THE UNIVERSITY OF MINNESOTA

GRADUATE SCHOOL

Report

of

Committee on Thesis

The undersigned, acting as a Committee of the Graduate School, have read the accompanying thesis submitted by Leland Ambrose Jessup for the degree of Master of Science. They approve it as a thesis meeting the requirements of the Graduate School of the University of Minnesota, and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science.

W. H. Peters
Chairman

Andrew Ross

C. P. Fitch

April 26 1918

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Report

of

Committee on Examination

This is to certify that we the undersigned, as a committee of the Graduate School, have given Leland Ambrose Jessup final oral examination for the degree of Master of Science . We recommend that the degree of Master of Science be conferred upon the candidate.

Minneapolis, Minnesota

April 26 1912

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PRODUCING PORK BY HOGGING DOWN CORN

A THESIS

PRESENTED TO THE FACULTY IN THE

GRADUATE SCHOOL

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF SCIENCE

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LELAND A. JESSUP

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INTRODUCTION

The swine industry in the United States is approximated at 66 million hogs, valued at 860 million dollars. This is 37 percent of the number of hogs in the world, not including China. Sixty-six million hogs is twice the number of hogs produced by any other one country and more than any other three countries combined. Thus it will be seen that the United States leads all nations in producing pork by a wide margin.

The swine of the world are found in largest numbers in those countries with the largest populations. The distribution of hogs in the United States closely follows the productive areas for corn, whereas in Europe the distribution of hogs has a close relationship to the production of potatoes and dairy products. Approximately 60% of the hogs in the United States are found in the seven corn belt states. Namely, Iowa, Illinois, Missouri, Nebraska, Kansas, I ndiana and Ohio.

Outside of the corn belt the number of hogs raised is largely dependent upon the local demand for pork and the relative prices of feeds. Barley, mill feeds, dairy by-products, and garbage are the most common feeds used outside of the corn producing states.

Barley has been the most common feed for hogs north of the corn belt but it is gradually being replaced by earlier maturing varieties of corn. In the neighborhood of several of the large cities of the East there have sprung up pork producing plants

for the utilization of garbage. The swine industry in the South is gradually finding more favor, it having been found to fit in to advantage with the need of diversified farming. Pork production has not been taken up extensively in the West principally because the crops grown in that section of the country are not suitable as hog feeds.

One of the greatest profit determining factors of beef cattle feeding is the pork produced by the hogs following the steers in the feed lot. One to two pounds of pork are produced for each bushel of corn fed the steers in the feed lot, and approximately one-quarter of a pound in case the corn is ground or crushed. Swine raising is usually an asset to all the general types of farming, to a greater or lesser extent. Hogs will consume a great variety of feeds, some of which are not consumed by the other classes of livestock, for example, the offal of the kitchen, waste material from the dairy and partly spoiled feeds.

The demand for pork is universal and it is a commodity which is consumed in relatively large quantities in the United States, the United Kingdom, France and Germany. The following table gives the per capita consumption of beef, veal, mutton and pork in the four countries previously mentioned. (2)

Table 1. Per capita consumption of meat by countries.

Kind of meat		United States	United Kingdom 1906-1908	Germany 1913	France
Beef	lbs.	78.40	56.00	31.35	37.00
Veal		7.50	4.00	7.25	8.00
Mutton		5.30	26.00	1.90	9.00
Pork, including lard		102.50	33.00	71.30	26.00
Total		193.50	119.00	111.80	80.00

Although some nations, especially the United Kingdom and France, seem to prefer beef rather than pork in the dietary, it is either the first or second choice of meat commodities by the people of these four nations.

The hog transforms grain into meat with a high degree of economy and rivals all the other classes of domestic livestock in the rapidity of gains and age at which he matures. Smith (1) presents the following comparison of the average amount of feed required to produce 100 pounds of gain with cattle, sheep and hogs of the following weights.

Table 2. Average amount of feed required to produce 100 lbs. gain.

	Feed	
1000 lb. steer	800 lbs. grain	475 lbs. hay
65 lb. lamb	400 lbs. grain	500 lbs. hay
200 lb. hog	450 lbs. grain	No hay

The production of pork from relatively small amounts of feed, together with the great variety of feeds which satisfy the appet-

ite of the pig, has helped to make more secure the important position the swine industry now occupies in the United States.

Profit in pork production is largely determined by the cost of production. Lowering the cost of production increases the profit derived from feeding hogs and this has led to many different plans of feeding, resulting in new systems of producing pork, and one of which is Hogging Down Corn.

Hogging down corn may be defined as the practice of pasturing off standing corn with hogs. It is accomplished by turning hogs into the corn field as soon as the corn is mature enough to feed and allowing the hogs to break down the stalks and consume the corn at will. It can readily be seen that there is much about the practice of hogging down corn that would and should appeal to the producer of market pork, provided he can be given the assurance that the practice is workable, safe and economical. This practice eliminates the harvesting of the corn and to a very large extent also the feeding and care of the hogs during the period when they are in the cornfield thus releasing a considerable amount of labor at a time when it can be advantageously and profitably employed at other work of which there is always an abundance during the fall of the year. The purpose of the author in presenting this paper then has been to collect the most reliable data available on this subject, analyze it, and verify it by conducting an original trial in the hogging of corn in order that definite conclusions may be drawn relative to the success of the practice.

