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## FEEDING COTTONSEED MEAL TO HOGS.

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STILLWATER, OKLAHOMA.

# Oklahoma Agricultural and Mechanical College Agricultural Experiment Station.

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EXPERIMENT STATION, Stillwater, Oklahoma.

# FEEDING COTTONSEED MEAL TO HOGS.

F. C. BURTIS AND J. S. MALONE.

## SUMMARY.

1. In this experiment where weanling pigs were kept in small pens and fed a grain ration containing one-fifth cottonseed meal and four-fifths corn meal, one-fourth to one-half of the number died after being fed the ration five to seven weeks; those living and fed the above ration, continuously and alternately with corn meal, were fattened with most excellent results.

2. The amount of grain required to produce a pound of gain was practically the same with the pigs getting cottonseed meal as it was with the pigs getting middlings, but was much less than that required by the pigs getting corn meal. The pigs getting one-fifth cottonseed meal and four-fifths corn meal alternating with corn meal, required 34.5 per cent. less grain to produce a pound of gain than the pigs did that were getting only corn meal for their grain.

3. More economical gains, disregarding losses caused by death, were obtained by feeding rations containing cottonseed meal than by feeding either corn meal or a mixture of corn meal and wheat middlings. With corn meal worth 53.5 cents per cwt., wheat middlings, 90 cents, and cottonseed meal \$1.00 per cwt., the gain of the pigs getting one-fifth cottonseed meal and four-fifths corn meal alternating with corn meal cost 23.5 per cent less than the pigs getting two-thirds wheat middlings and one-third corn meal (84 days). The cost of the gain of the corn meal fed pigs was a trifle more than that of those getting middlings in their ration, but the outcome of the former should be considered a failure and unprofitable while the latter was a success and profitable.

## INTRODUCTION.

This is a subject that has been investigated by several agricultural experiment stations, but it is far from exhausted and demands further investigation. Nine farmers out of ten at the present time have the idea that cottonseed meal is not a desirable or safe feed for

hogs under any conditions. In Professor Henry's late book, "Feeds and Feeding," the subject of cottonseed meal for pigs is concluded by the following quotation: "There is no profit whatever in feeding cottonseed in any form, or cottonseed meal, to hogs of any age." This is from a bulletin published some years ago by a southern station. It is not a statement in accordance with the results of later experiments, as the results from several stations show that cottonseed meal can be fed with profit under certain conditions. These results also show that the statement that the use of cottonseed meal as a feed for hogs is attended with great danger to the life of the hog, is true only under certain conditions.

Present results show that for three weeks hogs may be fed a certain amount of cottonseed meal mixed with other grain without danger to their health and that better gains may be obtained than when corn is fed alone. Certain preliminary work indicates that cottonseed meal may constitute part of a hog's ration for the greater part of his life, with good results, but more definite results are needed on this phase of the subject. It is the latter proposition that this station has planned to investigate in a series of experiments, of which the experiment detailed in this bulletin is the first. The results of some preliminary work carried on at this station were published in the tenth annual report.

The following experiment was carried on during the winter of 1900-1901:

#### PLAN OF THE EXPERIMENT.

One lot of pigs was to be fed a grain mixture consisting of one-fifth cottonseed meal and four-fifths corn meal until the pigs were grown and ready for market, provided that they did not die in the meantime. Lot 5 in this experiment was fed as above. Another lot was to be fed the same as the above for four weeks, then the cottonseed meal was to be dropped for two weeks and no grain but corn meal fed, then the former ration of one-fifth cottonseed meal and four-fifths corn meal resumed for four weeks, then corn meal returned to for two weeks, and so on until the pigs were dead or fattened. Lot 6 was fed in this manner. Another lot was to be fed nothing but corn meal to give results to compare with the mixed rations, and Lot 3 was used for this. A fourth lot was to be fed a grain ration consisting of one-third corn meal and two-thirds wheat middlings, a ration that

would furnish about the same food nutrients as the cottonseed meal and corn meal mixture, but that would not endanger the life of the pigs. This ration was fed to Lot 4.

