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Experiments with Feeding Steers Using Cottonseed Meal and Varying Proportions of Corn and Cottonseed Meal

By E. BARNETT and C. J. GOODELL



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Cottonseed meal is the most valuable concentrate used for the finishing of beef cattle throughout the greater part of Mississippi. By many of our feeders, it is depended upon as the sole concentrate for fattening steers for the market. Where fed in this manner with corn silage as roughage, cottonseed meal supplies more protein than is called for by ordinary feeding standards, and the use of some supplement high in carbohydrates is suggested as a means of reducing feed costs and, at the same time, producing a higher degree of finish than is secured where cottonseed meal is fed alone.

Among the feeds of a carbonaceous character corn is the most available. That corn has not been fed to a greater extent in Mississippi has been due to the farm price which, over a period of twenty years from 1901 to 1920, averaged almost fifty per cent higher than in some of the leading corn producing states. This limited its use in this section largely to the feeding of work stock and hogs. The acreage of corn in the state, however, for the ten years from 1911 to 1920 was greater by practically fifty per cent than for the preceding ten year period. As a result, during recent years, farm prices have been much nearer to those prevailing in the corn belt states, indicating an increasing availability of this feed to our farmers and cattle feeders.

The purpose of the feeding trials discussed in this bulletin was a comparison of cottonseed meal alone and with corn in varying proportions, fed with silage for fattening beef steers. The tables contained herein should assist the cattle feeder in selecting the most economical ration for fattening yearling and two year old steers under Mississippi conditons.

BULLETIN 214

Experiments with Feeding Steers Using Cottonseed Meal and Varying Proportions of Corn and Cottonseed Meal

By E. Barnett and C. J. Goodell*

CONCLUSIONS

I. Under the conditions of this experiment a pound of cottonseed meal was more valuable from an economic standpoint than a pound of corn, the difference in value being dependent upon the proportions in which the feeds were used, the relative values of the concentrates and roughages, and upon the spread in the market prices of well finished cattle and those carrying less finish.

II. Used with cottonseed meal and corn silage for fattening steers, small amounts of corn may be fed, without increasing the cost of gains, at higher prices than larger amounts.

III. As the prices of corn and cottonseed meal advance, the price of corn silage remaining constant, the difference in value between cottonseed meal and corn is widened. This is due to the utilization of larger amounts of silage where cottonseed meal is the sole concentrate, than where part of the concentrate portion of the ration consists of corn. In a ration of cottonseed meal, corn, and corn silage the consumption of corn silage varies inversely with the corn used in the ration.

IV. Whether or not corn can be profitably substituted for a part of the cottonseed meal in a ration of cottonseed meal and corn silage for fattening steers, and if so to what extent, is determined by the relative cost of these feeds, by the cost of corn silage and by spread between the market prices of well finished cattle and those carrying less finish.

V. By the use of corn in connection with cottonseed meal for the fattening of steers, a higher finish can be obtained than where cottonseed meal is the sole concentrate. Improvement in finish will be more marked where corn is fed in amounts of from eight to twelve pounds daily per thousand pounds weight of steers than where fed in smaller amounts. This improvement in finish is reflected in the selling price of the steers and in the dressing percent. The spread in the market price of well finished cattle compared with those carrying less finish may determine whether or not it is profitable to use corn in the feeding of steers for the market.

VI. Where corn and cottonseed meal are fed in combination with corn silage more rapid gains may be expected than where cottonseed meal is fed alone.

VII. Where corn is fed to steers, hogs should be kept in the lots to utilize the undigested grain.

VIII. Where cottonseed meal is the sole concentrate fed, it is not practicable to put hogs after steers unless they receive some feed in addition to that secured from the droppings.

*This work was undertaken by H. K. Gayle in 1916; continued by D. J. Griswold in 1919; and completed by the authors in 1921.

PURPOSE.

The questions most frequently asked concerning the fattening of beef cattle in Mississippi have to do with the use of corn; whether it can be profitably substituted for cottonseed meal; and, if so, in what proportions corn and cottonseed meal will prove most economical for finishing steers under Mississippi conditions. The purpose of the four years steer feeding trials herein reported was to secure data on the feeding of corn and cottonseed meal with corn silage for the fattening of beef steers.

PLAN.

The work was inaugurated in the fall of 1916 by H. K. Gayle, Experiment Station Animal Husbandman. That year, thirty-two steers were divided into four groups of eight each. With the exception of the ration fed, the purpose was to make all factors as nearly identical as possible.

During the first sixty days, the four lots of steers were fed the following average daily ration per thousand pounds of cattle, rations being calculated at the end of each thirty days:

Lot	I	II	III	IV
Cottonseed Meal	5.00	4.00	3.00	2.00
Broken Ear Corn		6.25	12.50	18.75
Corn Silage	ad libitum			

At the beginning of the second sub period of sixty days the cottonseed meal was increased one pound per thousand pound weight of cattle in each lot.

In the trials during the winter of 1918-19, the spring of 1920 and the winter of 1920-21, these same rations were used in the corresponding lots, except that in the 1920-21 work, lot IV was dropped from the experiment, due to economic conditions unfavorable to feeding for the higher finish obtained by the use of the larger amounts of corn.

For convenience in discussion the rations used in lots II, III, and IV are designated as "Light corn ration", "Medium corn ration", and "Heavy corn ration", respectively.

SHELTER, FEED LOTS, AND WATER SUPPLY

Each lot of cattle occupied similar quarters. The steers and hogs were sheltered by an open shed and had the run of open lots. Both concentrates and silage were fed in troughs about twenty-four inches wide, arranged along the feed alley at the back side of the shed. Water was supplied by the College power plant from deep wells, and watering troughs were accessible to each lot.

Except for cinders and shavings no bedding was used as the plan of the experiment limited the roughage consumed by the steers to corn silage, and it would have been impossible to have prevented the steers from eating part of the bedding had straw or old hay been used for that purpose*. The manure was hauled from the sheds at intervals during the feeding period. While the lots and sheds did not get in as bad condition as might have been expected, it is highly desirable, under farm conditions, that bedding be used to absorb the liquid manure and to keep the steers as comfortable as possible.

WEIGHTS

At the beginning and end of each trial, the steers were weighed individually three days in succession, the average of the three weights being used as the initial and final weights. Throughout the trials the cattle were weighed at intervals of twenty-eight or thirty days or at the conclusion of each sub-period. In the later trials the twenty-eight day sub-periods were used because of the convenience of weighing on the same day of the week each time. The identity of each steer was known either by a neck strap to which was attached a metal tag, or by individual brand. The steers were always weigh-

*Other feeding experiments indicate the desirability of using a small amount of dry roughage such as Johnson grass, hay or oat straw with corn silage for fattening steers.

ed at the same hour of the day and no change was made in water or feed preparatory to weighing.

METHOD OF FEEDING

The daily ration was divided into two equal feeds and the steers were fed at 6:30 a. m. and 4:30 p. m. The silage was first placed in the troughs and the concentrates were scattered over the silage†, and any feed remaining after two hours had elapsed from the time of feeding was removed and weighed. Salt was either kept before steers at all times or was supplied at regular intervals. The weighing of feeds and feeding was done by student help under the direction of the Station Animal Husbandman.

CATTLE.

All of the cattle used throughout these trials were two year olds of beef breeding and were either grown on the station farm or were purchased locally, except in 1918-19, when yearlings were secured on the St. Louis market. In each instance the cattle used were either naturally polled or had been dehorned for a long enough time prior to their being put on feed to be completely recovered from the effects of dehorning. In the matter of quality there was probably but little variation, the cattle at the beginning of the trials being graded each year as good to choice. Where the cattle used were bred by the Experiment Station, however, they were of a little better quality than those purchased either locally or at St. Louis.

FEEDS.

Cottonseed meal each year was purchased in the state, was of choice grade and was charged against the cattle at the cost price. The corn fed was grown on the station farm and was of the prolific varieties. It was charged to the cattle at the local market price*. Where tankage was fed to the hogs following the steers, it was charged at the cost price at the Experiment station.

In all trials in this experiment corn silage was used as the sole roughage and was produced on the Experiment Station farm in a field near the feed lots. To assist in maintaining the fertility of this field, it was seeded to crimson clover each year as soon as possible after the silage was removed. The crimson clover was turned under about the first of April and the corn planted about June first. Goliad corn was used because of the tonnage which it produces. The price at which silage was charged in each of the trials was influenced by the local price of corn and by labor costs.

HOGS.

During the winters of 1916-17 and 1918-19, hogs were used to follow the steers in each lot at the rate of one hog per steer. In 1916-17 two bunches of hogs were used. The first bunch followed the steers for the first ninety days of the trial and the second bunch for the remainder of the feeding period. A small pen containing a self feeder for the hogs was placed in each lot. The first year the self feeder was kept filled with shelled corn and cottonseed meal in separate compartments and the hogs were given access to it for a limited time each evening, after having followed the steers all day. In the winter of 1918-19, this same arrangement was used but tankage was supplied in the self feeder instead of cottonseed meal.

In the trials in the spring of 1920 and the winter of 1920-21 the hogs received no feed other than that secured from the droppings of the steers.

†While no difficulty was recorded as a result of this method of feeding it is preferable to thoroughly mix the concentrates with the silage to prevent any one steer that might be overly greedy from getting too large a portion.

*In the first two trials and part of the third, broken ear corn was used. On account of the greater convenience in weighing, shelled corn was used in the latter part of the third trial and in the last. In all calculations herein, 70 pounds of ear corn and 56 pounds of shelled corn were used per bushel. Under farm conditions, experimental data indicates that it does not pay to shell corn for fattening steers.

METHOD OF STARTING CATTLE ON FEED

The methods of starting the cattle on feed were very similar in each of the four trials. The one described here, however, is only approximate. The steers in lot I were started on an average daily ration of about two pounds of cottonseed meal which was raised at the rate of a pound a week until the cattle received five pounds of cottonseed meal daily per thousand pounds live weight. At the end of sixty days, the average daily ration was raised to six pounds of cottonseed meal daily per thousand pounds and by the end of the period to about eight pounds. Lots II, III and IV were started on a smaller average daily feed of cottonseed meal and were increased gradually until they received the amounts called for in their respective rations. In addition to the cottonseed meal received, the steers in lot IV were started on four pounds of corn per thousand pounds weight and were gradually increased until they received 18.75 pounds of corn daily per thousand pounds. Lots II and III were started on smaller average daily feeds of corn and were increased gradually until they were receiving the amounts of corn designated respectively in their rations. To all lots as much corn silage was fed as the cattle would eat up clean.

MARKETING.

Preparatory to shipment the cattle were handled in the ordinary way, no change being made either in regard to feed or water. The car was ordered through the local freight agent several days in advance of the date on which it was needed. Before the cattle were loaded the car was carefully examined to see that there were no holes in the floor and that it was otherwise in good condition. If the car provided was not already bedded, old hay or straw was used for that purpose. The cattle were driven a distance of about a mile and a quarter to the loading chutes. They were handled as quietly as possible enroute and on arrival, were allowed to rest and cool for about a half hour before loading, the general practice being to load within twenty or thirty minutes of the departure of the train. Leaving Starkville at seven A. M., the cattle usually arrived at the yards about ten a. m. the following day. They were consigned to one of the commission firms on the St. Louis market, arrangements being made to have each lot sold separately. To assist in the securing of an accurate appraisalment of each separate lot a representative of the Experiment Station accompanied the cattle to market, but all details of the sale and handling of the cattle were left entirely with the commission firm to whom they were consigned. In each case the packing firm handling the cattle gladly furnished the dressing percentages for the individual lots.

FEEDING TRIALS WITH COTTONSEED MEAL AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FED WITH CORN SILAGE FOR FINISHING TWO-YEAR OLD STEERS, WINTER 1916-17.

According to the original plan the cattle this year were to be fed for a period of one hundred and eighty days, using three sub-periods of sixty days each. Due to the spoiling of the silage in one of the silos, it was necessary to terminate the feeding at the end of the second sub-period, giving a total feeding period of one hundred and twenty days. As it was impossible to secure a car immediately upon the conclusion of the trial, the cattle were held for twelve days longer, waste hay being substituted during that time for part of the silage in the ration.*

*For this twelve day period, the average daily gain per steer in lots I, III, and IV were .8 pounds, .9 pounds, and 2.8 pounds respectively. Lot II showed an average daily loss per steer of .66 pounds. In a general way this supports the statement made by Professor E. S. Good in Circular 75 of the Kentucky College of Agriculture as follows: "The number of cattle fed should be determined by the amount of silage on hand. Cattle should be sold before the silage is exhausted for when they are deprived of succulent feed to which they have been accustomed, they usually shrink." The percent of shrink enroute to market was based on the final home weight. The shrink shown in the summary of this year's work was calculated by using the percent of shrink thus obtained and the weights of the cattle at the conclusion of the trials.

