EXPERIMENT STATION

OF THE

KANSAS STATE AGRICULTURAL COLLEGE,

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FARM DEPARTMENT.

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FEEDING EXPERIMENTS WITH PIGS ON CORN, WHEAT, KAFFIR CORN AND COTTON SEED MEAL.

The following feeding experiments with pigs were carried out during the early part of the present year. The experiments are divided into three series, comprising altogether thirty-three pigs.

SERIES I.

This experiment was planned with a view to ascertain the relative feeding value of Kaffir corn meal, corn meal and ground wheat. To test it, twelve pigs were selected and divided into three lots of four each. Each pig was given a separate pen and fed separately, a careful record being kept of the feed eaten and the gain made. The pigs had all been bred on the College farm, and averaged eight months old when the experiment began. There were three sows and one barrow in each lot, one of the sows in each lot being a grade Berkshire and the other two a pure Berkshire and a pure Poland China. The barrows in lots I and II were pure bred Berkshires and the barrow in lot III was a pure bred Poland China. These pigs had been running on pasture during the summer of 1894 with some little grain in addition, consisting chiefly of sorghum seed and low grade wheat. Owing to the dry weather of that year, the pasture was

poor and the grain feed was not abundant, so the pigs were of only average weight for their age.

As to the method of experiment the piggery in which they were confined is a small wing of the basement of the barn, built of stone. It is a cold and dark place during winter when the doors must be shut. The feed, as noted, consisted of Kaffir corn, corn and wheat, all three being ground. The Kaffir corn was of the red-seeded variety which has uniformly given the best yield of all the non-saccharine sorghums grown at the Station. It is to be noted that while our mill, the Kelly Duplex, grinds the corn and wheat very satisfactorily, it apparently could not grind the Kaffir corn as fine as desirable. The grain would crack up into little hard bits, which would settle in the water when made into slop, almost like sand.

The experiment began December 27, 1894, and until severe cold weather set in, the feed for the three lots was stirred in water twelve hours before it was fed, but during cold weather it was impossible to keep the slop from freezing and it was, therefore, found necessary to mix it as fed and even then it would frequently freeze in the trough before it could be eaten. This, it will be noted, was a serious drawback to the experiment and accounts, together with the uncongenial quarters, for the fact that the pigs made only small gains. The feeding was done at 6:00 in the morning, at noon and at 5:30 in the afternoon. Each pig was given what it would eat and no more. In addition to the regular feed each pig was supplied with wood ashes and charcoal with a sprinkling of salt and sulphur, in a separate box.

The experiment continued seventy-seven days, from December 27th until March 14th, when the pigs were in fine marketable condition and it was not considered that they could be fed profitably any longer. They were weighed separately every Thursday and their gains noted. The following table gives the results of the experiment in a condensed form. The weekly weighings with feed consumed and gains made by each pig have been omitted for the double purpose of saving space and to avoid tiring the reader.

SERIES I.

LOT I.—KAFFIR CORN MEAL.

No. of Pig.	Breed.	Weight Dec. 27. Pounds.	Weight Mar. 14. Pounds.	Gain in 77 days Pounds	Average Daily Gain Pounds.	Grain Eaten. Pounds.	Grain Eaten per pound of gain. Pounds
1.....	Berk. Sow.	222	373	151	1.96	722.7	4.78
2.....	P C. Sow.	140	249	109	1.42	559.5	5.13
3.....	Berk. Barrow	138	226	88	1.14	466.2	5.29
4.....	Grade Sow.	113	188	75	.97	431.9	5.76
Total.....		613	1036	423	5.49	2180.3	.....
Average.....		153	259	106	1.37	545.1	5.15

LOT II.—CORN MEAL.