The pigs used in the experiments were sixteen shoats, parts of several litters, farrowed on the college farm late in the fall of 1900, making the pigs about eleven weeks old at the beginning of the experiment, January 11. In size they varied but little, and were thrifty and fair in quality. All were sired by a Poland China boar; part were out of grade Poland China sows, and the rest out of some cross bred Duroc-Jersey Poland China sows. The sixteen were divided into four lots of four pigs each. The following table gives the weight of each pig at the beginning of the experiment and other matters of interest. The weights given are the average weights on January 10, 11 and 12, 1901.

TABLE I.  
Initial weights Jan. 11; sex and breeding of pigs.

LOT 3.				LOT 4.				LOT 5.				LOT 6.			
No.	Wt.	Sex	Dam	No.	Wt.	Sex	Dam	No.	Wt.	Sex	Dam	No.	Wt.	Sex	Dam
46	38	B	{ D-J P-C	39	59	B	{ G P C	45	50	S	{ D-J P-C	49	33	B	{ D-J P-C
50	43	B	{ G P C	53	37	B	{ G P C	47	43	B	{ P-C D-J	54	44	B	{ G P C
41	51	B	{ G P C	52	46	B	{ G P C	48	25	B	D-J	51	53	B	{ G P C
40	53	S	{ G P C	55	41	B	{ G P C	42	67	B	{ G P C	38	55	S	{ G P C

MANAGEMENT AND CARE.

Each lot of pigs had an open pen 9x24 feet, and a space 8x8 in an enclosed piggery. The latter was kept well bedded with straw. Cob charcoal, wood ashes and salt were kept in boxes in the pens at all times, and the pigs ate freely of these. Nothing but water was given for drink. The feeding was done at a regular time twice a day, 6 a. m. and 5 p. m. As fed, all of the grain was mixed with enough water to make a thick slop. During the first part of the experiment the policy was to feed the pigs all the grain they would eat up before the next feed. Most of the lots consumed very heavy rations, and at times there would be a little waste to weigh back. During the latter part of the experiment it was the policy to feed them light, and they were always quite hungry for the next feed, and the results were much

better. From January 14 to April 1 each lot was fed two pounds of sugar beets per pig per day. These were greatly relished by the pigs. In all the lots the pigs very frequently would leave the grain to go and eat beets. During the experiment the lots ate the following amounts of sugar beets and a mixture of cob charcoal, wood ashes and salt.

	Sugar Beets eaten Pounds	Mixture of Charcoal, ashes and salt, fed, Pounds
Lot 3—4 pigs .....	696	302
Lot 4—4 pigs .....	696	287
Lot 5—2 pigs .....	348	199
Lot 6—3 pigs .....	464	247

At the beginning and the ending of the experiment, each pig was weighed on three consecutive days, and on two consecutive days at the ending of each two weeks' period, and one week from these weighings each lot was weighed. Where more than one weight was taken, they were averaged, and the average taken for the ending or beginning weights of a period. For instance the weights given for January 11, are averages of weights on January 10, 11 and 12. This is to obliterate the daily variations due to other causes aside from the gains that the pigs made. The lots were very even in weight and make-up at the beginning of the experiment January 11.

The pigs in Lot 3 were fed no grain but corn meal up to April 5. After this they received the same mixture of grain and treatment as Lot 6; during the first four weeks following April 5, one-fifth cottonseed meal, four-fifths corn meal, then two weeks corn meal. Lots 4, 5 and 6 were fed as planned. Lot 6 was fed the cottonseed meal and corn meal mixture for the first four weeks of the experiment, and then corn meal two weeks and so on as planned. Aside from what is noted in Lot 3 no more changes were made in the plans of any of the lots. The change in the ration of Lot 3 was made because the lot was doing very poorly and two individuals in the lot would never have fattened on the former ration without a change of conditions. After a few weeks the pigs getting nothing but corn meal showed little appetite for their grain. At one time, during the sixth period, March 22, to April 5, the pigs in Lot 5 which were fed continuously on cottonseed meal and corn meal, seemed to tire of their grain and ate poorly, but after

These two weeks of indifference, their appetites returned and they were ready for a full feed. Aside from the above, all the pigs ate well during the experiment and seemed to relish the feed.

