

RATIONS FOR FATTENING SWINE

OHIO
Agricultural Experiment
Station

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RATIONS FOR FATTENING SWINE.

By B. E. CARMICHAEL.

FEEDS FOR USE WITH CORN.

A number of experiments in pork production have been conducted by this Station to determine the efficiency of different rations, all of them made up in part, at least, of corn. While much more work in this direction is needed, yet it is believed that the results as secured to date may indicate ways by which the profits (too often very meager, if not entirely wanting) from pork production may be increased. It is an accepted fact that corn alone will not produce the most rapid nor, under market conditions approximating the conditions that exist at present, most economical gains with growing, fattening swine. There may have been market conditions under which the use of corn alone would yield a maximum profit, but such conditions do not now prevail. An intelligent use of feeds is necessary, even with the present high price of pork, if the fattening of swine is to prove profitable. On the other hand, even at present prices, corn may well be used extensively in pork production, if properly combined with other feeds; indeed, no other grain feed of equal abundance and efficiency in the production of pork is so cheap as corn.

Results obtained from a few of the many useful combinations in which corn may be used are given on the following pages. An attempt has been made to classify the results in such a way as to afford fair comparisons of the various rations. The reader is urged to study efficiency of rations, rather than cash profits, for profits vary as market conditions fluctuate. Efficiency of rations does not change with varying market conditions, but profits that

result from the use of rations of equal efficiency, pound for pound, in producing gains in live weight, do vary greatly on account of widely varying market prices of the feeds which constitute the rations. It is, then, obviously impossible to suggest a ration that will prove most profitable under all conditions. Results of feeding tests will show the efficiency of rations, but feeders will need to apply local market conditions to these results in order to select the ration that will give best financial returns.

In studying the efficiency of various rations care should be taken to compare only the results of experiments that were conducted simultaneously, as factors other than feed may cause wide differences in results secured from experiments that were conducted under conditions that were not identical in all respects except the rations used.

In all of these experiments, young, growing swine were used. It is entirely probable that the results obtained will not prove strictly applicable to the fattening of mature, thin swine. However, relatively few mature hogs are fattened nowadays, and the results secured will apply to most of the swine feeding operations as now carried on.

Corn was ground before being fed, except in the experiments with hogs in cattle feed-lots, when shelled corn was used. Ground feeds were mixed together and fed with sufficient water to form a thick slop. Daily rations were supplied in two equal portions. A mixture of salt and ashes was regularly kept before the swine during all experiments. All proportions indicated in the description of rations refer to the parts, by weight, of the different feeds used in the rations.

GRAIN RATIONS FOR FEEDING IN DRY LOTS.

Table I shows the results of an experiment covering 66 days in which four different supplements for corn were used, viz: soy-bean meal, wheat middlings, digester tankage and skim milk. While much more work will need to be done before definite figures representing the relative values of these feeds for supplementing corn may be secured, yet the table sets forth a number of facts that are useful in deciding what feeds to use in connection with corn, which will doubtless continue to be the chief grain used for fattening swine in dry lots.

Of the feeds used in connection with corn, skim milk gave the highest daily gain per pig. Wherever skim milk is available for pig feeding, it seems very improbable that any other feed

will supplement corn more completely, or that any ration will produce any more rapid and economical gains than will corn and skim milk. The chief difficulty with this ration is the fact that skim milk is not available for extensive use in the greater hog-producing sections. Nevertheless, wherever it is available, skim milk and corn will doubtless prove as efficient a ration as can be used for fattening swine. The rate of gain for the lot fed corn and skim milk was high—over two pounds daily per pig.

TABLE I: GRAIN RATIONS FOR FEEDING IN DRY LOTS.
6 Hogs in Each Lot. Experiment I, lasting 66 Days. February 13 to April 19, 1907.

Ration	Initial weight	Final weight	Gain	Average daily gain per pig	Total feed consumed	Average daily feed consumed per pig	Feed consumed per 100 lbs. gain
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Corn meal.....	534	743	209*	.571	1291	3.53	617.7
Corn meal, 4; Soybean meal, 1	533	959	426	1.075	1823	4.60	427.9
Corn meal, 1;.. Middlings, 1..	583.5	1078.5	495	1.250	2087	5.27	421.6
Corn meal, 6;.. Tankage, 1,...	556.5	1195	638.5	1.612	2300	5.80	360.2
Corn meal, 1;.. Skim milk, 2.77	628.5	1199	634**	2.023	1983 corn 5505 s.m.	5.86 16.28	289.9 804.8

* One hog taken out March 20.

**One hog taken out February 21.

Digester tankage, a packing house by-product, ranked next to skim milk for efficiency in producing rapid and, from the standpoint of feed consumed for a pound of gain produced, economical gains. The amount of feed required to produce one hundred pounds of gain was comparatively small—360.2 pounds. The large amount of corn consumed daily per pig by the corn and tankage and the corn and skim milk lots is worthy of note. When either of these feeds was used, a much larger amount of corn was consumed daily than when a ration of corn alone, corn and middlings or corn and soybean meal was fed.