5.....	Berk. Sow	189	337	148	1.92	633.3	4.28
6.....	P C, Sow	152	302	150	1.95	656.1	4.37
7	Berk. Barrow	149	285	136	1.77	599.7	4.41
8.....	Grade Sow.....	119	208	89	1.15	405 0	4.55
Total.....		609	1132	523	6.79	2294.1	.....
Average.....		152	283	131	1.70	573.5	4.38

LOT III.—GROUND WHEAT.

9.....	Berk. Sow	195	339	144	1.87	613.63	4.26
10.....	P C. Sow	195	338	143	1.86	604.28	4.22
11.....	P C. Barrow	150	292	142	1.84	563.94	3.97
12.....	Grade Sow	114	234	120	1.56	474.80	3.95
Total		654	1203	549	7 13	2256.65	.....
Average		163	300	137	1.78	564.16	4.11

From the above table it will be seen that lot I was fed on Kaffir corn meal, lot II on corn meal and lot III on ground wheat. The table further shows the breed of each pig and the weight of each at the beginning of the experiment, December 27th. The weights given are the average of two weighings. The next column shows the weight of each pig at the close of the experiment, March 14th. This is the average of three weighings. Next is shown in succession, the gain of each pig during the entire period, the average daily gain of each pig, the total amount of grain eaten by each pig and the grain eaten for each pound of gain, and finally the totals and averages are given under each of these headings.

We will notice in the first place that the average weight of the pigs in lots I and II was ten and eleven pounds, respectively, less than lot III, it being impossible to arrange the breeds in each lot so as to adjust the weights better. Pig No. 1 in the Kaffir corn lot was a thrifty Berkshire gilt, weighing 222 pounds at the beginning of the experiment, which was heavier than any of the others, and to avoid making that lot too heavy it became necessary to select the lightest among the remaining pigs to put with her. As a result this lot is much more uneven than the other two, which militated to some extent against the Kaffir corn.

Next we notice that the grade gilt in each lot was lighter than the purebreds. These grades were somewhat younger than the others, having been farrowed May 10th, while the others were from a month to six weeks older. This fact must not be lost sight of in considering the gain made by each.

It will be noted that although pig No. 1 in the Kaffir corn lot made the largest gain of any in the experiment, which is partly accounted for by her greater size, the gains in that lot as a whole are nevertheless smaller than in lots II and III, by a 100 and 126 pounds respectively. The Berkshire barrow, pig No. 3, proved to be a poor feeder in comparison with the other pure bred pigs. While this defect may in a measure be charged to the feed it was also partly due to his individuality. A thriftier pig would have done better under the same conditions.

The last column in the table is perhaps the most interesting one, since it shows the amount of grain required for each pound of gain. It shows that it required 5.15 pounds of Kaffir corn meal to produce a pound of pork, while it took but 4.38 pounds corn meal to produce a pound of pork, and 4.11 pounds of ground wheat to produce the same results. The red Kaffir corn was here the least effective feed while wheat was the best, closely followed by corn. This comparison is of special interest at this time when Kaffir corn is growing in favor on account of its drougth resisting qualities. Had the pigs to which it was fed been a more even lot the average results might possibly have been more favorable to the Kaffir corn, but the fact remains that pig No. 1, which was decidedly a thrifty animal with a good appetite, required 4.78 pounds of Kaffir corn meal to make a pound of gain, which was more than was requried in any instance of either corn meal or ground wheat to produce the same results. We may therefore conclude that while red Kaffir corn is a very desirable grain and will answer the purposes of a fattening feed very well, it was in this instance not quite equal to either corn or wheat fed under exactly the same conditions. Possibly the results will be better when fed to larger hogs and under more favorable circumstances as to temperature and with grain ground to a finer meal than could be attained by our mill. The writer is convinced that it is essential to grind the grain fine. The seeds are hard and when coarsely ground a considerable percentage pass through the animal undigested.