RESULTS OF THE EXPERIMENT.

Table II gives the individual weights of the pigs, and grain eaten per lot, for the bi-weekly periods and the gain per pig for 126 days. The partially blank columns are the results of those pigs dying.

TABLE II.

Showing feed eaten per lot and weight of pigs for bi-weekly period.

LOT 3, FED CORN MEAL.						LOT 4, FED 1/3 CORN MEAL, 2/3 MIDLINGS.				
Date	WEIGHTS OF PIGS LBS.				Total grain eaten	WEIGHTS OF PIGS LBS.				Total grain eaten
1901	No. 46	No. 50	No. 41	No. 40	Lbs.	No. 39	No. 53	No. 52	No. 55	Lbs.
Jan. 11	38	43	51	53		59	37	46	41	
Jan. 25	43	49 1/2	65 1/2	67 1/2	144	74	53	63	56 1/2	144
Feb. 8	44 1/2	58	71 1/2	76 1/2	150	84	64	77	72	180
Feb. 22	49	63	77	85	154	92	75 1/2	89 1/2	84	196
Mch. 8	54	68 1/2	85 1/2	94 1/2	163	105	91	109	95	212
Mch. 22	59	74	95 1/2	101 1/2	168	122 1/2	106 1/2	127	116	280
Apr. 5	63	79 1/2	103	108 1/2	168	137 1/2	125	145	127	280
Apr. 19	75	95	122	122	168	144	135	158	139	280
May 3	83 1/2	99 1/2	137	133 1/2	168	169	156 1/2	178 1/2	156 1/2	280
May 17	94	109	149 1/2	145 1/2	190	192 1/2	185 1/2	204 1/2	182 1/2	302
Net gain	56	66	98 1/2	92 1/2		133 1/2	148 1/2	158 1/2	141 1/2	
Average gain, 74.55.						Average gain, 145.				
LOT 5, FED FOUR-FIFTHS CORN MEAL, ONE FIFTH COTTONSEED MEAL.						LOT 6, (For feed see Note II)				
Date	WEIGHTS OF PIGS LBS.				Total grain eaten	WEIGHTS OF PIGS LBS.				Total grain eaten
1901	No. 45	No. 47	No. 48	No. 42	Lbs.	No. 49	No. 54	No. 51	No. 38	Lbs.
Jan. 11	50	43	25	67		33	44	53	55	
Jan. 25	65	57	34 1/2	89	72	44 1/2	52 1/2	70	74	72
Feb. 8	81 1/2	72 1/2	44	114 1/2	94 1/2	57	70	88	93 1/2	102
Feb. 22	95	84 1/2	dead	dead	189	61	77	dead	101	122
Mch. 8	113	101 1/2			106	76	94		125 1/2	142
Mch. 22	127 1/2	111 1/2			110	91	109		146 1/2	188
Apr. 5	140	123			98	96 1/2	118 1/2		163 1/2	182
Apr. 19	156	139			120	114	136		184	189
May 3	176 1/2	150			126	128 1/2	150		199	182
May 17	190	173			148	145 1/2	153 1/2		226	204
Net gain	140	130				112 1/2	119 1/2		171	
Average gain, 135.						Average gain, 134.				

NOTE II.—Grain fed Lot 6, given in Tables III and IV. (Cottonseed meal and corn meal.)  
 Pig No. 51 in Lot 6 died February 15, p. m.; in Lot 5 No. 41,

died February 20, p. m.; and No. 48 February 20, during the night. Pig No. 51 in Lot 6 had been changed from the cottonseed meal-corn meal mixture that it had received for four weeks, to pure corn meal for one week previous to its death. Pigs Nos. 41 and 48 in Lot 5 had received the cottonseed-corn meal mixture for a little less than six weeks prior to their death. The feeding as first planned with Lots 5 and 6 was continued and the rest of the pigs lived and did well.

The small gain of Pig 41 in Lot 3 should be noticed, as it is about half of the average of the lot. The poor results were not due to sickness, but improper feed and conditions for a small growing pig. Pigs of the same size and type in the other lots made regular gains. Under adverse conditions the smaller pigs always suffer more than the larger, more thrifty ones.