The rations fed were those given in the general plan of the experiment. Hogs were used to follow the steers in each lot at the rate of one hog per steer. Two bunches of hogs were used, the first bunch following the steers for the first ninety days and the second bunch for the remainder of the feeding period. A small pen containing a self feeder, which was kept filled with corn and cottonseed meal in separate compartments, was placed in each lot. The hogs were given access to these feeders for about two hours each evening after having followed the steers all day. The hogs used were well bred and averaged 88.1 pounds when placed in the feed lot.

CATTLE.

The steers used were bought locally, costing \$7.00 per hundred weight. They were a mixed lot of Angus, Hereford and Shorthorn grades and would have been classed on the market good to choice feeders. At the time of starting on feed, they were in rather thin condition, averaging 858.6 pounds in weight.

FEEDS.

Cottonseed meal was bought and charged to the steers at \$37.50 per ton. Corn was charged at \$1.00 per bushel the average market price locally during the period of the trial. Silage was valued at \$4.00 per ton.

TABLE I. AVERAGE DAILY RATION BY SUB-PERIODS—1916-17

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration	C.S.M. Silage Medium Corn Ration	C.S.M. Silage Heavy Corn Ration
First Sub-Period (62 days)				
Cottonseed meal (lbs.)-----	4.71	3.65	2.86	1.82
Broken ear corn (lbs.)-----		5.69	11.52	17.08
Corn silage (lbs.)-----	69.17	59.57	50.44	39.41
Second Sub-Period (58 days)				
Cottonseed meal (lbs.)-----	6.25	5.37	4.34	3.00
Broken ear corn (lbs.)-----		6.96	13.37	21.40
Corn silage (lbs.)-----	70.38	42.67	51.00	41.00
Av. Daily Ration for entire Period (120 days)				
Cottonseed meal (lbs.)-----	5.46	4.49	3.58	2.39 ^f
Broken ear corn (lbs.)-----		6.31	12.42	19.17
Corn silage (lbs.)-----	69.76	51.41	50.72	40.06

The amount of corn silage consumed by the steers in the different lots varied inversely with the corn fed. The total dry matter in the ration was smallest in lot II receiving the least amount of corn, and was greatest in lot IV receiving the largest amount. Due to the comparatively light consumption of silage by the steers in lot II during the second half of the trial, the total dry matter in the ration in lot II was slightly less than in lot I receiving no corn. The amount of digestible nutrients in the ration was smallest in lot I and greatest in lot IV, increasing with the increased percentage of corn. In the average daily rations consumed by the different lots, the nutritive ratio, which is the ratio of the digestible crude protein to the total digestible carbohydrates and fats, varied from 1:4.96 in lot I to 1:7.93 in lot IV, widening as corn was added. In all lots the average daily rations fed during the second period were narrower than those fed during the first half of the trial. Where cottonseed meal and silage are the principle feeds used, this would indicate the greater possibility for profit by adding corn during the latter part of the feeding period.*

*In Circular 75 of the Extension Division of the University of Kentucky (pages 6 and 7) Prof. E. S. Good recommends that at the end of the 50th or 60th day, corn be introduced into the ration of cottonseed meal and corn silage at the rate of three pounds per head daily (shelled basis), this being gradually increased until the steers when they go to market, are getting fourteen pounds per head daily. This should be taken as referring to Kentucky conditions where corn is relatively cheaper than in Mississippi.

TABLE II. SUMMARY OF FEEDING TRIALS WITH COTTONSEED MEAL, AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FED WITH CORN SILAGE FOR FINISHING STEERS, WINTER 1916-17.

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn	C.S.M. Silage Medium Corn Ration.	C.S.M. Silage Heavy Corn Ration.
Date of Trial	October 17, 1916 to February 14, 1917			
Length of Trial	120 Days			
Breeding of Steers	Angus, Hereford, and Shorthorn Grades			
Age of Steers	2 Years Old			
Quality	Good to Choice			
Initial Valuation per cwt.	\$7.00			
Number of Animals	8	8	8	8
Initial weight, total (lbs.)	6935	6780	7073	6689
Average initial weight (lbs.)	866.9	847.5	884.1	836.1
Final weight, total (lbs.)	8847	8921	9347	9105
Average final weight (lbs.)	1105.9	1115.1	1168.4	1138.1
Total gain (lbs.)	1912	2141	2274	2416
Average gain per steer (lbs.)	239	267.6	284.3	302
Average daily gain per steer (lbs.)	1.99	2.23	2.37	2.52
Weight at market, total (lbs.)	8298.4	8198.4	8652	8647.2
Average weight at market (lbs.)	1037.3	1024.8	1081.5	1080.9
Total shrink (lbs.)	548.6	722.6	695	457.8
Shrink per steer (lbs.)	68.6	90.3	86.9	57.2
Percent of shrink	6.23	8.09	7.44	5.03
Dressing percent, based on market weight	56.6	55.98	57.74	58.9
Dressing percent, based on home weight	53.09	51.45	53.45	55.94
Feed consumed, total				
Cottonseed meal (lbs.)	5239	4309	3432	2294
Broken ear corn (lbs.)		6056	11918.4	18405.6
Corn silage (lbs.)	66970	49350	48690	38462
Feed consumed per steer				
Cottonseed meal (lbs.)	654.9	538.6	429	286.8
Broken ear corn (lbs.)		757	1489.8	2300.7
Corn silage (lbs.)	8371.3	6168.8	6086.3	4807.8
Average daily feed per steer				
Cottonseed meal (lbs.)	5.46	4.49	3.58	2.39
Broken ear corn (lbs.)		6.31	12.42	19.17
Corn silage (lbs.)	69.76	51.41	50.72	40.06
Feed required per cwt. of grain				
Cottonseed meal (lbs.)	274	201.3	150.9	94.9
Shelled corn (lbs.)*		226.3	419.26	609.44
Corn silage (lbs.)	3502.6	2305	2141	1591.8
Cost of 100 lbs. of grain	\$ 12.14	\$ 12.43	\$ 14.60	\$ 15.84
Selling price of steers per cwt.	10.05	10.21	10.53	11.00
Gross receipts per steer	104.25	104.63	113.88	118.90
Shipping and selling expense per steer	3.52	3.52	3.52	3.52
Net receipts per steer	100.73	101.11	110.36	115.38
Initial valuation of steer in feed lot	60.68	59.33	61.89	58.53
Feed cost per steer	29.02	33.25	41.50	47.86
Initial valuation and feed cost per steer	89.7	92.58	103.39	106.39
Profit†	11.03	8.53	6.97	8.99

The following tabulation shows the average daily gain per steer by lots during the two sub-periods:

TABLE III. AVERAGE DAILY GAIN BY SUB PERIODS—1916-17

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration	C.S.M. Silage Medium Corn Ration	C.S.M. Silage Heavy Corn Ration
First Sub-Period, 62 Days, (lbs.)	3.00	2.72	2.88	2.78
Second Sub-Period, 58 Days (lbs.)	.92	1.70	1.83	2.23
Average daily gain for entire period, 120 Days, (lbs.)	1.99	2.23	2.37	2.52

*For the purpose of comparison the corn eaten per hundred pounds of gain was reduced to shelled basis.

†The term "Profit" as used refers to the excess net receipts over the cost of steer and feed. In calculating "Profit", no account was taken of labor, interest, risk, etc. This should be borne in mind, otherwise the term will be misleading.

Notwithstanding the larger average daily rations fed during the latter part of the trial, the average daily gains were smaller in each instance than during the first sub-period. This was due largely to the fill taken on by the cattle during the early part of the feeding period and partly, perhaps, to the more expensive gains expected as the feeding period advances.*

For the entire trial, the average daily gain varied with the corn used in the ration. Based on initial and market weights, however, instead of on initial and final weights in the feed lot, there was little difference in the gains made by lot I receiving cottonseed meal as the sole concentrate, and lot II receiving the light corn ration.

Based on percentages given by Henry and Morrison the dry matter consumed per hundred pounds of gain was greatest in lot I and smallest in lot II. Due to the much heavier consumption of silage in lot I, however, this apparent difference may have been due largely to a variation from the average percentage used in the calculation of the dry matter in the silage. The total digestible nutrients consumed per cwt. of gain was smallest in lot II and greatest in lot IV. The feed cost per hundred pounds of gain increased as corn was added in the ration, varying from \$12.14 in lot I to \$15.84 in lot IV.

The dressing per cent was highest in lot IV and lowest in lot II. Though lot I showed a higher dressing per cent than lot II, a premium of sixteen cents per cwt. was paid for the latter lot as compared with the former. This was probably due to a difference in the coats of the two lots, giving lot II the appearance of higher finish.

PORK PRODUCED BY HOGS AFTER STEERS

As already state due to difficulty in obtaining a car for shipment to market, the cattle used in this work were held for twelve days after the conclusion of the feeding trials. The hogs continued to follow the steers for this additional period and the following summary is for 132 days.

TABLE IV. SUMMARY OF HOGS FED IN LOTS WITH STEERS, 1916-17.

Number of Hogs used per lot.....	16
Initial Valuation per cwt. of Hogs in lot.....	\$7.50
Average length of time on feed.....	66 days

RATION FED TO STEERS	LOT			
	I Silage C.S.M.	II Silage Light Corn Ration.	III Silage Medium Corn Ration.	IV Silage Heavy Corn Ration.
Initial weight, total (lbs.).....	1363.	1369.5	1448.	1459.5
Average initial weight (lbs.).....	85.2	85.6	90.5	91.2
Final weight, total (lbs.).....	2192.8	2171.	2514.2	2611.
Average final weight (lbs.).....	137.	135.7	157.1	163.2
Total gain, pork produced (lbs.).....	829.8	801.5	1066.2	1151.5
Average gain per hog (lbs.).....	51.86	50.09	66.6	72.
Average daily gain per hog (lbs.).....	.79	.76	1.01	1.09
Feed consumed, total				
Shelled corn (lbs.).....	3775	2447.	2228.4	2049.
Cottonseed meal (lbs.).....	262.5	210.	276.	211.
Average daily feed per hog				
Shelled corn (lbs.).....	3.20	2.32	2.11	1.94
Cottonseed meal (lbs.).....	.25	.20	.26	.20
Feed required per cwt. of gain				
Shelled corn (lbs.).....	406.7	305.3	209.	177.9
Cottonseed meal (lbs.).....	31.6	26.2	25.9	18.3
Cost of 100 pounds of gain.....	\$ 7.85	\$ 5.94	\$ 4.22	\$ 3.52
Selling price of pigs per cwt. at market.....	10.77	10.74	10.75	10.76
Shipping and selling expense per cwt.....	.782	.80	.853	.738
Gross receipts.....	236.09	233.25	270.22	281.01
Shipping and selling expense per lot.....	17.15	17.36	21.46	19.27
Net receipts.....	218.94	215.89	248.76	261.74
Initial valuation of hogs.....	102.23	102.71	108.60	109.46
Cost of feed.....	65.19	47.63	44.97	40.55
Cost of hogs and feeds.....	167.42	150.34	153.57	150.01
Profit per lot (lbs.).....	51.52	65.55	95.19	111.73
Profit per hog (lbs.).....	3.22	4.10	5.95	6.98

*According to Henry and Morrison (page 436), "Other conditions being equal, the higher the degree of finish to which the animal is carried, the larger the quantity of feed required to produce a given gain." For this reason, feeding periods for yearlings and year old steers in this State seldom exceed one hundred and twenty to one hundred and forty days.

While no check hogs were used with which to compare those after the steers it is evident from comparing the feed required per hundred pounds of gain in lot I with the average feed consumed per cwt. of gain by hogs in large numbers of trials* that little, if any, of the gains made by the hogs in this lot could be credited to the cattle. By using lot I as a check, 24.6% of the gains in lot II, 46.6% of the gains in lot III and 55.1% of the gains in lot IV can be credited to the steers, or 197 pounds, 497 pounds and 635 pounds respectively to lots II, III and IV. To secure the amounts of pork that might be credited for the one hundred and twenty days, ten elevenths of these amounts were used† or 179 pounds in lot II, 452 pounds in lot III and 577 pounds in lot IV.