The lot which received corn and middlings, equal parts of each by weight, made fair gains and at a not exceedingly heavy expenditure of feed. The amount of feed consumed was much lower than for the corn and skim milk lot or the corn and tankage lot, and the amount of feed required for a given gain was relatively large. The relatively low consumption of corn is especially striking.

The lot which received a ration of corn, 4 parts; soybean meal, 1 part, failed to consume a sufficient amount of feed to produce very rapid gains. The low consumption of feed was due to the fact that the pigs did not relish the soybean meal and corn meal mixture. No pig in this lot gained more than 1.4 pounds daily. In later experiments at this Station corn and soybeans gave excellent results. (See page 76.)

When the results that were yielded by the lot fed corn alone are considered, it is not difficult to understand why many farmers find that hog feeding is not so profitable as it should be. The amount of feed consumed by this lot was small, the rate of gain was very low, and the amount of feed required to produce one pound of gain was very high as compared with any of the other four lots.

TABLE II: AMOUNT* OF PORK PRODUCED BY ONE BUSHEL OF CORN OR ITS EQUIVALENT. EXPERIMENT I.

Ration	Corn meal	Cornmeal, 1; Middlings, 1	** Corn meal, 4; Soybean meal, 1	Cornmeal, 6; Tankage, 1	Cornmeal, 1; Skim milk, 2.77
Pork produced by 100 pounds of feed, lbs.....	16.19	23.71	23.35	27.76	9.13
Cost of 100 pounds feed....	\$1.00	\$1.125	\$1.10	\$1.14	\$.37
Amount of feed purchasable for 56 cts., (the value of a bushel of corn,) lbs..	56.0	49.7	50.9	49.0	149.2
Pounds of pork produced from feed equal in cost to one bushel of corn....	9.0	11.8	11.9	13.6	13.6

*Corn, 56 cents per bushel; middlings, \$25.00 per ton; tankage, \$40.00 per ton; skim milk, \$3.00 per ton.

**See page 76 for result of second test of soybean meal.

It will be noted that a bushel of corn, as fed to Lot 1, produced only 9 pounds of gain. Had a portion of this corn been sold at 56 cents per bushel and the proceeds used to purchase supplemental feeds at the following prices: middlings, \$25 per ton; soybeans, \$30 per ton; tankage, \$40 per ton; skim milk, \$3 per ton, the amount of gain produced from one bushel of corn or its equivalent would have been 11.8, 11.9, 13.6 and 13.6 pounds respectively, as is shown in Table II. In other words, a given amount of money invested in corn and tankage or in corn and skim milk would have produced one half more gains than if invested in corn alone; and a much shorter time would have been required for this increased production. At the prices named, digester tankage and skim milk

would be equally efficient so far as amount of pork produced from a bushel of corn is concerned, but the rate of production was higher with corn and skim milk than with corn and tankage. Market prices vary greatly from time to time, and the above comparison is accurate only for the prices named.

TABLE III: COST PER 100 POUNDS PORK PRODUCED. EXPERIMENT I.

Price of corn per bushel	Corn alone	Cornmeal, 4;* Soybean meal, 1. (soybeans at \$30 per ton.)	Cornmeal, 6; Tankage, 1. (tankage at \$40 per ton.)	Cornmeal, 1; Middlings, 1. (middlings at \$28 per ton.)	Cornmeal, 1; Skim milk, 2.77. (skim milk at \$3 per ton.)
\$.28	\$3.09	\$3.00	\$2.57	\$4.01	\$2.66
.35	3.86	3.42	2.96	4.27	3.02
.42	4.63	3.85	3.34	4.53	3.38
.49	5.40	4.28	3.75	4.80	3.74
.56	6.18	4.71	4.12	5.06	4.11
.63	6.95	5.14	4.50	5.32	4.47
.70	7.72	5.56	4.89	5.59	4.83
.77	8.49	5.99	5.27	5.85	5.19
.84	9.26	6.42	5.66	6.11	5.56

*See below for the results of a second test of soybean meal

Table III shows the cost of one hundred pounds of pork as produced in this test, with various prices for corn. The price of feeds other than corn would, of course, also have an important bearing on the cost of pork. The table is not presented with the thought that it will apply strictly to every case, but, rather, to show the great importance of considering cost of feeds as well as efficiency.

SOYBEANS COMPARED WITH TANKAGE FOR SUPPLEMENTING CORN IN DRY LOT FEEDING.