A comparison of the feeding value of these three feeds in this experiment will place them as follows when converted into terms of each other:

	Ground Wheat. lbs.	Corn Meal. lbs	Kaffir Corn Meal. lbs.
Average number of pounds consumed per pound of gain..	4.110	4.386	5.155

RELATIVE FEEDING VALUE IN POUNDS.

	Ground Wheat lbs.	Corn Meal. lbs.	Kaffir Corn Meal. lbs.
One pound of ground wheat equals		1.067	1.254
One pound of corn meal equals	.937		1.175
One pound of Kaffir corn equals	797	.850	

RELATIVE VALUE IN PER CENT.

	Ground Wheat is worth per cent.	Corn Meal is worth per cent.	Kaffir Corn Meal is worth per cent.
Measured by ground wheat at 100 per cent	100.00	93.72	79.74
Measured by corn meal at 100 per cent	106.72	100.00	85.10
Measured by Kaffir corn meal at 100 per cent	125.47	117.64	100.00

SERIES II.

The second series of experiments comprised four lots, numbered from 1 to IV, of which lot I was fed on corn meal and cotton seed meal, lot II on corn meal, lot III on equal parts of ground wheat and corn meal, and lot IV on ground wheat. The object was two-fold; first, to ascertain the effects of cotton seed meal, and second, to compare corn meal and wheat and a mixture of both, with each other as food for young pigs.

Lot I, it will be noticed, constitutes a separate experiment for the trial of cotton seed meal. The experiment was first begun on January 10th with four small pigs, and, as these were all killed by the cotton seed meal in the course of six weeks, the experiment was continued for seven weeks longer with two sows. The pigs selected had just been weaned and were fairly thrifty pigs. No. 30 was a pure bred Poland China boar pig and the other three Poland China grades. They were first offered a mixture consisting of two-thirds corn meal and one-third cotton seed meal, but they absolutely refused to eat it. The mixture was then changed to five-sixths corn meal and and one-sixth cotton seed meal which they did not refuse. The four pigs were kept in one pen and ate out of the same trough but were weighed individually They were fed three

times daily what they would eat up clean, the feed being stirred in water as it was fed. Although they ate very well for their size they did not relish the feed. They would drink the water first and later apparently eat the grain under protest. They would frequently leave the trough and walk about the pen for a while and then go back to finish up. After a few days their appetites seemed to improve and, as will be seen from the table, they made rapid gains. By January 25th they had become reconciled to the feed and seemed to do well on it. The cotton seed meal was then increased to one fourth the total feed. They would at this date eat about one pound of cotton seed meal between them daily. They continued in apparent good health though they did not show much spirit or activity. They were drowsy and slept nearly all the time when they were not eating. Pig No. 32, the smallest of the lot, succumbed first. It took to coughing violently during the last days of January. On February 1st it refused to eat, but drank a little of the water. On the morning of the 2nd the pig was evidently very sick and refused to eat altogether, and it died at noon of that day. Doctor Mayo held a *post mortem* examination and pronounced death caused by congestion of intestines, lungs and heart. Death resulted in this case in 23 days and the pig being of only half the weight of the others, it could not have eaten more than five pounds of cotton seed meal altogeher.

The accompanying table gives the details of the experiment:

LOT I. A.

CORN MEAL AND COTTON SEED MEAL.

WEEKLY ACCOUNT OF WEIGHT AND GAIN IN POUNDS.