From these figures it is seen that the pork produced by the steers varied with the corn in the ration.

FINANCIAL SHOWING.

Without considering the profits from the hogs fed after the steers, the best financial showing was made by lot 1, followed by lots IV, II and III in the order named. Combining the profits from the hogs and the steers, the best showing was made by lot IV followed by lots III, I and II in the order named.

In the preliminary statement at the close of the trial it was pointed out that the results indicated that ear corn could not be fed profitably to fattening steers with the prices prevailing, unless hogs were used to follow the cattle.

The financial returns from the combined hog and cattle feeding operations were highly satisfactory, especially considering the advantages of such operations in solving the problems of soil fertility and of labor distribution throughout the year.

FEEDING TRIALS WITH COTTONSEED MEAL, AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FED WITH CORN SILAGE FOR FINISHING YEARLING STEERS, WINTER 1918-19

The steer feeding conducted during the winter of 1918-19 was a continuation of the work started in 1916 to secure data on cottonseed meal, and cottonseed meal and varying proportions of corn, fed with corn silage for fattening beef steers.

Forty steers, averaging 610.2 pounds were divided into four groups as nearly equal as possible in breeding, quality, condition, conformation and weight. Younger cattle were used than in the 1916-17 work and they were carried for a longer period. The steers were started on feed December 11 and were fed one hundred and forty days, being put on the market about May 1. By finishing at that time, advantage was secured of seasonal prices and extension of the feeding period into the extremely warm weather was avoided. With the exception of the matter of rations, the cattle in all of the lots were fed and handled in a manner as nearly as possible identical. The rations used in each of the lots were similar to those used in the corresponding lots in 1916-17.

CATTLE.

The cattle used were yearling beef steers mostly grade Shorthorns, bought on the St. Louis market in December, 1918. While possibly not as good as the steers produced each year on the Experiment Station farm out of cows bred up from native stock by the use of pure bred Hereford, Short-horn and Angus bulls, they would have graded as good to choice feeders, possessing quality frequently difficult to obtain locally.

*"Pork Production," by W. W. Smith, page 276. "Feeds and Feeding," by Henry and Morrison, page 587.

†While this method of calculation admits of considerable error, the approximation should be of value in giving a fairly accurate idea of the pork which can be made with the different rations.

FEED AND FEED PRICES.

Cottonseed meal was charged against the cattle at \$62.00 per ton. Corn was fed in the ear and was charged at \$1.50 per bushel. Silage was charged at \$7.00 per ton. Tankage fed to hogs following the steers was charged at \$5.10 per hundred pounds.

RATIONS

Lot I received from three pounds of cottonseed meal daily per thousand pounds of weight of steers in the beginning of the trial to eight pounds of cottonseed meal daily per thousand pounds weight at the close. Lot II received from two pounds of cottonseed meal and three pounds of broken ear corn daily per thousand pounds weight to seven pounds of cottonseed meal and 6.25 pounds of broken ear corn daily per thousand pounds. Lot III received from one pound of cottonseed meal and four pounds of broken ear corn per thousand pounds to six pounds of cottonseed meal and 12.5 pounds of corn per thousand pounds. Lot IV received cottonseed meal from one pound daily per thousand pounds weight in the beginning to five pounds daily per thousand pounds weight at the close, and broken ear corn from five pounds daily per thousand pounds weight at the beginning to 18.75 pounds daily per thousand pounds weight at the close. The steers in each lot received all of the corn silage they would eat.

TABLE V. AVERAGE DAILY RATION BY SUB-PERIODS, WINTER 1918-19

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration.	C.S.M. Silage Medium Corn Ration.	C.S.M. Silage Heavy Corn Ration.
First Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	2.76	2.22	1.56	1.21
Broken ear corn (lbs.)-----		2.77	5.36	7.90
Corn silage (lbs)-----	33.63	34.09	32.20	26.96
Second Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	3.87	3.30	2.62	2.01
Broken ear corn (lbs.)-----		4.17	8.21	13.96
Corn silage (lbs)-----	35.00	35.80	25.3	20.30
Third Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	4.89	4.37	3.56	2.74
Broken ear corn (lbs.)-----		4.58	8.90	14.29
Corn silage (lbs)-----	35.00	34.80	25.4	22.23
Fourth Sub-Period (56 days)				
Cottonseed meal (lbs.)-----	5.95	5.44	4.67	4.11
Broken ear corn (lbs.)-----		4.80	9.73	15.00
Corn silage (lbs)-----	41.34	34.80	29.7	20.74
Av. daily ration for entire period (140 days)				
Cottonseed meal (lbs.)-----	4.68	4.16	3.42	2.85
Broken ear corn (lbs.)-----		4.23	8.38	12.92
Corn silage (lbs)-----	37.26	34.65	28.46	22.19

The concentrates were gradually increased as the feeding trial progressed while the steers were put on practically a full feed of silage from the first. The silage consumed varied inversely with the corn used in the ration. The total dry matter and total nutrients in the ration and the net energy values of the ration increased as corn was added.

TABLE VI. SUMMARY OF FEEDING TRIALS WITH COTTONSEED MEAL, AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FED WITH CORN SILAGE FOR FINISHING STEERS, WINTER 1918-19

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration.	C.S.M. Silage Medium Corn Ration.	C.S.M. Silage Heavy Corn Ration.
Date of Trial.....	December 11, 1918 to April 29, 1919			
Length of Trial.....	140 Days			
Breeding of Steers.....	Mostly Grade Shorthorns			
Age of Steers.....	Yearlings			
Quality.....	Good to Choice			
Initial Valuation per cwt.....	\$.25			
Number of Animals.....	10	10	10	9*
Initial weight, total (lbs.).....	5971.	6162.7	5993.3	5670.
Average initial weight (lbs.).....	597.1	616.3	599.3	630.
Final weight, total (lbs.).....	8558.	8836.	8903.	8391.6
Average final weight (lbs.).....	855.8	883.6	890.3	932.4
Total gain (lbs.).....	2587.	2673.3	2903.	2721.6
Average gain per steer (lbs.).....	258.7	267.3	290.3	302.4
Average daily gain per steer (lbs.).....	1.85	1.91	2.08	2.16
Weight of steers at market, total (lbs.).....	8380.	8560.	8770.	8280.
Average weight at market, total (lbs.).....	838.	856.	877.	920.
Average shrink per steer (lbs.).....	17.8	27.6	13.3	12.4
Percent of shrink.....	2.08	3.12	1.49	1.33
Dressing per cent. based on market weight.....	49.54	53.6	53.49	56.44
Dressing per cent. based on home weight.....	48.51	51.93	52.69	55.69
Feed consumed, total				
Cottonseed meal (lbs.).....	6557.9	5816.9	4783.7	3586.
Broken ear corn (lbs.).....		5926.4	11737.	16282.
Corn silage (lbs.).....	52165.	48517.	39847.	27958.
Feed consumed per steer				
Cottonseed meal (lbs.).....	655.8	581.7	478.4	398.4
Broken ear corn (lbs.).....		592.6	1173.7	1809.1
Corn silage (lbs.).....	5216.5	4851.7	3984.7	3106.4
Average daily feed per steer				
Cottonseed meal (lbs.).....	4.68	4.16	3.42	2.85
Broken ear corn (lbs.).....		4.23	8.38	12.92
Corn silage (lbs.).....	37.26	34.65	28.46	22.19
Feed required per cwt. of gain				
Cottonseed meal (lbs.).....	253.49	217.59	164.78	131.76
Shelled corn (lbs.)†.....		177.25	323.44	478.6
Corn silage (lbs.).....	2016.4	1814.9	1372.6	1027.3
Cost of 100 pounds of gain.....	\$ 14.92	\$ 17.85	\$ 18.58	\$ 20.50
Selling price per cwt.....	12.75	13.00	13.25	14.00
Gross receipts per steer.....	106.84	111.28	116.20	128.80
Shipping and selling expense per steer.....	6.28	6.42	6.58	6.90
Net receipts per steer.....	100.56	104.86	109.62	121.90
Initial valuation per steer in feed lot.....	55.23	57.00	55.44	58.28
Feed cost per steer.....	38.59	47.71	53.94	61.99
Initial valuation and feed cost per steer.....	93.82	104.71	109.38	120.27
Profit per steer.....	6.74	.15	.24	1.63

As in the preceding trial, the average daily gain per steer varied with the corn fed in the ration. The following tabulation shows the average daily gain by sub-periods:

†For the purpose of comparison the corn eaten per hundred pounds of gain was reduced to shelled basis.

*There were originally ten steers in each of the lots, one steer in lot IV became lame, however, and had to be taken out at the end of the second sub-period. It was estimated that up to the time of his removal he consumed the average amount of feed eaten by the whole lot and, on this basis, he was figured entirely out of the experiment, leaving only nine steers in that lot.

TABLE VII. AVERAGE DAILY GAIN BY SUB-PERIODS 1918-19

RATION	LOT			
	I	II	III	IV
	C.S.M Silage	C.S.M Silage Light Corn Ration	C.S.M Silage Medium Corn Ration	C.S.M Silage Heavy Corn Ration
First Sub-Period, 28 Days, (lbs.)-----	1.73	1.55	2.06	1.7
Second Sub-Period, 28 Days, (lbs.)-----	1.88	2.45	1.95	3.1
Third Sub-Period, 28 Days, (lbs.)-----	1.65	1.75	2.37	2.1
Fourth Sub-Period, 56 Days, (lbs.)-----	1.99	1.89	2.00	1.95
Av. daily gain for entire period, 140 days, (lbs.)---	1.85	1.91	2.08	2.16

From this it will be seen that while there was some variation in the average daily gains during the different sub-periods this difference was not nearly as marked as in the previous trial. The gains were smaller than in the 1916-17 trial which may have been due to the fact that the cattle were younger and smaller, or that they were not of quite the same quality as those used in the first trial. The gain and the average daily gain as shown in the summary are based on the initial and final weights in the feed lot. If calculated from the initial weight in the feed lot and the final weight at market, there would have been again practically no difference in the gains made by lot I, receiving cottonseed meal as the sole concentrate, and lot II receiving the light corn ration.

The shrink was extraordinarily light in all lots. As in the previous trial, it was smaller in the lots receiving the medium and heavy corn rations than in the other lots. The selling price and dressing per cent increased with the higher per cent of corn in the ration*.

The dry matter consumed per hundred pounds of gain was smallest in lot I and greatest in lot II. The total nutrients and the net energy values required per cwt. of gain were smallest in lot I and greatest in lot IV, increasing as corn was added in the ration. The dry matter, digestible nutrients and net energy values per cwt. of gain were smaller than in the preceding trial. This was notwithstanding the longer feeding period and was probable due to the younger age of the cattle.† The cost of gains varied from \$14.92 per cwt. in lot I to \$20.50 in lot IV, increasing with the addition of corn. The gains were more expensive this year than in the first trial, due to the advance in feed prices.

HOGS FOLLOWING STEERS

Ten shoats averaging about seventy-five pounds were put in each lot and were allowed to run for a limited time each day to self feeders containing shelled corn and tankage in separate compartments. Lot I was allowed access to the self-feeder for two hours each day and all of the other lots one hour a day. The following is a summary of the results obtained:

*The following comments on the different lots by Mr. F. W. Manker, Beef Department, Swift & Co., are based on a study of the carcasses.

Lot I. "Common quality, carry very little fat."

Lot II. "While not as good quality and shape at the nine steers (lot IV), show a more even distribution of fat especially on the rounds."

Lot III. "Have fair quality, show large frame and shallow loins, a fair covering of fat."

Lot IV. "Are the best quality cattle and carry most fat, although fat is not evenly distributed over carcass."

†"Influence of Age on Cost of Fattening", "Fattening Calves, Yearlings and Two year Olds", and "Feeds and Feeding", Henry and Morrison, pages 433 and 434.

TABLE VIII. HOGS FED IN LOTS WITH STEERS, 1918-19
 Number of Hogs Used per Lot-----10
 Value of Pork produced-----\$20.00 per cwt.