In two tests to compare soybeans and tankage as supplements for corn in dry lot feeding, the results shown in Table IV were secured. The advantage of both the corn and soybean and the corn and tankage rations over the ration of corn alone is very evident. It will be observed that soybeans made a much better showing in these tests than in a former one. No reason was apparent for the marked dislike which the pigs that received soybeans in the previous test showed for the corn and soybean mixture. While the experiments conducted at this Station indicate that pigs are not so fond of soybeans as of some other feeds, notably skim milk and tankage, yet the results of these two tests show an especially high value for soybeans as a supplement for corn.

TABLE IV: GRAIN RATIIONS FOR FEEDING IN DRY LOTS.

5 Hogs* in Each Lot.—Experiment II lasting 84 Days. November 24, '08 to February 15, '09.

Ration	Initial weight	Final weight	Gain	Average daily gain per pig	Feed consumed	Average daily feed consumed per pig	Feed consumed per 100 lbs. gain
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Cornmeal.....	653.5	1074 5	421	1.002	2336.5	5.56	554.9
Cornmeal, 8;... Tankage, 1.....	657	1363.5	706.5	1.682	2784 5	6.62	394.1
Cornmeal 4;... Soybean meal, 1.	520.5	1063 5	543	1.616	2163.5	6.44	398.4

6 hogs in each lot—Experiment III, lasting 56 days. December 22, '08 to February 15, '09

Cornmeal, 8;... Tankage, 1.....	843	1333	490	1.458	2145	6 38	437.7
Cornmeal, 4;... Soybean meal, 1	846	1331	485	1.443	2103	6.25	433.6

*Only four hogs in lot fed corn and soybeans.

The corn, soybeans and tankage as used in this experiment were sampled and analyzed under the direction of Mr. J. W. Ames, Chemist of this Station, with the results as shown in Table V.

TABLE V: PERCENTAGE COMPOSITION OF FEEDS.

	Water	Ash	Protein	Fiber	Nitrogen-free Extract	Ether Extract
Corn.....	15 50	1.21	8.90	1.99	68.74	3.66
Soybeans.....	11.84	4.86	38.62	1.91	25.56	17.21
Tankage.....	7.81	14.06	59 24	3.59	2.73	12.57

Table VI shows the average amount of the different food constituents consumed daily per pig throughout the experiment. It will be noted that the ration of corn alone contained a very small amount of ash and of protein as compared with the rations that contain either soybean meal or tankage in connection with corn.

Feeds for use in connection with corn should be relatively higher in protein and ash than is corn, so as to make up the marked deficiency of corn in these materials and thus provide for the growth of bone and muscle as well as for the formation of fat.

TABLE VI: FOOD CONSTITUENTS IN CONCENTRATES
CONSUMED DAILY PER HOG.

Ration	Ash	Protein	Fiber	Nitrogen-free Extract	Ether Extract
Experiment II					
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Cornmeal.....	.067	.495	.110	3.824	.203
Cornmeal, 8; .....	.071	.524	.117	4.051	.216
Tankage, 1 .....	.103	.436	.026	0.200	.092
Total.....	.174	.960	.143	4.071	.308
Cornmeal, 4; .....	.062	.458	.103	3.540	.188
Soybean meal, 1.....	.062	.497	.024	.330	.222
Total.....	.124	.955	.127	3.870	.410
Experiment III.					
Cornmeal, 8; .....	.068	.505	.113	3.900	.207
Tankage, 1.....	.100	.420	.025	.019	.089
Total.....	.168	.925	.138	3.919	.296
Cornmeal, 4; .....	.060	.445	.099	3.441	.183
Soybean meal, 1.....	.061	.483	.024	.319	.215
Total.....	.121	.928	.123	3.760	.398

Table VII shows the warm dressed weights of the various lots. This information was kindly furnished by Messrs. Swift and Company who slaughtered the various lots at their Chicago house February 25. The home weights were taken February 22, some days after the close of the experiment, but while the hogs were receiving the same rations as were fed during the experiment. There is need for more evidence concerning the dressed percentages of swine fed on these rations before any definite conclusions on this point will be justified. The lighter dressed percentages of the two lots fed for 56 days is largely, if not wholly, explained by the lighter average live weight of these lots.

TABLE VII: DRESSED PERCENTAGES.

5 hogs in each lot.—Experiment II lasting 84 days. November 24, '08 to February 15, '09.

Ration	Weight at Wooster February 22	Warm dressed weight at Chicago, Feb. 25	Dressed percentages (warm)
	Lbs.	Lbs.	%
Cornmeal.....	1115.5	893	80.05
Cornmeal, 8..... Tankage, 1.....	1421	1168	82.19
Cornmeal, 4*..... Soybean meal, 1.....	1109	896	80.79
6 hogs in each lot.—Experiment III lasting 56 days. December 22, '08 to February 15, '09.			
Cornmeal, 8..... Tankage, 1.....	1419.5	1126	79.32
Cornmeal, 4..... Soybean meal, 1.....	1417.5	1099	77.53

*Only four hogs in lot fed cornmeal and soybean meal.

