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Feeding Wheat to Hogs

E.C. Chilcott
South Dakota Agricultural College

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FEEDING WHEAT TO HOGS.

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FEEDING WHEAT TO HOGS.

E. C. CHILCOTT.

QUESTIONS ASKED.

This experiment was undertaken to answer the following questions:—

1. Can the farmers of this state realize more from their wheat by feeding it to hogs, than by selling at present prices for wheat and hogs?

2. Can wheat be profitably fed without some other food to form a balanced ration?

3. Will it pay to grind wheat as food for hogs?

4. How does wheat compare with corn and peas as food for hogs?

5. How does the quality of pork made from wheat compare with that made from corn, peas, and mixed food?

6. How does the average daily gain of hogs fed on an exclusive diet of wheat, corn or peas; compare with that of hogs fed on mixed foods?

7. When should fattening begin and how long should it continue?

ANSWERS OBTAINED.

The answers obtained from this experiment are as follows:—

1. Hogs, averaging about 100 lb in weight, can be purchased near Sept. 1st at $4.50 per hundred live weight, fed three months on nothing but wheat, water, ashes and salt, and an occasional handful of hay or corn fodder, butchered and sold Dec. 1st for $5.50 per hundred dressed; and will return from 56 to 58 cents per bushel for wheat consumed, without allowing anything for manure, or labor in caring for hogs.

2. At present prices wheat can be profitably fed as an entire ration, but it would undoubtedly *pay better* to mix it with some other food, particularly during the earlier stages of fatten ing.

3. Hogs fed on ground wheat made a more rapid and uniform gain, and produced pork of rather nicer quality; but they also consumed more food than those fed upon whole wheat. Those fed ground wheat required 4.81 pounds of wheat to produce one pound of gain, while those fed whole wheat required 4.91 pounds to make the same gain. Ground wheat brought 58 39 cents per bushel, while that fed whole brought 55.83 cents per bushel, a difference of only 2.56 cents per bushel. This would hardly pay for grinding, but considering the better quality of the pork and greater weight, it would probably pay to grind, if it could be done without much extra cost.

4. Ground wheat brought 58.39 cents, whole wheat 55.83 cents, peas 65.36 cents, and corn 60 cents per bushel, on an average, for all the grain consumed during the entire experiment, continuing for 90 days. Hogs fed on peas did much better,in proportion,during the first part of the experiment than they did during the latter part, which would indicate that peas are not as good for a complete ration for a long period as either wheat or corn.

5. The quality of the pork made from corn and ground wheat was about equal, and was superior to that made from

whole wheat, peas or mixed food. That made from mixed food was the fattest (see cuts).

6. The average daily gain of hogs fed on peas was 1.21 pounds, on whole wheat 1.12 pounds, on ground corn 1.40 pounds, on ground wheat 1.32 pounds; and on mixed foods 1.61 pounds.

7. This question was not settled, but it was very plainly demonstrated that a considerably larger return per bushel for food consumed would have been realized if the hogs had been sold at the end of the second period (October 28th). This was particularly true of Lot I, fed on peas. The decrease in rate of gain in proportion to food consumption for those fed cornmeal and wheat was no greater than could be accounted for by the natural result of increased weight and age.

Better results would undoubtedly have been obtained if the change from mixed food and plenty of exercise to close confinement and a single article of food, to which they were not accustomed, had been made gradually; as the number of pounds of food required for a pound of gain was greater during the first period than during the second, whereas, it should have been less.

This question will be made the subject of future experiments.

HISTORY.

On the 5th day of September eight pigs were selected from those raised on the College Farm. Four of them were pure bred Poland Chinas, four months and fifteen days old. The other four were crossbred Duroc Jersey and Poland China, and were four months and twenty-three days old. They were divided into four lots, known as Lot I, II, III and IV. Each lot consisted of one Poland China and one crossbred pig.

As will be seen in the tables of weights, there was quite a difference in weight of the several lots. This could not be avoided without placing two of the same breed together, which we did not deem it advisable to do. All the pigs seemed to be in good health throughout the experiment. One of those in Lot I, had a malformation of the lower jaw-bone, which probably interfered somewhat with its eating, and possibly affected its gain, but as they were given all they would eat, the mere fact

of its not being able to eat quite as fast as its mate did not necessarily prevent it from getting all it wanted to eat, and as the malformation was not such as to interfere with its grinding its food, it does not seem probable that the results would be materially affected by this slight defect. With the possible exception above noted, all the pigs were in good physical condition and a fairly even lot.