RATION	LOT.			
	I	II	III	IV
Initial weight, total (lbs.)-----	724.27	731.70	745.00	755.00
Average initial weight (lbs.)-----	74.23	73.17	74.5	75.5
Final weight, total (lbs.)-----	1796.	1710.	1836.	2022.
Average final weight (lbs.)-----	179.6	171.	183.6	202.2
Total gain, pork produced (lbs.)-----	1053.7	978.3	1096.	1267.
Average gain per hog (lb.s)-----	105.37	97.83	109.6	126.7
Average daily gain per hog (lbs.)-----	.753	.699	.783	.905
Feed consumed, total				
Shelled corn (lbs.)-----	4432.	3307.	2971.5	2491.5
Tankage (lbs.)-----	556.	267.	258.25	210.
Average daily feed per hog				
Shelled corn (lbs.)-----	3.166	2.362	2.122	1.78
Tankage (lbs.)-----	.397	.191	.184	.15
Feed required per cwt. of gain				
Shelled corn (lbs.)-----	420.6	338.	271.1	196.6
Tankage (lbs.)-----	52.8	27.3	23.6	16.6
Cost of 100 lbs. of gain-----	\$ 13.96	\$ 10.45	\$ 8.47	\$ 6.11
Value of gain made-----	210.74	195.66	219.20	253.40
Cost of feed-----	147.07	102.20	92.76	77.45
Profit-----	63.67	93.46	126.44	175.95
Profit per hog-----	6.37	9.35	12.64	17.60

The weight of hogs per thousand pound weight of cattle was greater than in 1916-17, more pork was made and a larger amount of feed was consumed by the hogs following the steers. The following table showing the amount of feed required per hundred pounds of pork produced during each of the two years presents an interesting study:

TABLE IX. FEED REQUIRED PER HUNDRED POUNDS OF PORK PRODUCED AFTER STEERS, 1916-17 AND 1918-19

RATION	LOT			
	I	II	III	IV
	C.S.M.	Light Corn Ration.	Medium Corn Ration.	Heavy Corn Ration.
1916-17--				
Corn (lbs.)-----	405.70	303.00	208.00	177.80
Cottonseed meal (lbs.)-----	30.5	26.3	25.7	18.3
Total (lbs.)-----	436.2	329.3	233.7	196.1
1918-19--				
Corn (lbs.)-----	420.6	338.	271.1	196.6
Tankage (lbs.)-----	52.8	27.3	23.6	16.6
Total (lbs.)-----	473.4	365.3	294.7	213.2

In order to show how much of the gains made by the hogs could be legitimately credited to the steers, a check lot of hogs not following cattle should have been carried each year with access to self feeders containing the same feeds used in these trials. By comparing the feed consumed per hundred pounds of gain, however, in the different lots each year with averages given by Smith and by Henry and Morrison*, it will be seen that very little, if any, saving was effected from the droppings of the steers in lot I where cottonseed

*Tabulations by Smith, based on thirty-five experiments with corn and protein supplement, give 436.23 pounds as the average amount of corn and supplement eaten per hundred pounds gain. An average of eight experiments shows 378.82 pounds of corn and 24.53 pounds of tankage eaten for each hundred pounds of gain. (Pork production, W. W. Smith, page 276.) In thirty-two trials (according to Henry and Morrison, page 587), an average of 441 pounds of corn and supplement were required for one hundred pounds of gain.

meal was the sole concentrate fed to the steers. By using Lot I as a check, the following tabulation, based on calculations using the tables of digestible nutrients given by Henry and Morrison shows the percent of gain and the gain made by the hogs in Lots II, III and IV., which might be credited to the cattle.

TABLE X. GAINS BY HOGS CREDITED TO STEERS, 1916-17 AND 1918-19

Steer Ration	LOT					
	Lot II Light Corn Ration		Lot III Med'm Corn Ration		Lot IV Heavy Corn Ration	
	Percent	Pounds	Percent	Pounds	Percent	Pounds
1916-17 -----	24.57%	179.14lbs.	46.61%	451.78lbs.	55.14%	557.22lbs
1918-19 -----	19.84%	194.08lbs.	35.32%	387.11lbs.	53.21%	674.17lbs

Valuing the pork made after the steers in 1918-19 at twenty cents per pound, lots II, III and IV would be credited respectively with \$38.81, \$77.42 and \$134.83 per lot, or \$3.88, \$7.74 and \$14.98 per steer.

FINANCIAL SHOWING 1918-19

Without considering the pork produced, the best financial showing was made by lots I, IV, III, and II as named. Adding the value of the pork credited to the different lots to the profit from the steers and the best financial showing was made by lot IV, followed by lots III, I and II in the order named. Combining the profit from the steers and hogs the results were highly satisfactory, indicating that with the prices of feed and livestock prevailing during the period of this trial good profits could be made from the feeding of cattle and hogs.

FEEDING TRIALS WITH COTTONSEED MEAL, AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN AND COTTONSEED MEAL FED WITH CORN SILAGE FOR FINISHING TWO-YEAR OLD STEERS, SPRING 1920

Forty steers averaging 805 pounds were used in this trial, being fed in four lots, corresponding to those used in the two trials already reported. Some of the cattle used were bought from local cattle raisers and some were bred and raised by the Mississippi Agricultural Experiment Station. An additional lot was fed this year, in which molasses was substituted for corn in the concentrate portion of the ration. The results obtained from the molasses feeding will be reported in a bulletin on that subject. As in previous trials, with the exception of the concentrate portion of the rations, all variable factors were eliminated as far as possible. The cattle were started on feed January 16 and were fed for one hundred and twelve days. Their initial valuation in the feed lot was \$8.50 per cwt.

HOGS.

Shoats averaging about a hundred pounds were used after the cattle, the number being regulated by the amount of corn fed to the steers. The hogs received no feed other than that secured from the steers. At the beginning the total weight of hogs in lot I was two hundred and fifty pounds; in lot II four hundred and ten pounds; in lot III, five hundred and fifteen pounds; in lot IV, seven hundred and eighty-two pounds. At the conclusion of the third sub-period, the hogs were changed and the number used reduced, indicating that too many hogs were used in the lots during the first part of the trial. The pork made was credited to the steers at thirteen cents per pound, or its value locally at the conclusion of the feeding trials.

FEED PRICES

Cottonseed meal was charged against the cattle at \$72.00 per ton, corn at \$1.50 per bushel and corn silage at \$8.00 per ton. The reason for charging corn silage at \$8.00 per ton instead of \$7.00, as in the 1918-19 work was the increased cost of labor the latter year.

RATIONS

The steers in each lot were given all the corn silage they would consume. In addition lot I received cottonseed meal from 2.4 pounds per head daily at the beginning to 7.6 pounds per head daily at the close. Lot II received cottonseed meal from 1.6 pounds per head daily at the beginning to 6.6 pounds per head daily at the close, and shelled corn from 2.4 pounds per head daily at the beginning to 4.8 pounds per head daily at the close. Lot III received cottonseed meal from .8 pounds per head daily at the beginning to 6. pounds per head daily at the close, and shelled corn from 3.2 pounds per head daily at the beginning to 10. pounds per head daily at the close. Lot IV received cottonseed meal from .8 pounds per head daily at the beginning to 5. pounds per head daily at the close, and shelled corn from 4. pounds per head daily at the beginning to 14.8 pounds per head daily at the close.

TABLE XI. AVERAGE DAILY RATION BY SUB-PERIODS, SPRING 1920

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration.	C.S.M. Silage Medium Corn Ration.	C.S.M. Silage Heavy Corn Ration.
First Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	3.64	2.77	2.01	1.58
Corn (lbs.)*-----		2.78	5.57	7.86
Corn silage (lbs.)-----	34.00	32.50	32.90	26.20
Second Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	5.00	4.20	3.60	2.60
Corn (lbs.)-----		4.30	8.63	12.96
Corn silage (lbs.)-----	46.70	41.10	39.10	23.90
Third Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	6.30	5.40	4.70	3.80
Corn (lbs.)-----		4.47	9.35	14.25
Corn silage (lbs.)-----	58.70	42.30	37.60	28.00
Fourth Sub-Period (28 days)				
Cottonseed meal (lbs.)-----	7.34	6.36	5.79	4.83
Corn (lbs.)-----		4.80	10.00	14.80
Corn silage (lbs.)-----	50.60	45.70	41.10	29.40
Av. daily ration for entire period (112 days)				
Cottonseed meal (lbs.)-----	5.57	4.68	4.03	3.19
Corn (lbs.)-----		4.09	8.39	12.47
Corn silage (lbs.)-----	47.43	40.39	37.64	26.86

It will be noted that the silage consumed by the steers in lot I increased for the first three twenty-eight day periods and decreased for the last twenty eight days. In lot II, the increase in the consumption of silage continued for each of the succeeding four periods, while in lots III and IV, the consumption of silage was greatest during the last period. The consumption of silage in the different lots varied as in the other trials inversely with the corn in the ration. The dry matter and digestible nutrients in the ration increased as corn was added, in each instance corresponding with the weight of the steers rather closely to the average of the four years trial reported herein. The net energy values of the rations used also increased as corn was added. The nutritive ratio widened with the use of corn in the ration.

*During the first and second sub-periods and part of the third, broken ear corn was fed, while for the remainder of the trial shelled corn was substituted. In this table, all corn is reduced to the shelled basis.

TABLE XII. SUMMARY OF FEEDING TRIALS WITH COTTONSEED MEAL AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FED WITH CORN SILAGE FOR FINISHING STEERS, SPRING 1920

Date of Trial.....January 16, 1920 to May 7, 1920
 Length of Trial.....112 Days
 Breeding of Steers.....Angus, Hereford, and Shorthorn Grades
 Age of Steers.....Two Years Old
 Quality.....Good to Choice
 Initial Valuation per cwt.....\$8.50

RATION	LOT			
	I	II	III	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration.	C.S.M. Silage Medium Corn Ration.	C.S.M. Silage Heavy Corn Ration.
Number of Animals.....	10	10	10	10
Initial weight, total (lbs.).....	8045.	7979.00	8110.00	8060.
Average initial weight (lbs.).....	804.5	797.9	811.	806.
Final weight, total (lbs.).....	9926.	10226.	10838.	10910.
Average final weight (lbs.).....	922.6	1022.6	1083.8	1091.
Total gain (lbs.).....	1881.	2247.	2728.	2850.
Average gain per steer (lbs.).....	188.1	224.7	272.8	285.
Average daily gain per steer (lbs.).....	1.68	2.01	2.44	2.54
Weight at market (lbs.).....	9210.	9530.	10120.	10330.
Average weight at market (lbs.).....	921.	953.	1012.	1033.
Total shrink (lbs.).....	716.	696.	718.	580.
Shrink per steer (lbs.).....	71.6	69.6	71.8	58.
Percent. of shrink.....	7.21	6.81	6.63	5.32
Dressing percent, based on market weight.....	55.13	55.28	55.85	57.1
Dressing per cent, based on home weight.....	51.15	51.52	52.15	54.06
Pork produced by hogs after steers (lbs.).....	25.	155.	330.	223.
Feed consumed, total				
Cottonseed meal (lbs.).....	6240.	5246.	4508.	3568.
Shelled corn (lbs.).....		2131.5	4437.25	6637.75
Broken ear corn (lbs.).....		3057.	6196.5	9155.
Corn silage (lbs.).....	53210.	45245.	42160.	30078.
Feed consumed per steer				
Cottonseed meal (lbs.).....	624.	524.6	450.8	356.8
Shelled corn (lbs.).....		213.15	443.73	663.78
Broken ear corn (lbs.).....		305.7	619.65	915.5
Corn silage (lbs.).....	5321.	4524.5	4216.	3007.8
Average daily feed per steer				
Cottonseed meal (lbs.).....	5.57	4.68	4.03	3.19
Shelled corn (lbs.).....*		4.09	8.39	12.46
Corn silage (lbs.).....	47.51	40.40	37.64	26.86
Feed required per cwt. of gain				
Cottonseed meal (lbs.).....	331.74	233.47	165.25	125.19
Shelled corn (lbs.).....*		203.69	334.37	489.85
Corn silage (lbs.).....	2828.81	2013.57	1545.45	1055.37
Cost of 100 pounds of gain.....	\$ 23.26	\$ 21.92	\$ 21.35	\$ 21.85
Selling price per cwt.....	11.60	11.60	12.00	12.25
Gross receipts per steer.....	106.84	110.55	121.44	126.54
Shipping and selling expense per steer.....	4.28	4.38	4.55	4.62
Net receipts per steer.....	102.56	106.17	116.89	121.92
Initial valuation per steer in feed lot.....	68.38	67.82	68.94	68.51
Feed cost per steer.....	43.75	49.24	58.25	62.27
Initial valuation and feed cost per steer.....	112.13	117.06	127.19	130.78
Profit or loss per steer.....	-9.57	-10.89	-10.30	-8.86
Profit or loss per steer, crediting pork†.....		-8.88	-6.01	-5.96

In the different lots, the average daily gain increased with the increased use of corn in the ration. The following tabulation shows the average gain by sub-periods of twenty-eight days each:

*For the purpose of comparison the corn eaten per hundred pounds of gain was reduced to shelled basis.