Table VIII, based on the results that were secured from the lots that were fed 84 days, shows the cost of one hundred pounds of pork under market prices for corn ranging from 28 to 84 cents per bushel, with soybeans at \$30 per ton and tankage at \$40 per ton.

TABLE VIII. COST PER 100 POUNDS GAIN.

Experiment II lasting 84 days, November 24, '08 to February 15, '09.

Price of corn per bushel	Corn alone	Cornmeal, 8; Tankage, 1 (tankage @ \$40 per ton)	Cornmeal, 4; Soybean meal, 1 (soybeans @ \$30 per ton)
\$.28	2.77	\$2.63	\$2.79
.35	3.47	3.07	3.19
.42	4.16	3.50	3.59
.49	4.86	3.94	3.98
.56	5.55	4.38	4.38
.63	6.24	4.82	4.78
.70	6.94	5.25	5.18
.77	7.63	5.69	5.58
.84	8.32	6.13	5.98

Soybeans are not usually available for use at \$30 per ton, but their cost of production would indicate that they may possibly soon be available at about this price. It will be noted that the financial advantage is not always with the same lot. With very cheap corn, it alone may be more profitable to use than the other rations. Using

the results secured from the three lots that were fed the rations indicated for 84 days as the basis of calculations, the corn and soybean ration would have produced the most costly gains with corn at 28 cents per bushel, and the cheapest gains with corn at only slightly above 56 cents per bushel. This table emphasizes again the importance of a knowledge concerning both efficiency and cost of rations; without such knowledge feeders cannot hope to secure best results from their feeding operations.

Although present prices for soybeans that are fit for seed prohibit their profitable use for feeding purposes, yet, with its high feeding value, effect as a soil improver, and an average yield under Ohio conditions of about 18 bushels (1080 pounds) per acre, it seems entirely probable that the soybean crop may come to be grown very extensively in Ohio for feed purposes. Besides the matter of feeding value, the effect of the soybean plant as a soil improver is worthy of careful consideration. For information relative to general characteristics, culture, etc., of the soybean, the reader is referred to Circular 78 of this Station.

Farm grown feeds have been found to be very efficient supplements for corn, but it is often better business practice to sell a part of the farm products and buy commercial feeds, rather than to feed a ration all of which has been grown on the farm. The example of soybeans is a case of this kind. At present prices—at least \$2.00 per bushel, wholesale—soybeans could well be sold, and the proceeds used to buy such commercial feeds as would prove more profitable than soybeans to use with corn for fattening swine under present market conditions. Beans that have been cracked in threshing or that have been rendered unmarketable in any other way that does not impair their feeding value could be used very profitably in pork production.

CORN AND BLUEGRASS PASTURE COMPARED WITH CORN, SKIM MILK AND BLUE GRASS PASTURE.

Two lots of pigs, five in each lot, were fed rations as above. The results of this test are given in Table IX. Each lot received (for Lot 1) all of the corn or (for Lot 2) corn and skim milk that they would consume. The pigs were about four months old when the test began, July 6. Both lots were fed until September 22, 1906, when the pigs from Lot 2 were sold. Lot 1, fed corn and bluegrass pasture, was fed until their total gain was approximately equal to that of Lot 2. The rate of gain was more than one half greater with Lot 2 than with Lot 1.

TABLE IX: CORN AND BLUEGRASS PASTURE COMPARED WITH CORN,
SKIM MILK AND BLUEGRASS PASTURE.

5 pigs in each lot—Experiment IV lasting 79 days. July 5 to September 20, '06

Grain ration	Initial weight	Final weight	Gain	Average daily gain per pig	Feed consumed	Feed consumed per 100 lbs. gain
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Corn.....	349	780	431	1.091	1644.5	381.5
Corn and skim milk.	384	1028	644	1.630	{ 1697.5 5647	{ 263.5 corn 876.8 s.m.

It should be stated that in this, as in all other similar tests conducted at this Station, the hogs to which corn alone was fed ate very much more grass than did the hogs which received corn and skim milk. Besides the lower rate of gain made by Lot 1, this lot after having made practically the same total gain (640 lbs.) that Lot 2 made, would have sold on the market for 25 cents per hundred-weight less. This point is often of great importance, but market conditions are so irregular that no attempt will be made here to advise feeders when to market their product. This matter must be decided by the feeder after considering the conditions which exist during each year. However, it can be said that economy and rapidity of gains seldom prevent advantageous marketing.

DRY LOT VS. PASTURE.