Up to the time of beginning this experiment the pigs had been well fed upon swill, consisting largely of kitchen slops, sour milk and whey, with some corn and peas. They also had the run of a good pasture, part of the time, and had been fed rape when not at pasture.

At the beginning of the experiment each lot was put into a small pen in the hog-house, having a small out-door yard attached. Each lot was allowed to eat what it would of hay and early cut corn fodder (without ears). They all had free access at all times to salt and hardwood ashes.

The grain for each of the several lots was soaked in cold water. Each lot was provided with a separate tub in which enough grain to last for several days was placed, and enough water, was added, to not only thoroughly moisten the grain; but to furnish all the water needed by the hog. From time to time more grain and water was added as occasion required. An accurate record was kept of the weight of all grain put into the tubs and the supply was so regulated that they would be emptied at the expiration of each period.

Lot I was fed entirely upon Canada field peas, unground.

Lot II was fed upon spring wheat of rather poor quality, unground.

Lot III was fed upon, Dakota grown, Dent corn, ground.

Lot IV was fed upon spring wheat, same quality as that fed to lot II, ground.

The pigs were all given all the food they could be induced to eat. Each lot was weighed once a week, as will be seen by reference to table of weights.

This experiment began on the 5th day of September and closed on the 6th of December, but as the supply of food was greatly reduced for the last four days, I have used ninety days

as the actual feeding term instead of ninety-two, which was the time that really elapsed between the beginning and ending of the experiment. This term was subdivided into three separate periods.

The first period began Sept. 5th and ended Sept. 30th, twenty-five days.

The second period began Sept. 30th and ended Oct. 28th, twenty-eight days.

The third period began Oct. 28th and ended Dec. 4th, thirty-seven days.

Table of Weights and Gains for Entire Term.

Date of weighing.	Number of days.	Lot I.			Lot II			Lot III			Lot IV.		
		Weight, pounds.	Gain,—pound.	Daily average,—pounds.	Weight,—pounds.	Gain,—pounds	Daily average,—pounds.	Weight,—pounds.	Gain,—pounds	Daily average,—pounds.	Weight,—pound.	Gain,—pounds.	Daily average,—pounds
September 5th	..	184	.	....	174	..	....	191	..	....	205	..	....
" 13th	8	182	18	2.25	191	17	2.12	215	24	3.00	223	18	2.25
" 16th	3	192	10	3.33	198	7	2.33	215	.	....	229	6	2.00
" 23rd	7	207	15	2.14	213	15	2.14	240	25	3.56	240	11	1.56
" 30th	7	224	17	2.43	226	13	1.86	256	16	2.28	263	23	3.28
October 7th	7	246	22	3.14	245	19	1.71	278	22	3.14	288	25	3.56
" 14th	7	273	27	3.86	273	28	4.00	305	27	3.86	315	27	3.86
" 21st	7	290	17	2.43	287	14	2.00	329	24	3.43	330	15	2.14
" 28th	7	310	20	2.86	304	17	2.43	344	15	2.14	350	20	2.84
November 4th	7	328	18	2.57	322	18	2.56	370	26	3.71	375	25	3.56
" 11th	7	343	15	2.14	330	8	1.14	398	28	4.00	390	15	2.14
" 18th	7	355	12	1.71	343	13	1.86	411	13	1.86	406	16	2.28
" 25th	7	367	12	1.71	358	15	2.14	425	14	2.	420	14	2.
December 2nd	7	383	16	2.28	375	17	2.43	452	27	3.86	438	18	2.56
" 6th	4	382	−1	−.25	377	2	.50	444	−8	−2.	443	5	1.25
Average daily gain, pounds	..	....	..	2.42	....	..	2.25	....	..	2.81	....	..	2.64
" " " per head	..	....	...	1.21	....	..	1.12	.....	..	1.40	....	...	1.32

Lot V consisted of two pigs, one Duroc Jersey and Poland China crossbred, and one Poland China. This lot weighed 229 lb on Sept. 5th. It was fed on mixed food, consisting largely of kitchen slops, sour milk and whey; with some corn, peas, and wheat. No record was kept of the amount of food consumed, as much of it was of such a nature that it would be impossible to place any value upon it. This lot was not weighed again until Dec. 6th, when it was found that it weighed 520 lb,

having gained 291 lb in ninety days, or 3.23 lb per day for the lot, or 1.61 lb per head per day.

This is a better gain than was made by any other lot, which would indicate that a mixed diet is better than any one kind of grain, as an entire ration.