DATE. 1895.	Boar. Pig 30.		Sow. Pig 32.		Sow. Pig 33.		Barrow. Pig 34.		Total.		Av rg.		Gain of lot from January 10th lbs	Average gain of lot from January 10th Pounds	Grain Eaten.		
	Wt.	G'n	Wt.	G'n	Wt.	G'n	Wt.	G'n	Wt.	G'n	Wt	G'n			Corn Meal, lbs.	Cot'n Seed Meal, lbs.	Total lbs.
January 10	32.0	...	15.0	..	31.0	....	41.0	....	119.0	....	29.7	....	....	.....	....	..	.....
January 17	35 5	3.5	16.0	1.0	32.5	1.5	44.5	3.5	128.5	9.5	32.1	2.4	9.5	1.35	34.17	6.83	41.00
January 24	37 5	2.0	17.5	1.5	36.0	3.5	49.5	5.0	140.5	12.0	35.1	3.0	21.5	1.53	35.42	7.08	42.50
January 31	39.0	1.5	16.5	-1.0	37.5	1.5	52.0	2.5	145.0	4.5	36.2	1.1	26.0	1.24	31.56	10.52	42.08
February 7	44.0	5.0	Died Feb. 2		42.5	5.0	57.5	5.5	144.0	15.5	48.0	5.1	41.5	1.48	29.72	9.90	39.62
Feb ary 14	48.5	4.5	.....	.....	47.0	4.5	62.5	5.0	158.0	14.0	52.6	4.6	55.5	1.58	30.27	10.09	40.36
Feb'ary 21	Died Feb. 16	.....	.....	.....	Died Feb. 17	.....	70.0 Died Feb. 25	7.5	70.0	7.5	70.0	7.5	63.0	1.50	11.37	3.79	15.16
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain.	....	16.5	...	1.5	....	16.0	...	29.0	.....	63.0	...	....	....	.....	172.51	48.21	220.72
Grain eaten per pound of gain..														..	2.74	76	3.50

The history of each of the other cases is a repetition of the first. They ate reasonably well until a day or two before they died, and they all had more

or less cough. But they gained much more rapidly than any of the other three lots, fed on corn, wheat, and a mixture of the two, respectively. They seemed at times to gasp for breath. On February 14th pig No. 30 had lost his appetite. He was languid and sick and grew worse as time passed and finally died February 16th, 37 days after the experiment began. No. 33 likewise began with the same symptoms on the 15th, and was found dead early in the morning of the 17th. Pig No. 34 continued well a few days longer, but succumbed on the 25th. All the pigs were submitted to the Veterinary Department for *post mortem* examination, and death in all cases was pronounced to have taken place from the same cause, congestion and inflamation of intestines, lungs and heart.

On the death of the last pig in this lot two sows were put in, instead, weighing respectively 135 and 308 pounds. The table for Lot I, B, shows their weekly weights and gains together with the amount of corn meal and cotton seed meal eaten. The ratio continued one-fourth cotton seed meal and three-fourths corn meal. These sows were fed from February 25th to April 11th, 45 days, during which time each gained 89 pounds or nearly two pounds a day and they made this gain from the average daily consumption of 6.3 pounds of the mixed food per head. The sows were getting fat and showed no signs of disease. This certainly proves that cotton seed meal can be used to advantage for short periods in feeding hogs for market. The following table gives the details in regard to the weights and gains of these sows:

LOT I. B. CONTINUED WITH TWO SOWS.

Date 1895.	Sow 1.		Sow 2.		Total.		Average.		Gain of lot from Feb 25. Pounds	Ave. daily g'n of lot from Feb 25. Pounds	Grain Eaten.		
	Wt.	G'n	Wt.	G'n	Wt.	G'n	Wt.	G'n			Corn Meal. pounds	Cotton Seed, m'l. lbs	Total, lbs.
February 25..	135	...	308	....	443	..	221	....	.....	.....	... .	.....	.....
February 28..	141	6	323	15	464	21	232	11	21	7.00	30.16	10.05	40.21
March 7.....	160	19	340	17	500	36	250	18	57	5.70	62.63	20.87	83.50
March 14.....	176	16	351	11	527	27	263	13	84	4.94	65.63	21 87	87.50
March 21.....	191	15	370	19	561	34	280	17	118	4.91	65.63	21 87	87.50
March 28	205	14	376	6	581	20	290	10	138	4.45	65.63	21.87	87.50
April 4.....	220	15	389	13	609	28	304	14	166	4.36	65.63	21.87	87.50
April 11.....	224	4	397	8	621	12	310	6	178	3.95	66.75	22.25	89.00
Total gain....	....	89	...	89	.....	178	.....	89	.....	.....	422.06	140.65	562.71
Grain eaten per lb of gain.	....	....	....	....	.....	....	.....	....	.....	....	2.37	.79	3.16

Total gain of lot, 178 pounds.