Experiments conducted during the summers of 1907 and 1908 give an excellent opportunity to compare dry lot feeding with feeding on pasture, when corn alone, or corn and tankage are used. These experiments are summarized in Table X. It will be noted that in both years the use of pasture added materially to the rate and economy of gain when corn alone was fed. In the 1907 test corn and tankage in dry lot produced almost as great and, so far as concentrates are concerned, economical gain as did corn, tankage and pasture. In the 1908 test, with younger, smaller pigs, quite an appreciable difference in rate and economy of gain is noted, in favor of the pasture lot, even when corn and tankage were fed. Pasture grass is usually a relatively cheap feed and should be used extensively for pork production, especially when grain feeds are high in price. Green feeds other than bluegrass may often be used to good advantage; among them are clover, alfalfa, timothy and rape. In both of the experiments summarized in Table X heavy grain rations were used.

TABLE X: DRY LOT VS. PASTURE.

5 hogs in each lot—Experiment V lasting 55 days. July 5 to August 28, '07.

Ration	Initial weight	Final weight	Gain	Average daily gain per pig	Feed consumed	Feed consumed per 100 lbs. gain
Cornmeal on pasture.....	Lbs. 719 5	Lbs. 1103 5	Lbs. 384	Lbs. 1 396	Lbs. 1795	Lbs. 467.4
Cornmeal in dry lot.....	709.5	940	230.5	.838	1370 5	594.5
Cornmeal, 6; tankage, 1, on pasture.....	699.5	1246.5	547	1.989	2084	380.9
Cornmeal, 6; tankage, 1, in dry lot.....	719	1246	527	1 916	2051.5	389.2
5 hogs in each lot—Experiment VI lasting 62 days. June 26 to August 26, '08						
Cornmeal on pasture.....	324.5	696	371 5	1.198	1279 5	344.4
Cornmeal in dry lot.....	338.5	547.5	209	.674	1062.5	508.3
Cornmeal, 8; tankage, 1 on pasture.....	329	831	502	1.619	1613	321.3
Cornmeal, 8; tankage, 1 in dry lot.....	338 5	826 5	488	1.574	1697.5	347.8

The financial results that would have been secured under varying market conditions, using the 1908 test as the basis of calculations are shown in Table XI. It will be noted that the cheaper the corn the less the relative profit from pasturing in connection with both the corn and the corn and tankage lots. In this calculation a fixed charge—\$1.00 for the corn and tankage lot and \$1.50 for the corn lot—is made for pasture. The reason for this difference in charge for pasture is the fact, noted above, that the corn lot consumed noticeably more grass than did the corn and tankage lot.

From the foregoing it is seen that pasture may often be a source of very valuable feed. An extensive use of pasture should often be made in pork production, especially when grain is very high in price. In this connection attention is directed to the data presented in Table XIV, page 84, which shows the results secured from the use of light and heavy grain rations upon pasture. The amount of corn required for one hundred pounds gain is 467.4 pounds for the lot fed a heavy corn ration upon pasture and only 386.7 pounds for the lot which received a light grain ration. In this experiment the light grain ration was equal in amount to two-thirds of the heavy grain ration.

TABLE XI: FINANCIAL RESULTS UNDER VARYING MARKET CONDITIONS.

Experiment VI lasting 62 days. June 26 to August 26, '08.

Rations	Corn meal in dry lot	Corn meal on pasture	Corn meal and tankage on pasture	Corn meal and tankage in dry lot
Corn, 45 cents per bushel; tankage, \$42.60 per ton				
Cost per hundred lbs. gain....	\$4 09	\$ 3.17	\$ 3 25	\$ 3.31
Profit on gain in live weight of 5 hogs @ 5 cents per lb.....	1.91	6.80	8 76	8.26
Profit on gain in live weight of 5 hogs @ 6 cents per lb.....	4.00	10 51	13.78	13.14
Corn, 60 cents per bushel; tankage, \$42.60 per ton.				
Cost per 100 pounds gain.....	\$ 5.45	\$ 4.09	\$ 4 02	\$ 4.14
Profit on gain in live weight of 5 hogs @ 5 cents per lb.....	loss .93	3 37	4 92	4.22
Profit on gain in live weight of 5 hogs @ 6 cents per lb.....	1 16	7 08	9 94	9.10
Corn, 75 cents per bushel; tankage, \$42.60 per ton,				
Cost per 100 pounds gain.....	\$ 6 81	\$ 5.02	\$ 4.78	\$ 4 96
Profit on gain in live weight of 5 hogs @ 5 cents per lb.....	loss 3.78	loss .06	1.08	.17
Profit on gain in live weight of 5 hogs @ 6 cents per lb.....	loss 1.69	3 65	6 10	5 05

**FEEDING ON BLUEGRASS PASTURE. CORN COMPARED
WITH CORN AND TANKAGE. TWO TESTS.**

In 1907 and in 1908 tests were conducted to compare corn with corn and tankage for feeding on pasture. The pasture used in these tests, as in the one just discussed, consisted of bluegrass and white clover. In 1907 the corn and tankage mixture consisted of 6 parts cornmeal to 1 part tankage, by weight; in 1908 the proportions were 8 to 1, for cornmeal and tankage, respectively. In both tests the hogs were fed all the grain they would consume. Table XII shows the results secured from these tests.