Table of Gains, by Periods, per Day, per One Hundred Pounds, and per Bushel of Food Consumed. Consumption of Food by Periods per Day and per pound of Gain.

LOT I.—PEAS.

	No. of days.	Increase in weight. For period.	Increase in weight. Per day.	Feed consumed. Per period.	Feed consumed. Per day.	Pounds feed for 1 lb gain.	Gain for 100 lb feed.	Gain per bushel of feed.
1st Period	25	60	2.40	202	8.08	3.37	29.67	17.90
2nd "	28	86	3.07	283	10.10	3.29	30.39	18.23
3rd "	37	72	1.95	433	11.70	6.01	16.63	9.98
Term	90	218	2.42	918	10.02	4.21	23.75	14.25

LOT II.—UNGROUND WHEAT.

1st Period	25	52	2.08	255	10.02	4.90	20.40	12.24
2nd "	28	78	2.78	349	12.46	4.47	22.37	13.42
3rd "	37	73	1.97	393	10.61	5.39	18.55	11.13
Term	90	203	2.25	997	11.07	4.91	20.36	12.22

LOT III.—CORN MEAL.

1st Period	25	65	2.60	291	11.64	4.47	22.37	12.53
2nd "	28	88	3.14	385	13.75	4.37	22.88	12 81
3rd "	37	100	2.70	483	13.05	4.83	20 70	11 59
Term	90	253	2.81	1159	12.77	4.58	21.83	12.22

LOT IV.—GROUND WHEAT.

1st Period	25	58	2.32	288	11.52	4.96	20.16	12.09
2nd "	28	87	3.10	366	13.07	4.20	23.80	14.28
3rd "	37	93	2.51	490	13.24	5.26	19.01	11.40
Term	90	238	2.64	1144	12.71	4.81	20.79	12.49

LOT V.—MIXED FEED.

Term	90	291	3.23	.....	.....	.....	.....	.....

This table deserves careful study, as it shows not only the relative value of the different foods; but also the number of pounds of the different foods required to produce a pound of gain during the several periods.

The principal object of this experiment being to determine the feeding value of wheat, to the average farmer, it was thought best to conduct the experiment under conditions, as nearly as possible, corresponding to those that would exist on the average farm.

There are, probably, comparatively few farmers in the state, engaged in grain raising, who would be likely to have on hand, at thrashing time, a large enough number of hogs to consume any great amount of wheat. If wheat did not bring more than fifty cents a bushel at harvest time, and hogs weighing from 50 to 100 lb each could be bought for $4.50 per hundred live weight, the farmer could go into the market and purchase such hogs and start, about Sept. 1st, feeding them on wheat alone, under substantially the same conditions existing during this experiment, with a fair prospect of realizing from 55 to 60 cents per bushel for his wheat. It was for this reason, that it was not considered best to place the hogs upon a preliminary diet, composed partly of the food that it was intended should constitute their entire diet, in order to accustom them to it, before they were placed upon that diet exclusively.

It will be noticed that each lot gained less per day, and per hundred pounds of food consumed, during the first period than during the second, whereas, according to the well established rule, that "rate of gain decreases as weight increases" they should have gained more, with a less proportionate consumption of food, during the first, than the second period. The most reasonable explanation of this circumstance is, that it was caused by the sudden change from plenty of exercise and a mixed diet to close confinement and a single article of food. Whenever practicable, such a sudden change should be avoided, but it would not always be possible to do so. The results of this experiment are therefore safer as a guide to the practical farmer than they would have been, had the conditions been such that he could not comply with them.

During the first period one pound of peas was equal to 1.45 pounds of unground wheat, 1.32 pounds of corn meal, or 1.47 pounds ground wheat. During the second period one pound of peas was equal to 1.36 pounds of unground wheat, 1.33 pounds of corn meal, or 1.28 pounds of ground wheat. During the third period one pound of peas was equal to .90 pounds of unground wheat, .80 pounds of cornmeal, or .88 pounds of ground wheat. This would seem to prove that while peas are a valuable food for young growing animals, they are not as well adapted to form an entire ration as either corn or wheat. It should be remembered, however, that after the peas had become distasteful to the hogs there was an unavoidable waste in feeding them; which, undoubtedly, made the consumption of food during the third period appear larger than it really was. This consideration would not, however, affect the daily gain, which fell off far more during this period than did that of the hogs fed upon corn meal, or ground wheat.

During the first period one pound of corn meal was equal to 1.10 pounds of unground wheat, or 1.11 pounds of ground wheat.

