421	25	2.00
Average	11.07	79	362	2—	385	540	.....	2.06
Heifers								
49	15.62	67	357	3	367	542	161	1.09
39	15.62	75	363	2	398	610	161	1.32
10	18.75	65	392	2—	410	580	100	1.70
154	6.25	56	295	3+	347	393	25	1.84
14	27.73	55	301	2—	406	473	25	2.68
108	19.73	55	270	3	346	410	25	2.56
23	22.27	57	329	3+	361	420	25	2.36
56	23.44	65	295	3+	338	400	25	2.48
Average	18.67	62	325	3+	372	479	.....	2.00
Mercury Line								
Bulls								
61	0.00	64	366	1—	400	690	161	1.80
9	0.00	84	434	2	448	715	100	2.67
4	0.00	69	391	2+	411	725	161	1.95
90	0.00	71	430	2	440	735	100	2.95
Average	0.00	72	405	2+	425	716	.....	2.34
Steers								
68	0.00	62	335	3+	360	570	100	2.10
Heifers								
82	0.00	66	353	1—	378	550	100	1.72
180	0.00	68	380	1	401	555	100	1.54
92	0.00	68	363	2+	376	565	161	1.17
58	0.00	57	342	2	360	555	100	1.95
79	0.00	59	311	2+	330	514	100	1.84
Average	0.00	64	350	2+	369	548	.....	1.64

Table 35.—Feed Prices Used in Beef Cattle Tests, 1952-53.

Corn, bushel	$ 1.60
Soybean oilmeal or pellets, ton	95.00
Special supplement, ton	82.00
Alfalfa hay, ton	40.00
Alfalfa silage, wilted and nonwilted, ton	10.00
Atlas sorgo silage, ton	10.00
Prairie hay, ton	25.00
Corn cobs, ton	12.00
Dry bluestem pasture, calves, per head per month	.50
Dry bluestem pasture, yearlings, per head per month	.75
Brome pasture, winter, per head per month	1.00
Vitamin A concentrate, lb.	1.18
Mineral (2 lbs. bonemeal to 1 lb. salt), cwt.	5.00
Salt, ton	12.00

Table 36.—Chemical Analysis of Feeds Used in Beef Cattle Feeding Trials, 1951-52, 1952-53.

	Moisture %	Protein %	Fat %	Fiber %	N-Free extract %	Mineral matter %	Calcium %	Phosphorus %	Carotene mg/ 100 gm. on dry basis
1951-52									
Cottonseed oilmeal	5.67	40.88	5.36	12.15	29.30	6.64			
Cottonseed oilmeal pellets	6.02	42.88	5.35	11.19	28.16	6.39	.19	1.07	
Milo grain	11.85	9.94	2.76	2.12	71.55	1.78			
Prairie hay	4.55	6.31	2.37	32.60	47.39	6.78	.28	.10	1.99
Sorghum silage (Tenn. O)	73.00	1.49	.57	8.29	14.25	2.40	.07	.05	1.47
Sorghum silage (Atlas, Black Amber)	63.63	1.90	.72	12.15	17.63	3.67	.01	.08	.78
Nonwilted alfalfa silage[1]	75.28	4.00	.93	9.84	7.44	2.51	.04	.06	.63
Nonwilted alfalfa silage[2]	75.90	4.27	.85	9.49	7.18	2.31	.04	.08	.62
Wilted alfalfa silage[1]	57.00	7.58	.89	16.50	13.61	4.42	.49	.11	.36
1952-53									
Corn	11.58	9.19	4.20	1.90	71.48	1.45			
Soybean oilmeal pellets	9.60	45.56	4.66	4.81	29.66	5.71			
Special cattle supplement	11.27	34.13	1.97	4.91	35.61	12.11			
Ground corn cobs	8.87	2.31	.45	33.86	52.92	1.59			
Prairie hay	5.22	5.88	2.46	32.35	46.91	7.18			1.94
Alfalfa hay	5.95	13.56	1.90	32.18	38.21	8.20			
Atlas sorgo silage	65.00	2.77	.88	8.00	20.70	2.65			
Nonwilted alfalfa silage	75.00	4.86	1.14	7.33	8.77	2.90			12.9
Wilted alfalfa silage	64.70	5.69	.98	11.34	12.56	3.73			1.0

Table 36.—(Continued.)

1952—Bluestem pasture grasses:		
February 9	0	3.96
March 15	0	4.25
June 23—mature	0	7.00
June 23—immature	0	6.78
July 9—mature	0	5.58
July 9—immature	0	5.68
July 21—mature	0	6.50
July 21—immature	0	7.06
August 4—mature	0	6.19
August 4—immature	0	7.83
August 12—mature	0	5.47
August 12—immature	0	7.71
September 9—mature	0	6.63
September 9—immature	0	10.57
September 11—mature	0	5.93
September 11—immature	0	8.26
September 20—mature	0	5.23
September 20—immature	0	8.07

1. Sample 1.
2. Sample 2.