In each case the lot that received corn and tankage made greater gains than were secured from the use of corn alone. Less concentrates were required for a given gain when corn and tankage were fed than when only corn was given. Moreover, as was stated in connection with the comparison of corn with corn and skim milk on pasture, the lot fed corn alone consumed more grass than did the other lots. With corn very low in price it is possible that corn alone on pasture would produce more net profit than would corn and a supplemental feed. On this account, the feeder should know what results are to be expected from various rations so that he may apply local market conditions to these results.

TABLE XII: CORNMEAL COMPARED WITH CORNMEAL AND TANKAGE ON BLUEGRASS PASTURE.

Five hogs in each lot. Experiment VII lasting 55 days. July 5th to August 28th, 1907.

Grain ration	Initial weight	Final weight	Gain	Average daily gain per pig	Feed consumed	Feed consumed per 100 pounds gain
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Cornmeal, 6; tankage, 1.....	699.5	1246.5	547	1.989	2084	380.9
Cornmeal.....	719.5	1103.5	384	1.396	1795	467.4

Five hogs in each lot. Experiment VIII lasting 62 days. June 26th to August 26th, 1908.

Cornmeal, 8; tankage, 1.....	329	831	502	1.619	1613	321.3
Cornmeal.....	324.5	696	371.5	1.198	1279.5	344.4

LIGHT VS. HEAVY GRAIN RATIONS IN DRY LOT.

Two experiments have been conducted to compare light and heavy rations, when swine are confined in dry lot. The results of these experiments are presented in table XIII. In these experiments the light ration was equal in amount to three-fourths of the heavy ration. It will be noted that no marked difference in economy of gain resulted—in fact, the amount of feed consumed for a given gain was almost exactly the same for the two different lots.

TABLE XIII: LIGHT VS. HEAVY GRAIN RATIONS IN DRY LOT.

Four hogs in each lot. Experiment IX lasting 198 days. September 19, 1907 to April 3, 1908.

	Ration	Initial weight	Final weight	Gain	Average daily gain per pig	Feed consumed		Feed consumed per 100 lbs. gain	
						Milk	Concentrates	Milk	Concentrates
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Sept. 19, 1907, to	Cornmeal, middlings, skim milk	190	557	367	1.277	1444	950	393.4	258.8
Nov. 29, 1907	Cornmeal, middlings, skim milk (¾ full feed),	183	463	280	.972	1083	712.5	386.8	254.5
Nov. 30, 1907, to	Cornmeal 8; tankage 1	557	1457	900	1.785		3834		426.
April 3, 1908	Cornmeal 8; tankage 1 (¾ full feed).....	463	1122	659	1.307		2875.5		436.3

Five hogs in each lot. Experiment X lasting 62 days. June 26th to August 26th, 1908.

Cornmeal 8; tankage 1	338.5	826.5	488	1.574		1697.5		347.8
Cornmeal 8; tankage 1 (¾ full feed).....	327	689	362	1.167		1273		352.

The amount of gain was quite widely different—practically one-third more for the heavy-fed lot than for the light-fed lot. These results show that, so far as economy of gain is concerned, no material difference existed between light and heavy feeding as practiced in these tests. In rate of production and, therefore, in length of time required to produce a given amount of pork, a wide difference existed. There seems to be little reason for feeding less than a full ration to swine that are being fattened in dry lot.

The figures presented in the first part of Table XIII show something of the great capacity of swine for converting feed into meat. With the four head which were fed full rations it is seen that during the 198 days of the experiment they gained a total of 1267 pounds in live weight, consuming during this period 4087 pounds of cornmeal, 271 pounds of middlings, 426 pounds of tankage and 1444 pounds of skim milk.

LIGHT VS. HEAVY GRAIN RATIONS ON PASTURE.

With hogs upon pasture the proposition is very different from dry lot feeding, and it is often possible, by feeding relatively light grain rations, to induce hogs to eat a much larger amount of grass than when heavier grain rations are supplied, and thus effect a marked economy in production.

TABLE XIV: LIGHT VS. HEAVY GRAIN RATIONS ON PASTURE.

Five hogs in each lot. Experiment XI lasting 55 days. July 5th to August 28th 1907.

Grain ration	Initial weight	Final weight	Gain	Av. daily gain per pig	Grain consumed	Grain consumed per 100 lbs. gain
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Cornmeal.....	719.5	1103.5	384	1.396	1795	467.4
Cornmeal (½ full feed)....	675	982.5	307.5	1.118	1189.2	386.7

One experiment has been conducted at this Station to compare light and heavy grain rations for hogs on pasture. In this test two lots of pigs, five in each lot, were fed for 55 days upon a grain ration of corn alone with bluegrass and white clover pasture in abundance. The results of this experiment are given in Table XIV, and show that a marked lessening in amount of grain feed required for a pound of gain resulted from withholding a part of the grain, on account of the more extensive use made of a cheaper feed, pasture grass. It is not possible to ascertain the definite amount of grass consumed by the two lots; it was certain, however, that the lot which received the light grain ration consumed more grass than did the lot fed the heavy grain ration.