During the second period one pound of cornmeal was equal to 1.02 pounds of unground wheat, or .97 pounds of ground wheat.

During the third period one pound of corn meal was equal to 1.11 pounds of unground wheat, or 1.09 pounds of ground wheat.

From this we see that the relative meat producing values of unground wheat, ground wheat and corn meal remained reasonably constant throughout the entire term of feeding.

When we come to consider the relative daily gains, and food consumption, it will be seen that while that of those fed corn meal, and ground wheat remained reasonably constant, there was a marked falling off, in both food consumption and daily gain, in those fed unground wheat. As the object in feeding grain to hogs is to realize a profit on each pound of grain consumed, therefor, the more grain consumed, provided the ratio of consumption to gain remains the same, the greater the profit. It is, therefore, evident that while ground wheat and corn meal were about equal, pound for pound, whole wheat was inferior to either of them when fed alone for three months.

FIRST PERIOD.—TWENTY FIVE DAYS.

	Av. weight at end of period.	Av. daily gain in l ve weight during period.	Av. daily amt. of dry matter in food consumed during period.	Av. amt. of dry matter in food consumed for each pound increase in live weight.
Vermont experiment (41 days)	104	1.28	3.16	2.47
Lot I, peas	112	1.20	3.55	2.96
Lot II, unground wheat	113	1.04	4.40	4.31
Lot III, ground corn	128	1.30	5.12	3.93
Lot IV, ground wheat	132	1.16	5.06	4.35

SECOND PERIOD.—TWENTY-EIGHT DAYS.

Vermont experiment (39 days)	160	1.40	4.65	3.32
Lot I, peas	155	1.53	4.44	2.90
Lot II, unground wheat	152	1.39	5.48	3.98
Lot III, ground corn	172	1.57	6.04	3.84
Lot IV, ground wheat	175	1.55	5.74	3.69

THIRD PERIOD.—THIRTY-SEVEN DAYS.

Vermont experiment (33 days)	202	1.31	5.12	3.96
Lot I, peas	191	.98	5.14	5.29
Lot II, unground wheat	188	.99	4.66	4.74
Lot III, ground corn	222	1.35	5.73	4.25
Lot IV, ground wheat	221	1.25	5.82	4.63

As before mentioned, there is a well established rule, that "the greater the weight the less the rate of increase." In order to test this rule the Vermont Experiment Station conducted a series of experiments, the results of which are reported on page 120 of the Fourth Annual Report of that Station.

As the weight of hogs at close of periods, and the length of periods II, III, and IV of that experiment, correspond aproximately with the first, second, and third periods of our experiment, the accompanying table was prepared for the purpose of ascertaining, if possible, how much of the decrease in rate of gain during the third period was the natural result of increased weight, and how much the result of confining the hogs to a diet composed of but the one kind of food.

The pigs in the Vermont experiment were fed as follows:—

"The feed in general consisted of six quarts of skim milk per day and three quarters of a pound of either corn meal or middlings. This was given each day of the test. As the pigs grew older whatever more food they wanted was made up of a mixture of one part by weight of wheat bran and two parts of gluten meal. The pigs were fed all they wanted, or rather all they could be induced to eat."

This ration was certainly one well calculated to produce the very best of results for a long period, so that we can safely say that whatever decrease in gain, or increase in ratio of consumption to gain, was observed, could only be attributed to the rule above quoted.

Taking the results of the Vermont experiment, then, as a standard, we will now proceed to compare our results with them.

In this table we have calculated the weights and consumption of food *per head* and have reduced the feed to *dry matter*.

The periods in the two experiments do not agree. The first period of our experiment was twenty-five days. The corresponding period in the Vermont experiment was forty-one days. The average weight in the Vermont experiment was 77½ lb; in our experiment Lot I, 97 lb, Lot II, 100 lb, Lot III, 112 lb, Lot IV, 117 lb.

The second period in our experiment was twenty-eight days. The corresponding period in the Vermont experiment was thirty-nine days, and the average weight 132 lb; in our experiment Lot I, 133½ lb, Lot II, 132½ lb, Lot III, 150 lb, Lot IV, 153 lb.

The third period in our experiment was thirty-seven days. The corresponding period in the Vermont experiment was thirty-three days and the average weight was 181 lb; in our experiment Lot I, 173 lb, Lot II, 170 lb, Lot III, 197 lb, Lot IV, 198 lb.