Average daily gain, 3.96 pounds.

Average daily gain per head, 1.98 pounds.

Returning now to lots II, III and IV, fed on corn meal, corn meal and ground wheat in equal parts, and ground wheat respectively, attention is called to the table given herewith, which gives a summary of the results for each lot. The experiment with these was continued for a period of 112 days, from January 10th to May 2d:

LOT II.—CORN MEAL.

No. of Pig.	BREED.	Weight January 10th, pounds	Weight May 2nd, pounds	Gain in 112 days, pounds	Average gain, pounds daily	Grain eaten. Corn Meal lbs.	Grain eaten. G'nd Wh't lbs.	Grain eaten. Total lbs.	Grain eaten per pound o. gain pounds
25	P C. Sow	38.0	86.0	48.0	.43				
29	P. C. Boar	31.0	57.0	26.0	.23				
35	Grade Boar	22.0	30.0	8.0	.07				
36	Grade Barrow	31.0	86.0	55.0	.49				
Total		122.0	259.0	137 0	1.22	999.46			
Av'g.		30.6	64.7	34.2	.30	249.86			7.29

LOT III.—CORN MEAL AND GROUND WHEAT.

31	P C. Sow	33.0	109.0	76.0	.68				
37	Grade Boar	14.0	29.0	15.0	.13				
38	Grade Barrow	44.0	122.0	78 0	.70				
39	Grade Boar	26.0	59.0	33.0	.29				
Total		117.0	319.0	202.0	1.80	557.76	557.76	1115.52	
Av g.		29.2	79.7	50.5	.45	139.44	139.44	278.88	5.52

LOT IV —GROUND WHEAT.

18	P C. Sow	42.0	108.0	66.0	.59				
40	Grade Boar	14.0	42.0	28.0	.25				
42	Grade Barrow	26.0	74 0	48.0	43				
Total		82 0	224.0	142.0	1.27		794.11		
Av'g.		27.3	74.6	47.3	.42		264.70		5.59

The gains were not, satisfactory in any case. Several of the pigs did very poorly. One in lot IV was taken sick and died after the experiment was well under way and, as another one could not be well introduced, we went forward with three in that lot.

So far as the evidence goes, equal parts of corn meal and ground wheat proved to be better than either pure wheat or corn, wheat standing next and corn last.

The confinement to which the pigs were subject as well as the monotonous diet, conditions which were incident to the experiment, are accountable for the poor gains made.

SERIES III.

In the third series of experiments we again took up the question of cotton seed meal as a food for pigs. Two lots of three pigs each, averaging in one case 43 pounds and in the other case 53 pounds, were subjected to the treatment. The experiment began May 2d and continued until June 27th. The details are given in the following table: The pigs were drawn from all three lots in the previous wheat and corn experiment, i. e. pig No. 35 of lot I and No. 29 of lot II had up to May 2d been fed on corn meal exclusively in lot II of the previous experiment. Pig No. 39 in lot I and 37 in lot II were in like manner taken from the lot fed on corn meal and ground wheat. And pig No. 40 of lot I and No. 42 of lot II were drawn from lot IV of the previous experiment fed on ground wheat. They were the runts in each case and the object was to see not only if the cotton seed meal should prove as disastrous as in the former case, but also to ascertain what effect it had upon their gains:

SERIES III.

LOT I. ¼ COTTON SEED MEAL. ¾ CORN MEAL.