†Pork was credited to steers at 13 cts. per cwt. No feed was fed to hogs following cattle.

TABLE XIII. AVERAGE DAILY GAIN BY SUB-PERIODS, SPRING 1920

RATION	LOT			
	I	II	III.	IV
	C.S.M. Silage	C.S.M. Silage Light Corn Ration.	C.S.M. Silage Medium Corn Ration.	C.S.M. Silage Heavy Corn Ration.
First Sub-Period, 28 days, (lbs.)-----	1.39	1.72	1.96	1.88
Second Sub-Period, 28 days, (lbs.)-----	2.02	1.66	2.57	3.25
Third Sub-Period, 28 days, (lbs.)-----	1.50	2.13	1.86	1.09
Fourth Sub-Period, 28 days, (lbs.)-----	1.81	2.52	3.35	3.96
Av. daily gain entire period, 112 days, (lbs.)-	1.68	2.01	2.44	2.54

The gains held up well in all of the lots throughout the entire feeding period. In lots II, III and IV, the gains were the greatest during the last twenty-eight days. The per cent of shrink was smallest again in lot IV, but was heaviest in lot I. As in the earlier trials it was smaller in lots III and IV, receiving the medium and heavy corn rations than in lot II, receiving the light corn ration, or lot I where cottonseed meal was the sole concentrate fed. The dressing per cent increased as corn was added in the ration*. There was no difference in the selling price of lots I and II. The selling price of lots II, III and IV correlated rather closely with the dressing per cent.

The dry matter eaten per cwt. of gain varied inversely as corn was added in the ration. The digestible nutrients and net energy values per cwt. of gain were smallest in lot III and greatest in lot I. The nutritive ratios of the rations used compared closely with those used in 1918-19, as well as to the averages for the four years' trials.

The gains this year were the most expensive of any during the four years' work due to the extremely high feed prices prevailing. They were highest in lot I and lowest in lot III.

More pork was made behind the steers in lot III, receiving a medium corn ration than behind those in lot IV, where a greater amount of corn was fed to the cattle. This may have been due partly to the number and partly to the individuality of the hogs used. Two shoats were kept behind the steers in lot I until the last sub-period. These showed a loss to that time of forty pounds. During the last sub-period, one hog was kept in lot I and made a gain of fifteen pounds. This indicates that not more than one 100 lb. shoat should be used to follow ten steers, fed only on cottonseed meal and corn silage.

Where no pork was credited to the steers in either lot, it is seen that the best financial showing was made by lot IV followed by lots I, III and II in the order named. In each lot there was a loss on the operations. This was due to economic conditions generally unfavorable to the finishing of cattle. The fact that lot I made a better showing than lot II could not be charged against the corn used in the ration of lot II as the cost of gains was cheapened thereby, but the better financial showing of lot I was due rather to the economic conditions just mentioned. Where the pork produced behind the cattle was credited, the loss decreased as the corn was increased in the ration used.

The steers used in these trials sold at the highest figures that any Mississippi beeves had brought that year. The top of the market on beef steers for the day they were sold was \$13.00 per cwt.

*According to the report received from the Dressed Beef Department of Armour & Company, the percentage of fat as follows: Lot I, 3.6%; lot II, 3.93%; lot III, 5.55%; and lot IV, 5%.

FEEDING TRIALS WITH COTTONSEED MEAL, AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN AND COTTONSEED MEAL FED WITH CORN SILAGE FOR FINISHING TWO-YEAR OLD STEERS 1920-21

Due to prevailing economic conditions unfavorable to the finishing of cattle, the number of lots this year was reduced to three, lot IV being dropped. Twenty-five steers were used averaging in weight 862 pounds nine being put in lot I and eight each in lots II and III. Most of the steers used were bred and raised on the station farm, though a few were purchased locally. In quality and condition they were comparable with those used in the earlier trials.

The number of hogs following the cattle was regulated by the amount of corn in the steer ration. One hog was kept in lot I. During the first part of the trial two hogs were kept in lot II and for the latter part, when a heavier corn ration was being fed, three were used. In lot III three hogs were used at the beginning and four towards the end of the trial. When put into the lots the hogs averaged about one hundred pounds.

The cattle were started on feed December 31 and the trial was concluded April 23.

FEED PRICES

Cottonseed meal was charged at \$40.00 per ton, corn \$1.00 per bushel and corn silage at \$5.00 per ton.

RATIONS

The rations in each of the lots were the same as were used in the corresponding lots in the previous trials and similar methods were used of bringing the cattle up to full feed.

TABLE XIV. AVERAGE DAILY RATION BY SUB-PERIODS, 1920-21

RATION	LOT I C.S.M. Silage	LOT II C.S.M. Silage Light Corn Ration.	LOT III C.S.M. Silage Medium Corn Ration.
First Sub-Period (28 days)			
Cottonseed meal (lbs.)-----	3.77	2.92	2.13
Corn (lbs.)-----		3.63	7.35
Corn silage (lbs.)-----	40.92	40.96	37.56
Second Sub-Period (28 days)			
Cottonseed meal (lbs.)-----	5.66	4.75	3.75
Corn (lbs.)-----		5.88	11.88
Corn silage (lbs.)-----	47.22	42.95	35.69
Third Sub-Period (28 days)			
Cottonseed meal (lbs.)-----	7.11	6.25	5.03
Corn (lbs.)-----		6.50	13.10
Corn silage (lbs.)-----	50.34	43.91	33.71
Fourth Sub-Period (30 days)			
Cottonseed meal (lbs.)-----	8.67	7.75	6.63
Corn (lbs.)-----		6.87	13.88
Corn silage (lbs.)-----	52.93	40.96	30.83
Av. daily ration for the entire period (114 days)			
Cottonseed meal (lbs.)-----	6.34	5.46	4.47
Corn (lbs.)-----		5.74	11.59
Corn silage (lbs.)-----	47.85	42.00	34.26

As in the former trials the consumption of silage decreased in the different lots as the per cent of corn increased in the ration. In lot I the consumption of silage increased for each sub-period, while lot II showed an increase up to the last sub-period, when there was a small decline. In lot III there was, after the first, a decrease in the silage consumption in each succeeding sub-period. The nutritive ratio in the different lots widened as the per cent of corn increased in the ration.

TABLE XV. SUMMARY OF FEEDING TRIALS WITH COTTONSEED MEAL AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FED WITH CORN SILAGE FOR FINISHING STEERS, WINTER 1920-21

Date of Trial.....December 30, 1920 to April 23, 1921
 Length of Trial.....114 Days
 Breeding of Steers.....Angus, Hereford, and Shorthorn Grades
 Age of Steers.....Two year olds
 Quality.....Good to Choice
 Initial Valuation per cwt.....\$7.00

RATION	LOT I. C.S.M. Silage	LOT II C.S.M. Silage Light Corn Ration.	LOT III C.S.M. Silage Medium Corn Ration.
Number of Animals.....	9	8	8
Initial weight, total (lbs.).....	7720.	6911.	6916.
Average initial weight (lbs.).....	857.8	863.9	864.5
Final weight, total (lbs.).....	10373.3	9478.	9443.
Average final weight (lbs.).....	1152.6	1184.75	1180.4
Total gain (lbs.).....	2653.3	2567.	2527.
Average gain per steer (lbs.).....	294.8	320.88	315.9
Average daily gain per steer (lbs.).....	2.58	2.81	2.77
Weight of steers at market, total (lbs.).....	9720.	8900.	8860.
Average weight at market (lbs.).....	1080.	1112.5	1107.5
Average shrink (lbs.).....	72.6	72.25	72.9
Percent. of shrink.....	6.29	6.10	6.18
Dressing per cent. based on market weight.....	56.06	55.47	56.77
Dressing per cent. based on home weight.....	52.53	52.09	53.26
Pork produced by hogs after steers (lbs.).....	42.5	200.	370.
Feed consumed, total			
Cottonseed meal (lbs.).....	6509.5	4978.	4081.
Shelled corn (lbs.).....		5234.	10570.4
Corn silage (lbs.).....	49094.	38305.	31242.5
Feed consumed per steer			
Cottonseed meal (lbs.).....	723.28	622.25	510.13
Shelled corn (lbs.).....		654.25	1321.3
Corn silage (lbs.).....	5454.88	4788.13	3905.31
Average daily feed per steer			
Cottonseed meal (lbs.).....	6.34	5.46	4.47
Shelled corn (lbs.).....		5.74	11.59
Corn silage (lbs.).....	47.85	42.00	34.26
Feed required per cwt. of gain			
Cottonseed meal (lbs.).....	245.34	193.23	161.50
Shelled corn (lbs.).....		203.89	418.30
Corn silage (lbs.).....	1850.30	1492.21	1236.35
Cost of 100 pounds of gain.....	\$ 9.53	\$ 11.24	\$ 13.79
Selling price per cwt.....	7.40	7.40	7.40
Gross receipts per steer.....	79.92	82.33	81.96
Shipping and selling expense per steer.....	5.94	6.12	6.09
Net receipts per steer.....	73.98	76.21	75.87
Initial valuation per steer in feed lot.....	60.05	60.47	60.52
Feed cost per steer.....	28.10	36.07	43.56
Initial valuation and feed cost per steer.....	88.15	96.54	104.08
Loss per steer, pork not credited.....	14.17	20.33	28.21
Loss per steer, crediting pork*.....	13.82	18.43	24.74

The average daily gains were larger than in the corresponding lots in either of the previous trials. The largest average daily gain per steer was made in lot II and the smallest in lot I, this being the only trial in which the average daily gain per steer did not increase in each instance with the addition or increase of corn in the ration. As the dry matter and total nutrients in the ration, as well as the net energy values, increased with the addition of corn this is not explained in these data.

*Pork was credited to steers at \$7.50 per cwt. No feed was fed to hogs following cattle.

TABLE XVI. AVERAGE DAILY GAIN BY SUB-PERIOD 1920-21

RATION	LOT I C.S.M. Silage	LOT II C.S.M. Silage Light Corn Ration.	LOT III C.S.M. Silage Medium Corn Ration.
First Sub-Period, 28 days, (lbs.)-----	3.10	2.92	2.92
Second Sub-Period, 28 days, (lbs.)-----	2.69	3.57	3.68
Third Sub-Period, 28 days, (lbs.)-----	2.04	2.03	2.10
Fourth Sub-Period, 30 days, (lbs.)-----	2.52	2.74	2.41
Av. daily gain for entire period, 114 days, (lbs.)-----	2.58	2.81	2.77

From this tabulation it is seen that during the last two sub-periods lot II made greater daily gains than did lot III. The very satisfactory gains in both lots, however, indicate that the cattle were doing well and that neither lot was off feed. In lots I and II less dry matter and digestible nutrients were consumed per cwt. of gain than were consumed by these lots in either of the other trials. The dry matter, digestible nutrients and net energy values increased as corn was added in the ration. The feed costs were the lowest of the four years, due to the light consumption of feed per cwt. of gain and to the decline in feed prices.

The gains made by the hogs after the cattle increased with the increased amount of corn fed to the cattle.

The cattle this year brought \$7.40 per cwt., which was seventy cents below the top for the day on which they were sold, no premium being paid for the corn fed steers over those receiving cottonseed meal as the sole concentrate. The dressing per cent, however, indicated a higher finish in the two lots which received corn than in the cottonseed meal and silage lot. The following statement from the commission firm handling the cattle also bears out this point. Writing in this connection, Mr. J. R. Wooten, of Long, Wooten and Company, says referring to information secured from Swift & Company, who purchased the cattle, "Needless to say their beef man regarded group three as producing the most desirable carcass, group two the next best and group one the poorest."