CHAPTER I.

The Practice of Hogging Down Corn.

Hogging down corn is not a new method of producing pork. The farmers of southern Ohio are reported (3) to have followed this system of feeding some thirty or thirty-five years ago. The early development of the swine industry in southern Ohio is a matter of historical interest. It was in the western part of this section of the state of Ohio that the Poland-China breed of of hogs originated. The progressive attitude of the farmers of this section of the country no doubt led to the invention of new systems of feeding which would be more economical and saving of labor, one of which was hogging down corn.

The period of time in which hogging down corn was popular in that section of country in which it originated is reported (3) to have been very brief. This reversal in the attitude of the farmers is explained by the fact that there was no absolute proof that the hogs made more economical gains nor faster gains than when they were fed picked corn in the dry lot. The practice looked shiftless and wasty to many and this caused many farmers to assume a skeptical attitude towards taking it up. At approximately the same time (3) there was an increased interest in agriculture and the Experimental Station propaganda regarding better agriculture discouraged any methods of farming which looked wasty. This, combined with the already existing skeptical attitude of the farmers,caused this system of feeding to become unpopular and it

was discontinued by the majority of the hog feeders.

Approximately the same time that hogging down corn became unpopular in Ohio it was taken up by the farmers in the more westernly part of the corn belt, according to Gaumnitz, Wilson and Basset (3), it became popular and gradually spread through out the corn belt.

An accurate estimation of the extent of hogging down corn in the United States is impossible. To say that it is a common method of feeding in all the sections of the corn belt is probably not too large an estimation. A survey made at the Iowa Station by Evvard, Kennedy and Kildee (4) showed that it was a common method of producing pork in all the localities of Iowa, it being popular in 98 of the 99 counties of that state. While hogging down corn may not be as popular in the other states of the corn belt as it is in Iowa, it seems safe to assume that it is practiced to a greater or lesser extent in all sections of the corn belt.

The rapid spread of the practice of hogging down corn during the period of 1900 to 1910 attracted the attention of experiment stations and numerous inquiries from farmers for information about this method of producing pork led a number of the Experiment Stations to conduct experiments in hogging corn. The results of some of these experiments which have been published have led many of the Experiment Stations to modify their criticism of this practice as being wasteful. At present the majority of the experiment stations recommend this practice as an economical and

and labor saving system of feeding. A review of some of these experiments is given in the following chapter.

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Chapter 11.

EXPERIMENTS AT SEVERAL STATIONS.

Experiments at the Minnesota Station.

The first experimental work conducted along the line of hogging down corn was started at the Minnesota Station (3) in 1905 and concluded at the end of the harvesting season in 1906. The results of hogging down corn with lots of hogs was compared with lots of hogs fed under the same conditions in the dry lot.

This experiment had in view the gaining of information on the following questions: Waste of corn by hogging down; cost of fencing in relation to cost of husking; loss of part of the corn crop by loss of stover; condition of field after hogging down; expense and care of hogs when away from the permanent hog house; the size of the hog most suitable for hogging down; length of season during which hogging down might be practiced; area of field as affecting efficiency of hogging down; variety of corn most suitable; and effect of run on rapidity of gain.

The corn plots hogged down were three acres in size, and the corn occupied a place in a rotation of corn, barley and mangels. In 1905, 26 hogs were fed by the hogging down method and 13 were fed in the dry lot. In 1906, 32 hogs were fed in the corn field, 8 in the dry lot, and 8 were fed snapped corn in the feed lot. Each of the corn plots was divided into three fields by temporary fences. One acre was hogged off at a time

making three periods of hogging down for one plot of corn. Each time the hogs in the field were allowed a new area of corn, the hogs in the feed lot were given corn harvested at the same time from a field of corn of the same variety.

The corn was supplemented with shorts fed at the rate of one pound per day per one-hundred pounds of pork. The author observed that the hogs did not have a keen appetite for shorts when a good succulent feed was accessible. In the first feeding trial the hogs were not allowed shelter. Neither were the hogs in the corn field given shelter during the second year of the experiment, but the two lots of hogs fed in the feed lot the second year were furnished a suitable shelter. Table II gives the amount of grain required to produce one pound of gain in the feeding lot and in the corn field.

Table II. Feed per pound gain.

Year	Method	No. of hogs	Grain to produce one lb. of gain		Total
			Shorts	Corn	
1905	Dry lot	13	1.69	8.31	10.42
1906	Dry lot	8	1.46	5.73	6.77
Average			1.57	7.02	8.59
1905	Field lot	26	1.39	6.96	8.35
1906	Field lot	32	1.03	5.32	6.35
Average			1.21	6.14	7.35
	Snapped corn	8	1.43	5.01	6.44

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The exceptionally high amount of corn necessary to produce one pound of gain in 1905 is due in part, to representative sample not having dried out, there being usually a 15 to 20 percent shrinkage, the authors state.