During the first period the advantage was decidedly in favor of the Vermont experiment, as the average weight of their hogs was from 20 lb to 40 lb less than ours. This will help to account for the greater gains in proportion to food consumption in their experiment during this period. During the second and third periods the average weights in the two experiments agreed much more closely.

Comparative Value of One Pound of Dry Matter for Different Periods for Each Lot.

	Ratio of values.		
	1st and 2nd period,	1st and 3rd periods.	2nd and 3rd period.
Vermont experiment	1:1.34	1:1.60	1:1.19
Lot I	1: .88	1:1.78	1:1.82
Lot II	1: .91	1:1.10	1:1.20
Lot III	1: .98	1:1.09	1:1.11
Lot IV	1: .85	1:1.07	1:1.25

As will be seen from the above table, in the Vermont experiment one pound of dry matter fed during the first period was equal to 1.34 lb fed during the second period, or 1.60 lb, during the third period. One pound fed during the second period was equal to 1.19 lb fed during the third period.

In Lot I, one pound fed during the first period was equal to .98 lb fed during the second period, or 1.78 lb, during the third period. One pound fed during the second period was equal to 1.82 lb fed during the third period.

In Lot II, one pound fed during the first period was equal to .91 lb fed during the second period, or 1.10 lb, during the third period. One pound fed during the second period was equal to 1.20 lb fed during the third period.

In Lot III, one pound fed during the first period was equal to .98 lb fed during the second period, or 1.09 lb, during the third period. One pound fed during the second period was equal to 1.25 lb, fed during the third period.

In Lot IV, one pound fed during the first period was equal to .85 lb fed during the second period, or 1.07 lb, during the third period. One pound fed during the second period was equal to 1.25 lb, fed during the third period.

Three points are brought out very strongly by this table:—

1st. The gains, in proportion to food consumed during the first period of our experiment for all four lots, were from two per

cent to fifteen per cent less than for the second period; whereas, in the Vermont experiment, the gain was thirty four per cent greater in the first, than in the second period. 2nd. The gain in proportion to food consumed by Lot 1, during the third period, as compared with either the first or second period, was very much less than that of any of the other lots. 3rd. With the two exceptions above mentioned, the relative rate of gain in proportion to food consumption was, reasonably, uniform for all lots and periods, and corresponded closely with the Vermont experiment.

From these facts we must conclude that;—

1. Hogs that have been accustomed to exercise and a mixed diet, should not be shut up, and confined to one kind of food, at once, or without a preliminary feeding period to gradually accustom them to the changed conditions.

2. Although peas gave better returns than either corn or wheat for the first and second periods, they are not equal to either of them as a single article of food for a long period.

3. The decrease in rate of gain of Lots II, III, and IV during the third period was no greater than could be accounted for by increased age and weight. This would indicate that the length of the feeding period had no greater effect upon the feeding value of corn and wheat, than it had upon mixed feed.

Table of Gains and Shrinkage.

	I.	II.	III.	IV.	V.
	Unground peas.	Unground wheat.	Ground corn.	Ground wheat.	Mixed feed.
Total weight, Sept. 5th	164	174	191	205	229
Total weight, Dec. 6th	382	377	444	443	520
Total gain in live weight	218	203	253	238	291
Per cent. of gain to live weight, Sept. 5th	132.92	116.66	132.46	116.09	127.07
Dressed weight, Dec. 6th	316	313	382	370	443
Shrinkage (pounds)	66	64	62	73	77
Shrinkage (per cent.)	17.	17.	14.	16.5	14.8
Equivolent in live weight to $5.50 dressed	4.55	4.54	4.73	4.59	4.68

The above table gives the weights, shrinkage, gains, percentage of gain to weight, percentage of shrinkage, and amount per hundred live weight, realized from selling at $5.50 per hundred, dressed weight, for each lot.

It will be noticed that in the table of gains and consumption the amount of gain to the bushel of food consumed is the same for both Lot II, and Lot III, namely, 12.22 lb; while Lot IV, gave 12.49 lb for each bushel of grain consumed. This estimate was based upon the total gain in live weight for the entire term of feeding.

In the financial statement it will be seen that the price per bushel realized for the grain fed to the several lots was greater for Lot III, than for Lot II, or Lot IV. This seeming disagreement in the two tables is easily explained, when we consider that the estimates in the financial statement are based upon the dressed weight of the hogs, and that the shrinkage, and, therefore, the price per pound live weight actually realized, varied considerably for the several lots.

Financial Statement.