As in preceding trials the general market condition was responsible for the unfavorable financial showing. Because of the small margin received, losses were recorded in all the lots. These were decreased somewhat when the pork made in the different lots was credited to the steers. The losses increased as the per cent of corn was increased in the ration.

TABLE XVII. RESULTS BY YEARS FOR CONVENIENCE IN COMPARISONS

RATION	LOT I C.S.M. Silage	LOT II C.S.M. Silage Light Corn Ration.	LOT III C.S.M. Silage Medium Corn Ration.	LOT IV C.S.M. Silage Heavy Corn Ration.
Average Daily Gain per Steer (lbs.)				
1916-17 -----	1.99	2.23	2.37	2.52
1918-19 -----	1.85	1.91	2.08	2.16
Spring 1920 -----	1.68	2.01	2.44	2.54
1920-21 -----	2.58	2.81	2.77	
Average -----	2.00	2.19	2.37	2.39
Percent. of Shrink from Feed lot to Market				
1916-17 -----	6.23	8.09	7.44	5.03
1918-19 -----	2.07	3.12	1.49	1.33
Spring 1920 -----	7.21	6.81	6.63	5.32
1920-21 -----	6.29	6.10	6.18	
Average -----	5.56	6.07	5.53	4.05
Dressing Percent. based on Home weight				
1916-17 -----	53.09	51.45	53.45	53.94
1918-19 -----	48.51	51.93	52.69	55.69
Spring 1920 -----	51.15	51.52	52.15	54.06
1920-21 -----	52.53	52.09	53.26	
Average -----	51.39	51.74	52.86	55.14
Margin between cost & selling price per cwt.				
1916-17 ----- \$	3.05	\$ 3.21	\$ 3.53	\$ 4.00
1918-19 -----	3.50	3.75	4.00	4.75
Spring 1920 -----	3.10	3.10	3.50	3.75
1920-21 -----	.40	.40	.40	
Average -----	2.47	2.62	2.92	4.16
Dry Matter in Ration (lbs.)*				
1916-17 -----	23.40	22.19	25.55	26.48
1918-19 -----	14.28	15.99	16.64	17.73
Spring 1920 -----	17.65	18.61	21.14	21.17
1920-21 -----	18.45	21.23	23.51	
Average -----	17.93	19.01	21.16	21.34
Total Nutrients in Ration (lbs.)*				
1916-17 -----	16.62	16.94	20.30	22.10
1918-19 -----	10.25	12.28	13.45	15.02
Spring 1920 -----	12.77	14.32	17.00	17.93
1920-21 -----	13.43	16.62	19.49	
Average -----	12.94	14.72	17.11	17.98
Total Dry Matter per cwt. of gain (lbs.)*				
1916-17 -----	1174.63	994.96	1077.90	1051.87
1918-19 -----	764.79	837.32	802.89	802.40
Spring 1920 -----	1050.84	927.83	867.52	831.77
1920-21 -----	713.57	753.67	848.93	
Average -----	896.04	871.40	890.23	894.50
Total Nutrients per cwt. of Gain (lbs.)*				
1916-17 -----	834.22	759.34	856.27	878.25
1918-19 -----	555.13	643.38	648.99	695.03
Spring 1920 -----	760.12	713.54	697.90	704.50
1920-21 -----	519.36	589.96	703.61	
Average -----	646.37	671.47	719.66	753.85
Nutritive Ratio Used*				
1916-17 -----	1:4.96	1:5.50	1:6.73	1:7.93
1918-19 -----	1:3.79	1:4.65	1:5.47	1:6.24
Spring 1920 -----	1:3.94	1:4.76	1:5.71	1:6.44
1920-21 -----	1:3.67	1:4.72	1:5.72	
Average -----	1:4.07	1:4.88	1:5.88	1:6.83
Net Energy Values in Ration (therms)†				
1916-17 -----	16.19	17.19	20.27	22.28
1918-19 -----	10.30	12.41	13.70	15.41
Spring 1920 -----	12.76	14.44	17.23	18.36
1920-21 -----	13.53	16.90	19.96	
Average -----	12.88	14.84	17.33	18.33
Net Energy values cwt. of Gain (therms)†				
1916-17 -----	812.99	756.40	855.26	885.17
1918-19 -----	557.52	650.05	660.63	713.20
Spring 1920 -----	759.82	719.97	707.21	721.56
1920-21 -----	523.49	599.64	720.47	
Average -----	643.70	676.78	729.20	768.23

Table XVII.—Continued

RATION	LOT I	LOT II	LOT III	LOT IV
	C. S. M. Silage	C. S. M. Silage Light Ration.	C. S. M. Silage Medium Corn Ration.	C. S. M. Silage Heavy Corn Ration.
Digestible Crude Protein in Ration (lbs.)*				
1916-17 -----	2.79	2.61	2.63	2.48
1918-19 -----	2.14	2.17	2.08	2.07
Spring 1920 -----	2.58	2.48	2.53	2.41
1920-21 -----	2.87	2.91	2.90	
Average -----	2.55	2.50	2.49	2.29
Digestible crude protein per cwt. of gain (lbs)				
1916-17 -----	139.91	116.81	110.83	98.33
1918-19 -----	115.97	113.77	100.33	95.95
Spring 1920 -----	153.86	123.81	103.97	94.67
1920-21 -----	111.13	103.21	104.73	
Average -----	127.49	114.12	104.57	96.22

*The total dry matter, total nutrients and digestible crude protein shown are based on calculations using the percentages given in table III appendix, Feeds and Feeding, by Henry and Morrison, 1922 edition.

†The net energy values given herein are based on the table of Net Energy Values by Armsby (Bulletin 459, U. S. Department of Agriculture.) A therm is the quantity of heat required to raise the temperature of 1000 kilograms (2204.6 pounds) of water 1° C. In the Armsby standards, true protein is used instead of crude protein. Digestible crude protein is given here for comparison with the Morrison Modified Wolff-Lehmann Standards.

The average daily gain per steer in all of the trials, except the last, increased consistently with the corn used in the ration. In each of the first three lots the largest daily gains were made in 1920-21. The total dry matter and total nutrients in the ration that year, as well as the net energy values, were a little less than in 1916, and 1917, and the total dry matter and total nutrients, as well as the net energy requirements per cwt. of gain, were less than for either of the other trials. The average weight of the steers used in lots I, II, and III in 1916-17 was heavier by only about five pounds than that of those in 1920-21, while in 1916-17 the length of the trial was one hundred and twenty days, and in 1921 it was one hundred and fourteen days. The apparent difference in economy of gain these two years may have been due to a difference in the moisture content of the corn silage, or to a difference in methods of handling prior to the beginning of the feeding trials.

In each of the lots the dry matter in the ration, as well as the total nutrients and net energy values, were least in 1918-19, when economical gains were made from the standpoint of total nutrients per cwt. of gain. This was due to the use that year of younger and lighter cattle than were used either of the other years. The nutritive ratios widened consistently as corn was added or increased in the ration, varying from 1:3.67 for lot I in 1920-21 to 1:7.93 for lot IV in 1916-17. No harmful effect was noted from the use of the narrow rations in lot I, the economy of gains from the standpoint of total nutrients and net energy requirements usually increasing with the digestible crude protein in the ration. (This, however, may be partly due to the stimulating effect of cottonseed meal for short periods.)

Due to the higher finish the per cent of shrink was usually lower in the lots receiving the medium or heavy corn rations than in the cottonseed meal and light corn lots.

Except in 1920 when lots I and II sold for the same price per cwt., and in 1920-21 when economic conditions were extremely unfavorable to the finishing of cattle the margin between the cost price per cwt. in the feed lot and the selling price per cwt. on the market increased with the increased amount of corn fed.

TABLE XVIII. SUMMARY OF FOUR TRIALS WITH COTTONSEED MEAL, AND COTTONSEED MEAL AND VARYING PROPORTIONS OF CORN FOR FATTENING BEEF STEERS

Total Number of Steers Used-----136
 Breeding-----Angus, Hereford, and Shorthorn Grades
 Age-----Yearlings and Two-year Olds
 Quality-----Good to Choice

RATION	LOT I C.S.M. Silage	LOT II C.S.M. Silage Light Corn Ration.	LOT III C.S.M. Silage Medium Corn Ration.	LOT IV C.S.M. Silage Heavy Corn Ration.
Number of steers used-----	37	36	36	* 27
Average length of feeding period (days)-----	122.	122.	122.	124.
Initial weight of steers, total (lbs.)-----	28671.	27832.7	28092.3	20419.
Average initial weight of steers (lbs.)-----	774.9	-773.1	780.3	756.3
Final weight of steers, total (lbs.)-----	37704.3	37461.	38531.	28406.6
Average final weight of steers (lbs.)-----	1019.	1040.6	1070.3	1052.1
Total gain (lbs.)-----	9033.3	9628.3	10438.7	7987.6
Average gain per steer (lbs.)-----	244.1	267.5	290.	295.8
Average daily gain per steer (lbs.)-----	2.	2.19	2.38	2.39
Weight of steers at market, total (lbs.)-----	35608.4	35188.4	36402.	27257.2
Average weight of steers at market (lbs.)-----	962.4	977.5	1011.2	1009.5
Shrink, total (lbs.)-----	2095.9	2272.6	2129.	1149.4
Average shrink per steer (lbs.)-----	56.6	63.1	59.1	42.6
Percent. of shrink-----	5.56	6.07	5.53	4.05
Feed consumed, total				
Cottonseed meal (lbs.)-----	24546.	20350.	16805.	9443.
Shelled corn (lbs.)-----		19397.	38889.	41711.8
Corn silage (lbs.)-----	221439.	181417.	161940.	96498.
Average feed consumed per steer				
Cottonseed meal (lbs.)-----	663.4	565.28	466.8	349.9
Shelled corn (lbs.)-----		538.8	1080.3	1544.9
Corn silage (lbs.)-----	5984.8	5039.4	4498.3	3574.
Average daily ration				
Cottonseed meal (lbs.)-----	5.44	4.63	3.83	2.82
Shelled corn (lbs.)-----		4.42	8.85	12.46
Corn silage (lbs.)-----	49.05	41.31	36.87	28.82
Feed consumed per cwt. of gain				
Cottonseed meal (lbs.)-----	271.7	211.4	161.	118.3
Shelled corn (lbs.)-----		201.46	372.5	522.2
Corn silage (lbs.)-----	2451.4	1884.2	1551.	1208.
Selling price of cattle per cwt.-----	\$ 10.36	\$ 10.55	\$ 10.83	\$ 12.38*
Margin received**-----	2.47	2.62	2.92	4.16
Dressing per cent. based on home weight-----	51.39	51.74	52.86	55.15
Shipping and selling expense per cwt.†-----	.50	.49	.49	.48
Pork per lot, credited to steers (lbs.)-----	17.5	728.	1539.	1474.
Pork credited per steer (lbs.)-----		20.2	42.8	54.6
Pork credited per 100 lbs. gain made by steers-----		7.56	14.74	18.45

*Lot IV was dropped the last year of the experiment and therefore these data for this lot are not strictly comparable with those for the other lots.

†Shipping and selling expense per cwt. is based on the home weight.

**The margin as here given is the difference between the cost price per cwt. in the feed lot and the selling price per cwt. on the market

The average initial weights of the steers used in the four lots were very close with the exception of those in Lot IV. The average weight of steers in lot IV was lower than in the other lots due to the fact that his lot was dropped the last year of the experiment, when the average weights of the cattle used were considerably above the average of the first three trials.

The average daily gain per head increased with the increased amount of corn in the ration. The finish was also improved by the use of corn as indicated by the selling price per cwt. of the steers and by the dressing per cent.

The selling price per cwt. correlated rather closely with the dressing per cent. The selling price per cwt. and the margin between the cost and selling price per cwt. for lot IV are not strictly comparable with these data for the other lots, as lot IV was dropped the last year of the experiment, when a

margin of only forty cents was received on the lots fed. This reduced the selling price and margin on lots I, II, and III, leaving the figures for lot IV disproportionately high.

The per cent of shrink from the feed lot to market in the different lots was smallest in lot IV and greatest in lot II. It was lighter in lots III and IV where the steers showed higher finish than in lots I and II, which carried a less finish.

The shipping expense, based on home weights was approximately fifty cents per cwt. Based on market weights, it would have run somewhat higher.