## RESULTS BY PERIODS.

TABLE III.

*Giving gains, grain eaten, and grain required for gains.*

BI-WEEKLY PERIODS.	LOT 3.	LOT 4.	LOT 5.	LOT 6.
	Fed Corn Meal	Fed one-third Corn Meal two-thirds Middlings	Fed four-fifths Corn Meal one-fifth Cot- tonseed Meal	Fed four-fifths Corn Meal one-fifth Cot- tonseed Meal*
January 11 to 25—Average per pig. Period I.—14 days.				
Gain, pounds.....	9.85	15.85	15.15	14.15
Daily gain, pounds.....	.70	1.13	1.08	1.01
Grain eaten, pounds.....	36	36	36	36
Lbs. grain eaten for 1 pound gain.....	3.65	2.27	2.37	2.54
January 25 to February 8.—Average per pig. Period II.—14 days.				
Gain, pounds.....	6.50	12.65	16.70	16.70
Daily gain, pounds.....	.46	.93	1.19	1.19
Grain eaten, pounds.....	37.50	45	44.80	49.50
Lbs. grain eaten for 1 pound gain.....	5.77	3.55	2.68	2.96
February 8 to 22—Average per pig. Period III.—14 days.				
Gain, pounds.....	5.90	13.50	12.75	7
Daily gain, pounds.....	.42	.96	.91	.50
*Grain eaten, pounds.....	38.50	49	49	44.75
Lbs. grain eaten for 1 pound gain.....	6.52	3.63	3.84	6.39
February 22 to March 8—Average per pig. Period IV.—14 days.				
Gain, pounds.....	7.10	12.85	17.50	18.40
Daily gain, pounds.....	.51	.98	1.25	1.31
Grain eaten, pounds.....	40.70	53	50.50	47.30
Lbs. grain eaten for 1 pound gain.....	5.73	4.12	2.89	2.57
March 8 to 22—Average per pig. Period V.—14 days.				
Gain, pounds.....	6.90	17.40	12.25	17
Daily gain, pounds.....	.49	1.24	.87	1.21
Grain eaten, pounds.....	42	70	55.50	63
Lbs. grain eaten for 1 pound gain.....	6.09	4.02	4.53	3.71
March 22 to April 5—Average per pig. Period VI.—14 days.				
Gain, pounds.....	6	14.75	12	10.60
Daily gain, pounds.....	.43	1.05	.86	.76
*Grain eaten, pounds.....	42	70	49	60.60
Lbs. grain eaten for 1 pound gain.....	7.	4.75	4.08	5.72

\*During Periods 3 and 6, Lot 6 was fed corn meal.

Table III gives the average results per pig for the first six bi-weekly periods of the experiment. The results per pig are given instead of the results per lot for the reason that some of the lots, after the first few weeks, have one or two pigs less per lot than others. The fact that some of the pigs were dropped out because of death would not strictly admit of the results being compared, but since the pigs were fairly uniform in make-up in each lot at the start, the comparisons between lots on the average basis are allowable for practical purposes. After the ending of the second period two pigs are considered in Lot 5, and three in Lot 6. This table gives in detail in two-week periods, what is given as a whole in Table IV, but there are some facts shown in Table III that are not shown in Table IV. Note the gains made and the grain required to make one pound of gain by Lot 6 in Periods 1 and 2, when they were receiving four-fifths corn meal and one-fifth cottonseed meal, and how the gains drop, and the amount of grain required to produce a pound of gain goes up, in Period 3, where they were on pure corn meal. The gain is less than half as much as that of the preceding two weeks and the grain used to produce a pound of gain was more than double. In the following period when the lot was returned to the cottonseed meal-corn meal mixture the gains went up again to the former standard. When the corn meal was returned to again in the sixth period there was a drop in gains again, but not as marked as in Period 3. And when the cottonseed meal-corn meal mixture was returned to in Period 7 (see Table V), the normal gains were again obtained, which were eight pounds more than when the pigs were getting corn meal in Period 6. In Table III the gains of Lot 5 are shown to have varied from period to period more or less, but not any more than the other lots. Up to the fourth period Lots 4 and 5 were eating about the same amounts of grain, but in the fifth and sixth period Lot 4 ate more than Lot 5. And in these last two periods Lot 6 ate considerably more grain than Lot 5. About this time Lot 5 showed signs of being tired of its rations, but later got over it. The uniformly poor gains of Lot 3 that received corn meal are clearly shown.