	Lot I.	Lot II.	Lot III.	Lot IV.
	Peas.	Unground wheat.	Ground corn.	Ground wheat.
Total dressed weight, Dec. 6th	316	313	382	370
Received for dressed pork @ 5½c per pound	$17.38	$17.1[illegible]	$21 01	$20 35
Co-t of hogs, Sept. 5th, @ 4½c per pound, live weight	$ 7.38	$ 7 83	$ 8 59	$ 9.22
Balance to pay for feed	$10 00	$ 9 28	$12 42	$11.13
Feed consumed (bushels)	15.30	16.62	20.71	19.06
Price per bushel realized (cents)	65.36	55.83	60.00	58.39

QUALITY OF PORK.

The quality of the pork of all the lots was good. The principal difference being in the proportion of lean to fat meat. As this is largely a matter of individual taste, or the demands of local markets, it would be difficult to decide which lot was the best.

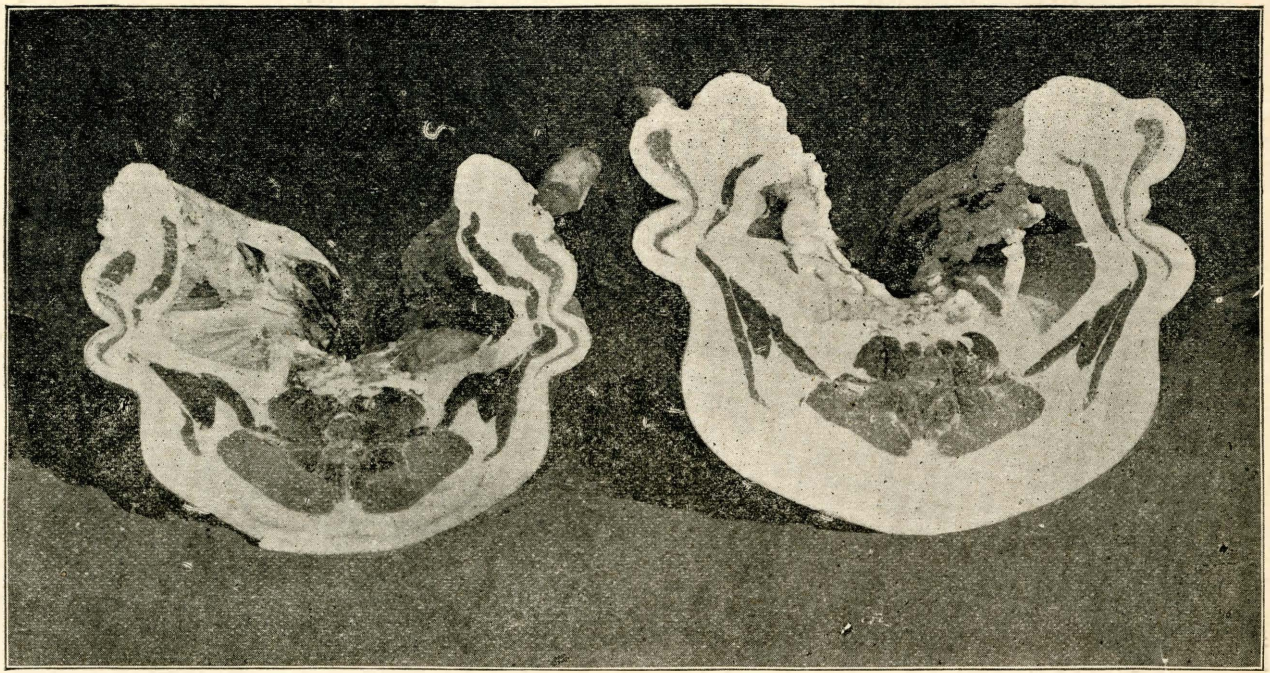
The accompanying cuts are of cross sections taken just back of the kidneys. Care was taken to have the photographs show the exact relative size of the several lots.

Considerable difference will be observed in the proportion of lean to fat meat in the different lots. Lot III, fed on corn meal, not only showed less lean meat in proportion to fat, but there was actually less in amount than in the other lots, if we are to judge from the sections.