Date 1895.	Pig 35.		Pig 39.		Pig 40.		Total.		Average		Aver'g daily gain of lot fm May 2, lbs	Grain Eaten.		
	Weight pounds	Gain, pounds	Weight pounds	Gain, pounds	Weight pounds	Gain, pounds	Weight pounds	Gain, pounds	Weight pounds	Gain, pounds	Gain of lot from May 2, Pounds	Corn Meal, pounds	Cotton seed, m l lbs	Total pounds
May 2	30	....	59	....	42	...	131	....	43.7	....	.....	.....	.....	.....
May 16	35	5	68	9	44	2	147	16	49.0	5.3	16	1.14	40.13	13.37	53.50
May 30	42	7	77	9	49	5	168	21	56.0	7.0	37	1.32	42.20	14.07	56.26
June 13	50	8	93	16	56	7	199	31	66.3	10.3	68	1.62	60.75	20.25	81.00
June 27	58	8	Died June 19		Died June 24		58	8	58.0	8.0	76	1.35	23.41	7.80	31.21
Totals	...	28	.....	34	.. ..	14	.....	76	....	....	.....	.....	166.49	55.49	221.98
Grain eaten per pound of gain													2.19	.73	2.92

LOT II. ½ COTTON SEED MEAL. ½ CORN MEAL.

Date 1895.	Pig 29.		Pig 37.		Pig 42.		Total.		Average		Gain of lot from May 2, lbs.	Average daily gain of lot from May 2, lbs.	Grain Eaten.		
	Weight pounds.	Gain, pounds.	Weight pounds.	Gain, pounds.	Weight pounds.	Gain, pounds.	Weight pounds.	Gain, pounds.	Weight pounds.	Gain, pounds.			Corn Meal, pounds.	Cotton seed m'l, lbs.	Total pounds.
May 2	57	....	29	....	74	....	160	....	53.3	....	....	....	....	....	....
May 16	67	10	34	5	79	5	180	20	60.0	6.7	20	1.42	29.00	29.00	58.00
May 30	83	16	43	9	89	10	215	35	71 6	11 6	55	1 96	37.50	36.50	75.00
June 13	101	18	56	13	102	13	259	44	86.3	14.7	99	2 35	53.50	53.50	107 00
June 27	Died June 16		*65	9	120	18	185	27	92.5	13.5	126	2 25	44.58	44.58	98.16
Totals	.....	44	.....	36	....	46	....	126	....	....	.....	....	164.58	164.58	329.16
Grain eaten per pound of gain	....	....	....	....	....	....	....	....	....	....	.....	....	1.30	1.30	2.60

Dead Weight: Died June 27th.

As will be seen from the above table, lot I was fed on a mixture of three-fourths corn meal and one-fourth cotton seed meal, and lot II was fed on equal parts of corn meal and cotton seed meal. This change of feed had a magic effect on these runts. They began to pick up at once and gained rapidly from the start. All had made very poor gains in the previous experiment, but now their gains were equal to those of the thriftiest pigs that can be found. The experiment lasted 56 days, from May 2d to June 27th. The three pigs in lot I made in that time a gain of 58 per cent of their original weight, and they made a pound of growth on 2.92 pounds of the mixed feed, and those in lot II gained still more rapidly and made a pound of gain on 2.6 pounds of the mixed feed. This brings out the fact that the larger proportion of cotton seed meal produced the best gains. The only change in the condition of these pigs was the feed. They remained in the same piggery where they had been under the previous experiment, where they had the run of a very small yard and they received no green feed whatever. That these runts should take on growth in this fashion is most surprising and proves beyond a cavil the nourishing qualities of cotton seed meal. But, alas! their gains were not to continue long. The first pig to die was No. 29 in lot II. It died on June 16th, 45 days after the beginning of the experiment. The symptoms were the same as in the previous cases, and the *post mortem* examination by Dr. Mayo revealed the same inflamed and congested condition of intestines, lungs and heart. The next one to die was No. 39 in lot I. It died June 19th, 48 days from the beginning of the experiment. This pig went off suddenly. Close watching had revealed nothing wrong with it and it had eaten well until the last. No. 40 in the same lot died next, on June 24th. He too was in apparent good health to the last. He ate his feed well at noon on that day but was dead at 2 o'clock. The fourth one to die was No. 37 in lot II. He died June 27th, 56 days from