HOGS IN CATTLE FEED-LOTS.

It is generally considered by feeders that hogs in cattle feed-lots, depending very largely, or exclusively, upon the corn in the droppings from the steers will make as great gains as hogs can be expected to make. A number of tests conducted at this Station showed decided increase in rate of gain when a supplemental feed was used. Facilities for making these tests have been rather limited, on account of the small number of cattle that have been fattened here under conditions that would permit such tests. Consequently, only one supplemental feed, digester tankage, has been used.

These tests were conducted in conjunction with a steer feeding experiment, the plan of which is given below. Later experiments were conducted under similar conditions. The plan of the first test was as follows:

Four lots of steers, seven head in each lot, were fed upon two different rations—two lots upon each ration. Lots 1 and 3 received shelled corn, cottonseed meal, corn stover, mixed hay and corn silage. Lots 2 and 4 received shelled corn, cottonseed meal, corn stover and hay. The two lots last mentioned received more corn and more dry roughage than did the lots first mentioned, on account of not receiving silage, which, of course, contained both grain and roughage. All lots of cattle received the same amount of cottonseed meal daily per steer.

TABLE XV: HOGS FOLLOWING STEERS.

Three hogs in each lot. Experiment XII lasting 63 days, March 20* to May 21, 1907.

Lot	Steer ration	Hog ration	Initial weight	Final weight	Total gain	Average daily gain per pig
1	Silage	Grain from droppings and one-third pound tankage daily per hog in addition	Lbs. 290	Lbs. 565	Lbs. 275	Lbs. 1.46
3	Silage	Grain from droppings.....	280	434	154	.81
4	Dry	Grain from droppings.....	305	530	225	1.19
6	Dry	Grain from droppings and one-third pound tankage daily per hog in addition.....	331	655	324	1.71

Four hogs in each lot. Experiment XIII lasting 56 days, May 22 to July 16, 1907, inclusive.

1	Silage	Grain from droppings and one-third pound tankage daily per hog in addition	445	766	321	1.43
3	Silage	Grain from droppings.....	460	657	197	.88
4	Dry	Grain from droppings.....	470	692	222	.99
6	Dry	Grain from droppings and one-third pound tankage daily per hog in addition.....	445	755	310	1.38

Total gains of lots fed tankage..... 1230 pounds.
 Total gains of lots not fed tankage..... 798 pounds.
 Increased gains by lots fed tankage..... 432 pounds.

* Weight of hogs taken March 20th; feeding of tankage began March 21st.

During the first part of the experiment three hogs were put with each lot of seven cattle; later these hogs were replaced by a thinner lot and four hogs were placed with each lot. The first set of hogs was under experiment for 63 days, the second lot for 56 days.

No corn was fed to the hogs, and, as the cattle feed racks were so constructed as to prevent the grain being thrown out, the hogs secured no grain except that which appeared in the droppings from the steers. All lots were kept supplied with a mixture of ashes and salt. It is of interest to note that the lots fed tankage cared less for the ashes and salt than did the other lots. The tankage was fed at the rate of one-third of a pound daily per pig, in the form of a thin slop. It may be very conveniently fed in this manner and was greatly relished by the hogs, in fact, they exhibited an almost ravenous appetite for it.

Table XV shows the results secured from experiments during which the corn in the steers' droppings was the only grain to which the hogs had access. It will be observed that greatly increased gains resulted from the use of the supplemental feed. There was no way of measuring the exact cost of gains with the different lots, as the amount of corn that passed through the steers might have varied materially. However, there is abundant evidence to show that the use of tankage was very profitable. The two lots that were fed tankage ate 295.5 pounds of this material and made 432 pounds greater gains than did the two lots which were subjected to similar treatment with the exception of the use of tankage. All of the lots left a small amount of corn in the manure, and it cannot be said for a certainty that the tankage fed lots did not eat more corn than did the others.

TABLE XVI: HOGS FOLLOWING STEERS.

Five hogs in each lot. Experiment XIV lasting 71 days. Jan. 15, to March 25, 1908.

Steer ration	Hog ration	Corn fed	Tank- age fed	Initial weight	Final weight	Gain	Av. daily gain per pig.
Silage	Grain from droppings, corn and tankage	Lbs	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
		962.5	121.15	548	1030	482	1.357
Dry	Grain from droppings, corn and tankage	662.5	121.15	553	1000	447	1.259
Silage	Grain from droppings and corn.....	916.5		537	*875	338	.952
Dry	Grain from droppings and corn.....	659.3		547	*755	348	1.017

Total gain of lots fed tankage..... 929 pounds

Total gain of lots not fed tankage..... 686 pounds

Increased gains by lots fed tankage..... 243 pounds

*One hog taken out March 14, weight 140 pounds.