#### SUMMARY OF RESULTS UP TO APRIL 5.

Table IV gives a summary of the bi-weekly results given in Table III. The results are the average per pig. Lots 4, 5 and 6 had obtained a very good weight in the 84 days, weighing 134, 132 and 127

pounds respectively, and had made 88, 85 and 82 lbs. gain. It is seen that there is but very little difference in the gains made by these lots, Lot 4 leading by six pounds over Lot 6, and three pounds over Lot 5. These three lots would have sold for light hogs at this time. In the matter of gains Lot 3 had made about half the gains made by the other lots. Two of the individuals were in a very scrawny condition, but the other two were making progress slowly. There was considerable difference in the amount of grain consumed by Lots 4, 5 and 6. Lot 4 ate the most, 22 lbs. per pig more than Lot 5, and 48 pounds per pig more than Lot 6, which compared with the gain made, gives Lot 5 the best standing as to the amount of grain required to produce a pound of gain. The cost of the gains made by these lots varies more than the other results, due to the difference in prices of the feed. The market price of these feeds for the winter of 1900-1901 were taken: Corn meal 53.5 cents per cwt; middlings 90 cents per cwt, cottonseed meal \$1.00 per cwt. Excepting Lot 3 the gain of Lot 4, receiving the corn meal and middlings cost the most, 2.85 cents per pound; that of Lot 6, that received the mixture of four-fifths corn meal and one-fifth cottonseed meal for two-thirds of the time and corn meal for one-third of the time, cost next highest, 2.18 cents per pound; that of Lot 5 that received a continuous ration of four-fifths corn meal and one-fifth cottonseed meal cost least, 1.95 cents per pound. The grain required to produce a pound of gain in Lot 3 was very high for pigs of that size, but the cost of gain is not very much above that of some of the others, due to the low price of corn at that time.

TABLE IV.

	LOT 3	LOT 4.	LOT 5.	*LOT 6.
<b>JANUARY 11 to April 5—84 days.</b>				
	Fed Corn Meal	Fed one-third Corn Meal and two-thirds Middlings	Fed one-fifth Cottonseed Meal and four- fifths Corn M <sup>l</sup>	Fed one-fifth Cottonseed Meal and four- fifths Corn M <sup>l</sup>
<b>Average per Pig.</b>	<b>Pounds</b>	<b>Pounds</b>	<b>Pounds</b>	<b>Pounds</b>
<b>Weight April 5</b> .....	84.5	133.75	131.50	126.50
<b>Gain, pounds</b> .....	42.25	88	85	82.16
<b>Daily gain</b> .....	.50	1.04	1.01	.98
<b>Grain eaten</b> .....	236.75	323	285.80	301.15
<b>Grain eaten per day</b> .....	2.81	3.84	2.72	3.53
<b>Grain required to make 1 lb. gain</b> .....	5.60	3.67	3.37	3.66
<b>Cost of grain to make 1 lb. gain</b> .....	2.99	2.85	1.95	2.18

\*Every two weeks following four weeks, corn meal alone, see Table III.

## CLOSING THE EXPERIMENT.

Table V contains data similar to that in Table IV and the results follow those given there. The change of the feed of Lot 3, that received corn meal in Tables III and IV, to the cottonseed meal-corn meal mixture in Table V, should be noticed. Otherwise the feeds used, and the plans followed were the same as those given in Table III. In period 9, in this Table, note that the gains of Lots 3 and 6 receiving corn meal were considerably better than those in period eight where they received the cottonseed meal-corn meal mixture. That there was no drop in the gains here, when the pigs were put on corn meal, may be explained by the fact that the pigs were about mature, as the older the pig the less the importance of a nitrogenous feed, such as cottonseed meal, for them. But in this table, Period 7, the advantage of changing Lot 3 from corn meal on April 5, (see period 6, Table III), to the cottonseed meal mixture, is clearly shown. In Period 6 the small gain of Lot 3 is very noticeable. As can be seen by the feed eaten, they were eating regularly. The weekly gain, not shown there, was very small. For the two weeks period, one of the pigs, No. 46 given in Table II, made only four pounds gain. No disease was present in the lot and nothing wrong could be seen, except their stunted and scrawny condition.