the beginning of the experiment, being found dead in the pen on the morning of that date. He had been noticed to breathe rapidly for some days previous, but had eaten his feed well up to the last. There was now but one pig left in each lot and there was scarcely a doubt but that they too would succumb in a very few days. It was, therefore, thought best to see if the effects of the cotton seed meal they had already eaten should prove detrimental if the feed was changed, or in other words, we decided to ascertain if the poison was of a cumulative nature and would remain active even after a change of feed. These two pigs were, therefore, turned into a lot of green oats along with other pigs belonging to the farm. They have never shown the slightest symptoms of any disease and at this writing are alive and doing well.

These experiments together with others of a similar nature at other stations, and the experience of many farmers, prove beyond the peradventure of a doubt that it is not safe to feed cotton seed meal to hogs for more than a short time. The meal used in these experiments was obtained from Mr. J. R. Knox, of Manhattan. Mr. Knox had shipped it from Texas to feed to a herd of Texas steers during the past winter. He turned in some 40 head of hogs to follow these steers, all of which died in the course of six or seven weeks. So the poisonous nature of this feed as hog food had been ascertained before we began the above experiment.

The Farm Department has not attempted to ascertain what the poisonous principle is, or whether it is inherent in all brands of cotton seed meal to the same extent. From what can be learned of the subject it appears that meal which has been kept in stock for some time is more dangerous than fresh meal. This would indicate that the poison might be due to the development of some low form of fungus. There is yet a large field open to experiment for the discovery, if possible, of some mode of treatment that would render the meal innocuous without destroying its nutritive qualities.

SUMMARY

From the foregoing experiments we may draw the following conclusions:

First: In the comparison of wheat, corn and red Kaffir corn, as fattening food for hogs the wheat proved to be the most effective, followed closely by corn; red Kaffir corn, although a good feed, was not equal in fattening qualities to either of the others. It required respectively 4.11 pounds of wheat and 4.38 pounds of corn to produce a pound of gain, while of red Kaffir corn it required 5.15 pounds to produce the same result, but it should be noted in this connection that the experiment was carried out during the coldest portion of the winter and that the hogs were confined strictly to these feeds. Under favorable weather the results would doubtless have been much better, and in like manner, these grains might have given different results if fed in judicious mixtures with other suitable hog feed.

Second: Cotton seed meal proved poisonous to pigs even though fed in

small quantities. A mixture of one-fourth cotton seed meal and three-fourths corn meal was as disastrous as equal parts of these feeds. The pigs died in from three to eight weeks after being put on this feed, the larger ones holding out the longest. *Post mortem* examinations revealed in all cases severe inflamation and congestion of the intestines, lungs and heart. But cotton seed meal produces very rapid gains in both pigs and large hogs, and if the feed is changed before symptoms of disease appear, hogs can be fed cotton seed meal for a short time with the best results, and this experiment would indicate without subsequent deleterious effects.

Third: Equal parts of corn meal and ground wheat proved to be a better food for pigs than either corn or wheat fed separately.

ERRATA.

Page 104, second paragraph, 1st line, for September 27, read December 27.

Page 106, third paragraph, 4th line, for 129 pounds, read 126 pounds.

Page 111, last column of table, 3d line, for 56.26, read 56.27.

Page 112, next to last column of table, 3d line, for 36.50, read 37.50.

Ditto, last column, 5th line, for 98.16, read 89.16.

Ditto, 8th line of text, for 38 per cent, read 58 per cent, and in 9th line, for 292 pounds, read 2.92 pounds.