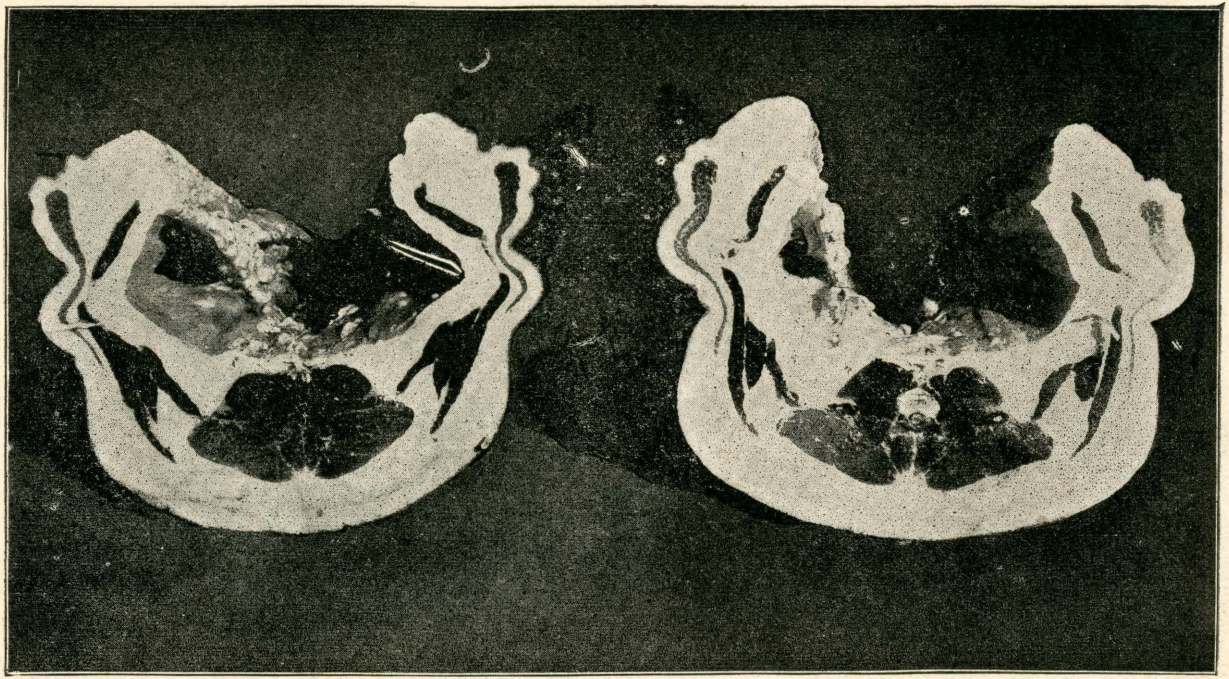
Lot V, fed on mixed feed, produced the greatest amount of leaf lard; but the proportion of lean to fat meat was greater than in Lot III.

In Lots I, II, and IV, the proportion of lean to fat meat did not vary more between the several lots than it did between different individuals of the same lot. The proportion of lean to fat meat was greater, and the amount of lard less, in each of these three lots than in Lot III or V.

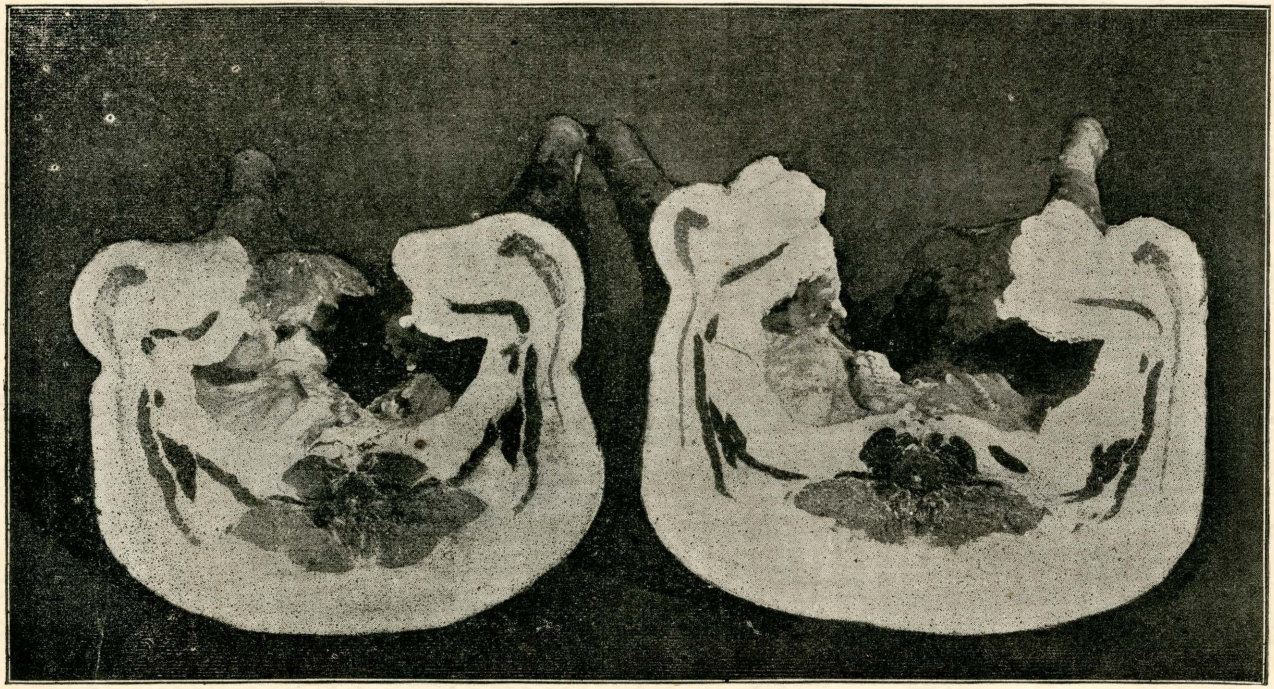
A study of the accompanying cuts will give a better idea of the quality of the pork, as determined by the proportion of lean to fat meat, than can any written description. Aside from this there was little, if any, difference in the quality of the pork of the several lots.