TABLE V.

BI-WEEKLY PERIODS.	LOT 3.	LOT 4.	LOT 5.	LOT 6.
	* Fed four-fifths Corn Meal and one-fifth Cottonseed Meal	Fed one-third Corn Meal and two-thirds Middlings	Fed four-fifths Corn Meal and one-fifth Cottonseed Meal	* Fed four-fifths Corn Meal and one-fifth Cottonseed Meal
<b>April 5 to 19—Average per Pig. Period VII—14 days.</b>				
Gain, pounds.....	15	10.25	16	18.50
Daily gain, pounds.....	1.07	.73	1.14	1.32
Grain eaten, pounds.....	42	70	60	63
Lbs. grain eaten per lb. of gain.....	2.80	6.82	3.75	3.41
<b>April 19 to May 3—Average per Pig. Period VIII—14 days.</b>				
Gain, pounds.....	9.90	21.10	15.75	14.56
Daily gain, pounds.....	.71	1.51	1.13	1.04
Grain eaten, pounds.....	42	70	63	60.60
Lbs. grain eaten per lb. of gain.....	4.24	3.32	4	4.19
<b>May 3 to 17—Average per Pig. Period IX—14 days.</b>				
Gain, pounds.....	*11.10	26.15	18.25	*18.54
Daily gain, pounds.....	.79	1.87	1.16	1.32
Grain eaten, pounds.....	47.50	75.50	74	68
Lbs. grain eaten per lb. of gain.....	4.28	2.89	4.05	3.67

\*During Period 9, Lots 3 and 6 were fed corn meal.

Table VI gives the results of Table V condensed. No radical change can be seen in the results of Lots 4, 5 and 6 from those given in Table IV. The lots continue about equal in weight. All continued to thrive and it is remarkable that there was scarcely any increase in the grain required to produce a pound of gain in the last forty-two day of the experiment over that required during the first eighty-four days of the experiment. The cost of gain remained about the same as for the first eighty-four days of the experiment. Note that during this period of forty-two days when Lot 3 received the cottonseed meal mixture, that the gains required but 3.42 lbs of grain to produce each pound of gain, and cost but 1.95 cents, while for the eighty-four days (see Table IV) during which time they were fed corn meal, it required 5.6 lbs of grain to produce a pound of gain at a cost of 2.99 cents, and by the change it was made possible to fatten the hogs. At the close of the experiment, May 17, two pigs of Lot 3 were in marketable condition and two were not. All the pigs in Lots 4, 5 and 6 were well finished and made a fine showing. The two pigs of Lot 3, that were not in a marketable condition, were fed for twenty-seven days longer on different feeds in a large lot, and made an average gain of 56 lbs. during that time. The feed cost \$1.15 apiece.

TABLE VI.

	*LOT 3.	LOT 4.	LOT 5.	† LOT 6.
APRIL 5 TO MAY 17—42 days.	Fed one-fifth Cottonseed Meal and four-fifths Corn Meal	Fed one-third Corn Meal and two-thirds Middlings	Fed one-fifth Cottonseed Meal and four-fifths Corn Meal	Fed one-fifth Cottonseed Meal and four-fifths Corn Meal
Average Per Pig	Pounds	Pounds	Pounds	Pounds
Weight May 17.....	124.50	191.25	181.50	178.33
Gain, pounds.....	38.50	57.50	50.50	54.83
Daily gain.....	.92	1.37	1.19	1.30
Grain eaten.....	131.5	215.5	197	191.6
Grain eaten per day.....	3.13	5.13	4.69	4.56
Grain required to make 1 lb. gain.....	3.42	3.74	3.94	3.49
Cost of grain for 1 lb. of gain.....	1.95	2.91	2.47	2.08

\*For four weeks, then corn meal alone for two weeks.