In tests conducted later than the ones reported above, dry shelled corn was fed in addition to that which was present in the steers' droppings. Tables XVI and XVII show the results of these tests, which are in close agreement with the ones previously discussed. In the tests summarized in Table XVII, tankage was used, but in different amounts, one-half of the lots receiving one-third of a pound of tankage daily per pig, the other half receiving twice as much.

TABLE XVII: COMPARISON OF DIFFERENT AMOUNTS OF TANKAGE FOR HOGS FOLLOWING STEERS.

Five hogs in each lot. Experiment XV lasting 70 days. January 14th to March 24th, 1909.

Steer ration	Initial weight	Final weight	Gain	Av. daily gain per pig	* Corn consumed during experiment	Tankage consumed during experiment
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Silage	517	960	443	1.265	619	175
Dry.....	530	1040	510	1.457	415	175
Silage	543	1110	567	1.620	650	262 5
Dry	567	1210	643	1.837	549	262 5

Six hogs in each lot. Experiment XVI lasting 70 days. March 25th to June 2nd, 1909.

ilage.....	625	1107	482	1.147	433	213
Dry.....	620	1099	479	1 140	293	213
Silage	625	1163	538	1 280	433	319 5
Dry	625	1103	478	1.138	293	319 5

Six hogs in each lot. Experiment XVII lasting 69 days. March 26th to June 3rd, 1908

Silage.....	595	1200	605	1.461	896	274
Dry	590	1155	565	1.364	723	274
Silage	590	1045	455	1 099	873	137
Dry	†470	†720	375	1.179	671.5	105.2

Total gains of heavy fed tankage lots..... 1170 pounds.
 Total gains of light fed tankage lots..... 830 pounds.
 Increased gains by heavy fed tankage lots..... 340 pounds.

* Besides that secured from droppings of steers.

† Only five hogs to begin with.

‡ One hog taken out May 7th, weight 125 pounds.

These three experiments conducted to secure data in regard to the amount of tankage which should be fed to hogs in cattle feed lots for best results have shown greater gains, on the whole, from two-thirds of a pound of tankage daily per pig than from only one-third of a pound daily. It will be observed that two of the three tests show better results from the use of the larger amount of tankage. It is expected that further work along this line will be done in connection with future cattle feeding experiments. If other supplemental feeds, suitable for use with corn are more readily available for use than tankage, there is no reason why they should not be used. As has been suggested before, the feed that will produce the desired results at the least cost should be used; to decide this point, market conditions will need to be carefully considered.

SUMMARY.

Corn alone, at prices approximating those that now prevail, is not a profitable ration to use in pork production.

Feeds richer in protein and mineral constituents should be supplied to supplement corn in a way to provide for the growth of muscle and bone as well as for the production of fat.

The use of supplemental feeds of the character mentioned in the preceding paragraph has given good results for feeding in ordinary dry lots, in cattle feed-lots and on pasture.

Skim milk, soybeans, tankage, middlings and pasture grass all proved valuable feeds for use in connection with corn. The supplemental feed to use will depend very largely upon market prices.

In the comparison of light and heavy grain rations for dry lot feeding no marked advantage of either was evident so far as economy of gains was concerned. As would be expected, the heavy grain ration produced more rapid gains than did the light grain rations.

Marked economy in cost of gains resulted from the use of a light grain ration in place of a heavy grain ration for swine on pasture. If a cheaper feed may be used in place of the grain, it is often possible to lessen very materially the cost of pork production by feeding a light grain ration. If concentrates are to be used exclusively, the use of a heavy grain ration would be advisable, unless the aim of the feeder is to hold the stock in a low or moderate condition in order to secure cheaper feeds for fattening later.

It is important for feeders to understand market conditions as well as efficiency of feeds. The rations that produce the most rapid gains are not necessarily the most profitable feeds to use. On the other hand, rations that produce cheap gains may produce these gains so slowly that the profits will be very small.

Either home grown or commercial supplemental feeds may be used in connection with corn to good advantage, and feeders should be ready to use whichever will be most profitable. It will often pay to exchange farm grown feeds for commercial feeds. On the other hand, it is often true that the use of feeds grown on the farm will prove more profitable than the use of commercial feeds.

Feeds other than those discussed in this bulletin have given good results when used to supplement corn. Buttermilk, meat meal, linseed oilmeal, clover, alfalfa and various other feeds may often be fed with corn to good advantage. Whatever feeds are used in pork production, the feeder should pay close attention to market prices of the various feeds that may be had, and use the most economical, efficient feeds that are available.