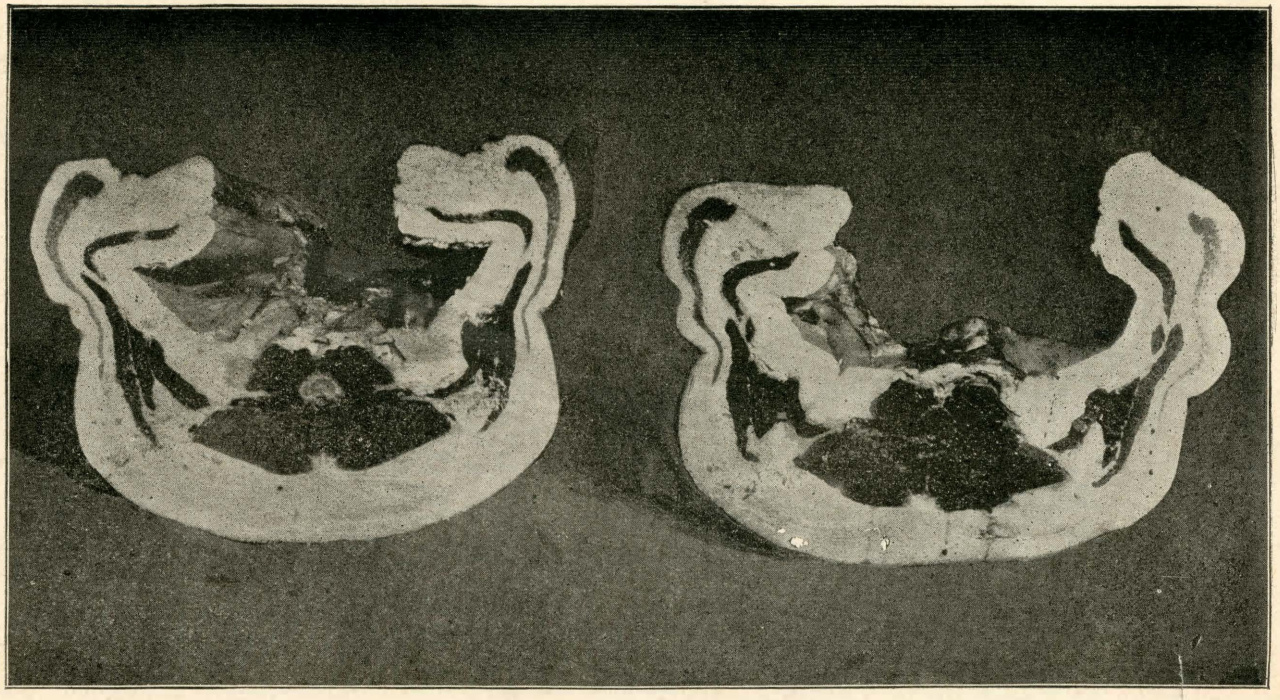
LOT I.—*Fed on Unground Peas.*



LOT II.—*Fed on Whole Wheat.*



LOT III.—*Fed on Ground Corn.*



LOT IV.—*Fed on Ground Wheat.*

LOT V.—*Fed on Mixed Feed.*