†Pure corn meal part of the time, see Table V.

The market price of fat pigs on May 17, 1901 was \$4.70 per cwt. Two representative pigs of each lot were slaughtered. All of the internal organs were found normal. A local butcher substantiated our

judgment in that all the meat was first class. A difference could be seen between some of the lots but of no practical value. If there was any difference it was in favor of the cottonseed meal fed hogs. The butcher was surprised to find the walls of the intestines of all the hogs entirely free from worm holes, that are almost always present in those of the average hog. We attribute this partially to the charcoal, ashes, and salt that the pigs ate. Worms in hogs are a great drawback to good gains.

## COST OF THE GAINS.

Summing up the results for all the periods including 126 days, the following results per pig are obtained:

TABLE VII.

*Summary for 126 days, per pig.*

Lot No.	Weight May 17	Gain in 126 days	Daily gain	Grain eaten	Grain eaten per pound of gain	Cost of grain	Cost of gain per lb (grain only)
	Pounds	Pounds	Pounds	Pounds	Pounds	Dollars	Cents
Lot 3.....	124.5	78.3	.62	368	4.70	2.04	2.61
Lot 4.....	191.3	145.5	1.15	539	3.70	4.18	2.87
Lot 5.....	181.5	135.0	1.07	483	3.57	3.03	2.24
Lot 6.....	177.7	133.7	1.06	493	3.68	2.93	2.14

From the above it can be seen that a very fair profit was realized upon Lots 3 and 4, and on Lots 5 and 6 if the dead pigs are not taken into account. All of the pigs that died were examined, but no special effort was made to discover the reason why the cottonseed meal killed the pigs. The characteristic symptoms and results of pigs dying from eating cottonseed meal were observed in the case of each pig that died. Another pig in Lot 6 gave early symptoms of cottonseed meal affection, but recovered. It did not interfere with his eating. The pigs that died ate right up to the time of death in a regular manner. Death takes place in about twelve hours after the first symptoms and in many cases in two or three hours.

The results from this experiment may be used as guides at present, and when they are compared with the results of other experiments

of a similar nature now under way at this station, and others planned for the near future, more definite conclusions can be arrived at.

In studying the results the fact should be borne in mind that these pigs were under unfavorable circumstances, restricted to small pens when young. If these pigs had had a wheat pasture to run on, and had been given a light grain ration for about 60 to 90 days, then put on a full feed of grain, the gains probably would have cost a third less. It is not the most economical as a rule to feed weanling pigs a full grain ration. It is the opinion of the writers, based upon preliminary work in this line at this station, that had Lots 5 and 6 been running on green pasture and been fed a rather light grain ration for the first half of the experiment, that no pigs would have died. (See Tenth annual report, page 102 )

As a rule pigs do not die when fed a grain ration containing cottonseed meal if the cottonseed meal is not continued longer than four weeks, although it sometimes happens that they do. No case has come under the notice of the writers where a pig has died if the cottonseed meal mixture has not been continued longer than three weeks. As a rule, if small pigs are shut up in a small pen, and fed a grain mixture containing cottonseed meal to the amount of one-fourth to one-fifth, all the pigs will die inside of eight to ten weeks. But this experiment, and others elsewhere, show that there are exceptions to this. From preliminary work done by this station, and other work under way, it looks as if a ration containing from one-fifth to one-tenth cottonseed meal may be fed in light rations for an indefinite time, if the pigs are running on a green range.

In such a year as the fall of 1901 when corn is very high priced and wheat worth 65 cents per bushel there will be a great advantage in feeding some cottonseed meal to hogs, if proper precautions are followed. The following recommendations have been given by this station and are followed with our hogs at the present time. (Fall of 1901.)

Don't add more than one-fifth cottonseed meal to the grain ration.

Feed rather a light grain ration.

After feeding the ration containing the cottonseed meal for two

or three weeks, drop the cottonseed meal for two or three weeks, after which return to the cottonseed meal mixture for a like duration to be followed by the omission of the cottonseed meal as before.

Endeavor to let the pigs have range and green feed at the same time.

At the present time we consider that the above directions may be followed without danger of losing any pigs, but our future experiments may prove differently.