The amount of pork produced in the lots, which could be credited to the cattle, was dependent upon the amount of corn used in the ration. In lot I, it will be noted that the total amount of pork produced was only 17.5 pounds indicating that it is not practical to follow cattle with hogs where only cottonseed meal and silage are fed. The pork credited per steer in lots II, III and IV increased in proportion to the corn in the ration, varying from 20.2 pounds per steer in lot II to 54.6 pounds in lot IV. From these data it is evident that when corn is fed hogs should be used to follow the steers.

The dry matter and the total digestible nutrients in the ration* were lowest in lot I and highest in lot IV, increasing as the per cent of corn was increased. The dry matter consumed per hundred pounds of gain was smallest in lot II and greatest in lot I, while the total digestible nutrients per cwt. of gain was smallest in lot I and greatest in lot IV, increasing as corn was added. The nutritive ratio varied from 1:4.07 in lot I to 1:6.83 in lot IV, widening as the per cent of corn was increased. The net energy values of the rations used increased as corn was added, as did the net energy values per cwt. of gain.

During the period of these trials, fluctuations in feed and cattle prices made the fattening of steers more or less hazardous from a financial standpoint, especially when both cattle and feeds were purchased or charged at market prices. These conditions, however, were not peculiar to Mississippi as they prevailed generally over the entire country. Where cattle and feeds are grown by the feeder, the speculation in fattening steers is greatly reduced. By using feed and cattle prices, based on the average for ten years, a more accurate estimate may be obtained of the financial side of cattle feeding and one more favorable to the industry.

The following tabulation, based on the preceding summary, shows the cost of one hundred pounds of gain with the prices of corn and cottonseed meal as shown at the left, and the prices of silage as given at the top of the table.

*The total dry matter and total nutrients in the rations, the total dry matter and nutrients per cwt. of gain, the nutritive ratios, and the net energy values both of the rations and per cwt. of gain are given in table IV. These data are based on calculations using the percentages given in table III, Appendix, Feeds and Feeding, by Henry and Morrison.

TABLE XIX. COST OF ONE HUNDRED POUNDS GAIN IN THE SEVERAL LOTS WITH VARYING PRICES OF COTTONSEED MEAL, CORN, AND SILAGE.

Price		Silage \$4.00 per ton				Silage \$5.00 per ton			
C. S. M. per ton, \$	Corn per Bu., Cts.	Lot No. I C.S.M. Silage	Lot No. II C.S.M. Silage Light Corn Ration.	Lot No. III C.S.M. Silage Medium Corn Ration.	Lot No. IV C.S.M. Silage Heavy Corn Ration.	Lot No. I C.S.M. Silage	Lot No. II C.S.M. Silage Light Corn Ration.	Lot No. III C.S.M. Silage Medium Corn Ration.	Lot No. IV C.S.M. Silage Heavy Corn Ration.
25.00	45.	\$8.30	\$ 8.03	\$ 8.11	\$ 8.09	\$9.52	\$ 8.97	\$ 8.88	\$ 8.70
"	47.5		8.12	8.27	8.32		9.06	9.05	8.93
"	50.		8.21	8.44	8.56		9.15	9.22	9.16
"	52.5	Cost not affected by price of corn.	8.30	8.61	8.79	Cost not affected by price of corn.	9.24	9.38	9.39
"	55.		8.39	8.77	9.02		9.33	9.55	9.63
"	57.5		8.48	8.94	9.26		9.42	9.71	9.86
"	60.		8.57	9.11	9.49		9.51	9.88	10.09
"	62.5		8.66	9.27	9.72		9.60	10.05	10.33
27.50	47.5	\$8.64	8.38	8.48	8.47	\$9.86	9.33	9.25	9.08
"	50.		8.47	8.64	8.71		9.42	9.42	9.31
"	52.5		8.56	8.81	8.94		9.51	9.58	9.54
"	55.	Cost not affected by price of corn.	8.65	8.97	9.17	Cost not affected by price of corn.	9.60	9.75	9.78
"	57.5		8.74	9.14	9.40		9.69	9.92	10.01
"	60.		8.83	9.31	9.64		9.78	10.08	10.24
"	62.5		8.92	9.47	9.87		9.87	10.25	10.47
"	65.		9.01	9.64	10.10		9.96	10.41	10.71
30.00	50.	\$8.98	8.74	8.84	8.85	\$10.20	9.68	9.62	9.46
"	52.5		8.83	9.01	9.09		9.77	9.78	9.69
"	55.		8.92	9.18	9.32		9.86	9.95	9.92
"	57.5	Cost not affected by price of corn.	9.01	9.34	9.55	Cost not affected by price of corn.	9.95	10.12	10.16
"	60.		9.10	9.51	9.79		10.04	10.28	10.39
"	62.5		9.19	9.67	10.02		10.13	10.45	10.62
"	65.		9.28	9.84	10.25		10.22	10.62	10.86
"	67.5		9.37	10.01	10.48		10.31	10.78	11.09
32.50	50.	\$9.32	9.00	9.04	9.00	10.54	9.94	9.82	9.60
"	52.5		9.09	9.21	9.23		10.03	9.99	9.84
"	55.		9.18	9.38	9.47		10.12	10.15	10.07
"	57.5	Cost not affected by price of corn.	9.27	9.54	9.70	Cost not affected by price of corn.	10.21	10.32	10.30
"	60.		9.36	9.71	9.93		10.30	10.48	10.54
"	62.5		9.45	9.88	10.17		10.39	10.65	10.77
"	65.		9.54	10.04	10.40		10.48	10.82	11.00
"	67.5		9.63	10.21	10.63		10.57	10.98	11.24
35.00	52.5	\$9.66	9.36	9.41	9.38	\$10.88	1030	10.19	9.99
"	55.		9.45	9.58	9.62		10.39	10.35	10.22
"	57.5	Cost not affected by price of corn.	9.54	9.74	9.85	Cost not affected by price of corn.	10.48	10.52	10.45
"	60.		9.63	9.91	10.08		10.57	10.69	10.69
"	62.5		9.72	10.08	10.31		10.66	10.85	10.92
"	65.		9.81	10.24	10.55		10.75	11.02	11.15
"	67.5		9.90	10.41	10.78		10.84	11.18	11.38
"	70.		9.99	10.58	11.01		10.93	11.35	11.62
37.50	55.	\$10.00	9.71	9.78	9.76	\$ 11.22	10.65	10.55	10.37
"	57.5		9.80	9.95	10.00		10.74	10.72	10.60
"	60.	Cost not affected by price of corn.	9.89	10.11	10.23	Cost not affected by price of corn.	10.83	10.89	10.83
"	62.5		9.98	10.28	10.46		10.92	11.05	11.07
"	65.		10.07	10.44	10.70		11.01	11.22	11.30
"	67.5		10.16	10.61	10.93		11.10	11.39	11.53
"	70.		10.25	10.78	11.16		11.19	11.55	11.77
"	72.5		10.34	10.94	11.39		11.28	11.72	12.00
40.00	57.5	\$10.34	10.06	10.15	10.14	\$ 11.56	11.01	10.92	10.75
"	60.		10.15	10.31	10.38		11.10	11.09	10.98
"	62.5		10.24	10.48	10.61		11.19	11.25	11.21
"	65.	Cost not affected by price of corn.	10.33	10.65	10.84	Cost not affected by price of corn.	11.28	11.42	11.45
"	67.5		10.42	10.81	11.08		11.37	11.59	11.68
"	70.		10.51	10.98	11.31		11.46	11.75	11.91
"	72.5		10.60	11.14	11.54		11.55	11.92	12.15
"	75.		10.69	11.31	11.78		11.64	12.09	12.38
"	77.5		10.78	11.48	12.01		11.73	12.25	12.61
"	80.		10.87	11.64	12.24		11.82	12.42	12.85
42.50	60.	\$10.68	10.42	10.51	10.52	\$11.90	11.36	11.29	11.13
"	62.5		10.51	10.68	10.76		11.45	11.46	11.36
"	65.		10.60	10.85	10.99		11.54	11.62	11.60
"	67.5	Cost not affected by price of corn.	10.69	11.01	11.22	Cost not affected by price of corn.	11.63	11.79	11.83
"	70.		10.78	11.18	11.46		11.72	11.95	12.06
"	72.5		10.87	11.35	11.69		11.81	12.12	12.29
"	75.		10.96	11.51	11.92		11.90	12.29	12.53
"	77.5		11.05	11.68	12.16		11.99	12.45	12.76
"	80.		11.14	11.84	12.39		12.08	12.62	12.99
"	82.5		11.23	12.01	12.62		12.17	12.79	13.23
"	85.		11.32	12.18	12.86		12.26	12.95	13.46

TABLE XIX—Continued

Price		Silage \$4.00 per ton				Silage \$5.00 per ton			
C. S. M. per ton, \$	Corn per bu., Cts.	Lot No. I C.S.M. Silage	Lot No. II C.S.M. Silage Light Corn Ration	Lot No. III C.S.M. Silage Medium Corn Ration	Lot No. IV C.S.M. Silage Heavy Corn Ration	Lot No. I C.S.M. Silage	Lot No. II C.S.M. Silage Light Corn Ration	Lot No. III C.S.M. Silage Medium Corn Ration	Lot No. IV C.S.M. Silage Heavy Corn Ration
45.00	60.	\$11.02	\$ 10.68	\$ 10.72	\$ 10.67	\$12.24	\$ 11.63	\$ 11.49	\$ 11.28
"	62.5		10.77	10.88	10.91		11.72	11.66	11.51
"	65.		10.86	11.05	11.14		11.81	11.82	11.74
"	67.5		10.95	11.21	11.37		11.90	11.99	11.98
"	70.	Cost not affected by price of corn.	11.04	11.38	11.61	Cost not affected by price of corn.	11.99	12.16	12.21
"	72.5		11.13	11.55	11.84		12.08	12.32	12.44
"	75.		11.22	11.71	12.07		12.17	12.49	12.68
"	77.5		11.31	11.88	12.30		12.26	12.66	12.91
"	80.		11.40	12.05	12.54		12.34	12.82	13.14
"	82.5		11.49	12.21	12.77		12.43	12.99	13.37
"	85.		11.58	12.38	13.00		12.52	13.15	13.61
"	87.5		11.67	12.54	13.24		12.61	13.32	13.84
47.50	62.5	\$ 11.36	11.04	11.08	11.05	\$12.58	11.98	11.86	11.66
"	65.		11.13	11.25	11.29		12.07	12.02	11.89
"	67.5		11.22	11.42	11.52		12.16	12.19	12.12
"	70.		11.31	11.58	11.75		12.25	12.36	12.36
"	72.5		11.40	11.75	11.99		12.34	12.52	12.59
"	75.	Cost not affected by price of corn.	11.49	11.91	12.22	Cost not affected by price of corn.	12.43	12.69	12.82
"	77.5		11.58	12.08	12.45		12.52	12.86	13.06
"	80.		11.67	12.25	12.69		12.61	13.02	13.29
"	82.5		11.76	12.41	12.92		12.70	13.19	13.52
"	85.		11.85	12.58	13.15		12.79	13.36	13.76
"	87.5		11.94	12.75	13.39		12.88	13.52	13.99
"	90.		12.03	12.91	13.62		12.97	13.69	14.22
50.00	65.	\$11.70	11.39	11.45	11.43	\$12.92	12.33	12.23	12.04
"	67.5		11.48	11.62	11.67		12.42	12.39	12.27
"	70.		11.57	11.78	11.90		12.51	12.56	12.51
"	72.5		11.66	11.95	12.13		12.60	12.73	12.74
"	75.		11.75	12.12	12.37		12.69	12.89	12.97
"	77.5	Cost not affected by price of corn.	11.84	12.28	12.60	Cost not affected by price of corn.	12.78	13.06	13.20
"	80.		11.93	12.45	12.83		12.87	13.22	13.44
"	82.5		12.02	12.61	13.07		12.96	13.39	13.67
"	85.		12.11	12.78	13.30		13.05	13.56	13.90
"	87.5		12.20	12.95	13.53		13.14	13.72	14.14
"	90.		12.29	13.11	13.77		13.23	13.89	14.37
"	92.5		12.38	13.28	14.00		13.32	14.06	14.60
"	95.		12.47	13.45	14.23		13.41	14.22	14.84
"	97.5		12.56	13.61	14.47		13.50	14.39	15.07
"	100.		12.65	13.78	14.70		13.59	14.55	15.30
52.52	70.	\$12.03	11.84	11.98	12.05	\$13.26	12.78	12.76	12.65
"	72.5		11.93	12.15	12.28		12.87	12.93	12.89
"	75.		12.02	12.32	12.52		12.96	13.09	13.12
"	77.5		12.11	12.48	12.75		13.05	13.26	13.35
"	80.		12.20	12.65	12.98		13.14	13.43	13.59
"	82.5		12.29	12.82	13.21		13.23	13.59	13.82
"	85.	Cost not affected by price of corn.	12.38	12.98	13.45	Cost not affected by price of corn.	13.32	13.76	14.05
"	87.5		12.47	13.15	13.68		13.41	13.92	14.28
"	90.		12.56	13.31	13.91		13.50	14.09	14.52
"	92.5		12.65	13.48	14.15		13.59	14.26	14.75
"	95.		12.74	13.65	14.38		13.68	14.42	14.98
"	97.5		12.83	13.81	14.61		13.77	14.59	15.22
"	100.		12.92	13.98	14.85		13.86	14.76	15.45
"	102.5		13.01	14.15	15.08		13.95	14.92	15.68
55.00	72.5	\$12.37	12.19	12.35	12.43	\$13.60	13.13	13.13	13.03
"	75.		12.28	12.52	12.66		13.22	13.29	13.27
"	77.5		12.37	12.68	12.90		13.31	13.46	13.50
"	80.		12.46	12.85	13.13		13.40	13.63	13.73
"	82.5		12.55	13.02	13.36		13.49	13.79	13.97
"	85.		12.64	13.18	13.60		13.58	13.96	14.20
"	87.5	Cost not affected by price of corn.	12.73	13.35	13.83	Cost not affected by price of corn.	13.67	14.13	14.43
"	90.		12.82	13.52	14.06		13.76	14.29	14.67
"	92.5		12.91	13.68	14.29		13.85	14.46	14.90
"	95.		13.00	13.85	14.53		13.94	14.62	15.13
"	97.5		13.09	14.01	14.76		14.03	14.79	15.37
"	100.		13.18	14.18	14.99		14.12	14.96	15.60
"	102.5		13.27	14.35	15.23		14.21	15.12	15.83
"	105.		13.36	14.51	15.46		14.30	15.29	16.06

TABLE XIX—Continued

Price		Silage \$4.00 per ton				Silage \$5.00 per ton			
C. S. M. per ton, \$	Corn per Bu., Cts.	Lot No. I C.S.M. Silage	Lot No. II C.S.M. Silage Light Corn Ration.	Lot No. III C.S.M. Silage Medium Corn Ration.	Lot No. IV C.S.M. Silage Heavy Corn Ration.	Lot No. I C.S.M. Silage	Lot No. II C.S.M. Silage Light Corn Ration.	Lot No. III C.S.M. Silage Medium Corn Ration.	Lot No. IV C.S.M. Silage Heavy Corn Ration.
57.50	75.	\$12.71	\$ 12.54	\$ 12.72	\$ 12.81	\$13.94	\$ 13.49	\$ 13.50	\$ 13.41
"	77.5		12.63	12.89	13.04		13.58	13.66	13.65
"	80.		12.72	13.05	13.28		13.67	13.83	13.88
"	82.5		12.81	13.22	13.51		13.76	13.99	14.11
"	85.		12.90	13.38	13.74		13.85	14.16	14.35
"	87.5		12.99	13.55	13.98		13.94	14.33	14.58
"	90.	Cost not affected by price of corn.	13.08	13.72	14.21	Cost not affected by price of corn.	14.03	14.49	14.81
"	92.5		13.17	13.88	14.44		14.12	14.66	15.05
"	95.		13.26	14.05	14.68		14.21	14.83	15.28
"	97.5		13.35	14.22	14.91		14.30	14.99	15.51
"	100.		13.44	14.38	15.14		14.39	15.16	15.75
"	102.5		13.53	14.55	15.38		14.48	15.32	15.98
"	105.		13.62	14.72	15.61		14.57	15.49	16.21
"	107.5		13.71	14.88	15.84		14.66	15.66	16.45
60.00	77.5	\$13.05	12.90	13.09	13.19	\$14.28	13.84	13.86	13.80
"	80.		12.99	13.25	13.43		13.93	14.03	14.03
"	82.5		13.08	13.42	13.66		14.02	14.20	14.26
"	85.		13.17	13.59	13.89		14.11	14.36	14.50
"	87.5		13.26	13.75	14.12		14.20	14.53	14.73
"	90.	Cost not affected by price of corn.	13.35	13.92	14.36	Cost not affected by price of corn.	14.29	14.69	14.96
"	92.5		13.44	14.38	15.14		14.38	14.86	15.19
"	95.		13.53	14.25	14.82		14.47	15.03	15.43
"	97.5		13.62	14.42	15.06		14.56	15.19	15.66
"	100.		13.71	14.58	15.29		14.65	15.36	15.89
"	102.5		13.80	14.75	15.52		14.74	15.53	16.13
"	105.		13.89	14.92	15.76		14.87	15.69	16.36
"	107.5		13.98	15.08	15.99		14.92	15.86	16.59
62.50	80.	13.39	13.25	13.45	13.57	\$14.62	14.19	14.23	14.18
"	82.5		13.34	13.62	13.81		14.28	14.40	14.41
"	85.		13.43	13.79	14.04		14.37	14.56	14.64
"	87.5		13.52	13.95	14.27		14.46	14.73	14.88
"	90.		13.61	14.12	14.51		14.55	14.90	15.11
"	92.5	Cost not affected by price of corn.	13.70	14.29	14.74	Cost not affected by price of corn.	14.64	15.06	15.34
"	95.		13.79	14.45	14.97		14.73	15.23	15.58
"	97.5		13.88	14.62	15.20		14.82	15.39	15.81
"	100.		13.97	14.79	15.44		14.91	15.56	16.04
"	102.5		14.06	14.95	15.67		15.00	15.73	16.28
"	105.		14.15	15.12	15.90		15.09	15.89	16.51
"	107.5		14.24	15.28	16.14		15.18	16.06	16.74
"	110.		14.33	15.45	16.37		15.27	16.23	16.97
65.00	85.	\$13.73	13.70	13.99	14.19	\$14.96	14.64	14.76	14.79
"	87.5		13.79	14.15	14.42		14.73	14.93	15.02
"	90.		13.88	14.32	14.65		14.82	15.10	15.26
"	92.5		13.97	14.49	14.89		14.91	15.26	15.49
"	95.		14.06	14.65	15.12		15.00	15.43	15.72
"	97.5		14.15	15.12	15.90		15.09	15.60	15.96
"	100.		14.24	14.99	15.59		15.18	15.76	16.19
"	102.5	Cost not affected by price of corn.	14.33	15.15	15.82	Cost not affected by price of corn.	15.27	15.93	16.42
"	105.		14.42	15.32	16.05		15.36	16.09	16.66
"	107.5		14.51	15.49	16.29		15.45	16.26	16.89
"	110.		14.60	15.65	16.52		15.54	16.43	17.12
"	112.5		14.69	15.82	16.75		15.63	16.59	17.36
"	115.		14.78	15.98	16.98		15.72	16.76	17.59
"	117.5		14.87	16.15	17.22		15.81	16.93	17.82
"	120.		14.96	16.32	17.45		15.90	17.09	18.05
"	122.5		15.05	16.48	17.68		15.99	17.26	18.29
"	125.		15.14	16.65	17.92		16.08	17.42	18.52

From a study of the preceding tables it will be seen that in small amounts, corn can be substituted for cottonseed meal without increasing the cost of gains at higher prices than in medium amounts, and that it may be substituted in medium amounts at higher prices than in large amounts. It should be borne in mind, however, that the tabulations are based entirely upon what happened in the case of the steers used in these trials and that considerable variation from the figures given may be expected with other bunches of steers handled under other conditions.

The following table shows the maximum price at which corn was substituted for cottonseed meal without increasing the cost of gains per hundred pounds, the price of cottonseed meal being as shown in the left hand column and the price of silage as shown above.

TABLE XX. MAXIMUM PRICE AT WHICH CORN WAS SUBSTITUTED FOR COTTONSEED MEAL IN LOTS II, III AND IV WITHOUT INCREASING COST OF 100 POUNDS OF GAIN.

C. S. M. Ration	SILAGE \$4.00 PER TON						SILAGE \$5.00 PER TON						
	Lot No. II C.S.M. Silage Light Corn Ration.		Lot No. III C.S.M. Silage Medium Corn Ration.		Lot No. IV C.S.M. Silage Heavy Corn Ration.		Lot No. II C.S.M. Silage Light Corn Ration.		Lot No. III C.S.M. Silage Medium Corn Ration.		Lot No. IV C.S.M. Silage Heavy Corn Ration.		
	Price per ton, \$	lb. cts	Price per lb cts	Bu. \$	Price per lb cts	Bu. \$	Price per lb cts	Bu. \$	Price per lb cts	Bu. \$	Price per lb cts	Bu. \$	
25.00	1.250	.937	.525	.855	.479	.843	.472	1.078	.604	.976	.546	.962	.539
27.50	1.375	.975	.546	.892	.500	.880	.493	1.115	.625	1.013	.567	.999	.560
30.00	1.500	1.012	.567	.929	.520	.917	.513	1.153	.646	1.050	.588	1.036	.580
32.50	1.625	1.049	.588	.966	.541	.954	.534	1.190	.667	1.087	.609	1.073	.601
35.00	1.750	1.087	.609	1.004	.562	.990	.555	1.228	.687	1.124	.630	1.109	.621
37.50	1.875	1.124	.630	1.041	.583	1.027	.575	1.265	.708	1.162	.650	1.146	.642
40.00	2.000	1.162	.651	1.078	.604	1.064	.596	1.302	.729	1.199	.671	1.183	.662
42.50	2.125	1.199	.672	1.115	.624	1.100	.616	1.340	.750	1.236	.692	1.220	.683
45.00	2.250	1.237	.692	1.152	.645	1.137	.637	1.377	.771	1.273	.713	1.256	.703
47.50	2.375	1.274	.713	1.189	.666	1.174	.657	1.415	.792	1.310	.734	1.293	.724
50.00	2.500	1.311	.734	1.226	.687	1.211	.678	1.452	.813	1.347	.754	1.330	.745
52.50	2.625	1.349	.755	1.264	.708	1.247	.699	1.490	.834	1.384	.775	1.366	.765
55.00	2.750	1.386	.776	1.301	.728	1.284	.719	1.527	.855	1.422	.796	1.403	.786
57.50	2.875	1.424	.797	1.338	.749	1.321	.740	1.564	.876	1.459	.817	1.440	.806
60.00	3.000	1.461	.818	1.375	.770	1.357	.760	1.602	.897	1.496	.838	1.477	.827
62.50	3.125	1.498	.839	1.412	.791	1.394	.781	1.639	.918	1.533	.858	1.513	.847
65.00	3.250	1.536	.860	1.449	.812	1.431	.801	1.677	.939	1.570	.879	1.550	.868
67.50	3.375	1.573	.881	1.486	.832	1.468	.822	1.714	.960	1.607	.900	1.587	.889
70.00	3.500	1.611	.902	1.524	.853	1.504	.842	1.751	.981	1.644	.921	1.623	.909
72.50	3.625	1.648	.923	1.561	.874	1.541	.863	1.789	1.002	1.682	.942	1.660	.930
75.00	3.750	1.686	.944	1.598	.895	1.578	.884	1.826	1.023	1.719	.962	1.697	.950
77.50	3.875	1.723	.965	1.635	.916	1.615	.904	1.864	1.044	1.756	.983	1.734	.971
80.00	4.000	1.760	.986	1.672	.936	1.651	.925	1.901	1.065	1.793	1.004	1.770	.991

Due to the greater margin usually received in the case of corn feeding and to the pork produced behind the steers, corn can be profitably substituted for cottonseed meal in steer rations at prices somewhat higher than those given in the table.

How much the steer feeder can afford to increase the cost of gains by the use of corn will depend largely upon the premium paid for the improvement obtained in finish and to a less extent upon the price received for the pork made after the cattle. Other factors which may influence the price at which corn can be profitably substituted for cottonseed meal in the fattening of steers are the age and quality of the cattle. With younger cattle, it is possible that corn can be profitably substituted at a little higher price than with older animals. It is generally accepted, also, that for cattle of good quality a greater premium may be expected for improvement in finish than with cattle of the cheaper grades.