According to this data, the hogs in the field lot made one pound of gain on 7.35 pounds of concentrates, this being 1.24 pounds less concentrates than that required by the dry lot fed hogs. Of this amount, .88 pounds was corn, while .36 pounds was shorts. This amount of shorts would be worth $.008 to $.009 per pound, figured at 1905 - 1906 current prices. The more economical gains made by the corn field fed pigs is explained as probably due to freedom of exercise and eating as aiding digestion, or to minerals gotten in the soil, or to the corn in the husks not drying out so thoroughly and therefore being more easily masticated. The preserving of the corn by the husks might also increase its palatibility, they conceed.

According to this data, the hogs in the corn field and the hogs fed snapped corn, made approximately the same gains, there being a small amount in favor of the corn field fed hogs. However, the authors point out the lack of reliability of drawing conclusions from this one experiment. The authors also point out the fact that the hogs in the corn field did not consume as much shorts to produce one pound of gain, green feed having probably replaced some of the shorts consumed by the other lots.

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Following the completion of the hogging down trial, the lots were fed to determine the effect of the two systems of feeding on subsequent gains. The results obtained were not convincing proof in favor of either system of feeding. The average amount and rapidity of gain made by the hogs in the three systems of feeding is given in Table III.

Table III. Amount and Rapidity of Gains - 1906.

Method of feeding	Number	Average total gain	Average daily gain
Field lot	58	70	1.37
Ear corn	21	53	1.03
Snapped corn	8	58	1.11

According to this data the corn field lot made .34 pounds more average daily gain per head, and the hogs fed snapped corn made .26 pounds larger average daily gain than the dry lot fed hogs. This, together with the preceding data establishes the conclusion that the corn field hogs made faster gains and cheaper gains.

Following the completion of the experiment in 1905, representative hogs from each lot were sold on the South St. Paul market. The corn field fed hogs sold for 10 cents more per hundred weight. It hardly seems that this is a fair estimation of the difference in the value of the hogs of the two lots. The two lots had approximately the same initial

weight per head, the gains made were not extremely far apart and yet the representative hogs of the field lot were 19 pounds heavier at the time of sale.

According to observations made by the authors of the experiment, the amount of corn wasted in the field was no greater than the amount of corn wasted in the feed lot. However, there seemed to be a greater tendency for the hogs to waste corn during rainy weather, and the limitation of the area hogged down tended to make the hogs clean up better during those adverse conditions.

The condition of the soil was not hurt by running hogs on the field. The hogs had no tendency to root, probably due to having plenty of range.

The variety of corn which is most popular and best adapted to the locality is probably best suited for hogging down, according to the authors. The early maturing varieties usually should be used when possible and practicable. Flint corn seemed preferable to sweet corn.

The size of pigs best suited for hogging down, according to these observations, is a pig weighing from 100 to 140 pounds. Pigs that are active and have had plenty of exercise are probably best suited. Shoats weighing 100 to 140 pounds should be expected to make an average daily gain of 1.4 pounds. Old brood sows and sows thin in flesh were found to pick up weight quickly when turned into the corn field.

The problem of watering was also one of importance,

because the hogs need plenty of fresh clean water before them at all times.

The time to turn the hogs into the corn field depends upon the development of the corn and the conditions under which the hogs have been handled previous to the time of turning in. Hogs having had access to succulent feed did not scour as easily as hogs raised in a dry lot. The corn was ready for hogging down when the grain was well dented, or about September 1st.

The results of this experiment show that when it took more than twenty days for the hogs to clean up a field, they did not make as good gains during the latter part of the experiment as during the earlier part. For this reason, and especially during rainy seasons, the authors advise putting in temporary fences to limit the area hogged down. The following table was submitted showing the approximate number of days required to hog off an acre of corn by a given number of pigs weighing 125 pounds. The authors advise that pigs should not be on one field more than 20 days, 14 days being better than 20.

Table IV. Carrying Capacity of an Acre of Corn.

Number of hogs	Corn shrunk to Jan. 1 basis, yielding 30b.	35b.	40b.	45b.	50b.	55b.	60b.	65b.	70b.
	Days	Days	Days	Days	Days	Days	Days	Days	Days
Will keep 10	22.5	26.2	30.	33.7	37.5	41.2	45.	48.7	52.5
Will keep 20	11.2	13.1	15.	16.8	18.7	20.6	22.5	24.3	26.2
Will keep 30	7.5	8.7	10.	11.2	12.5	13.7	15.	16.2	17.5
Will keep 40	5.6	6.5	7.5	8.4	9.3	10.3	11.2	13.2	14.1
Will keep 50	4.5	5.2	6.	6.7	7.5	8.2	9.	9.7	10.5
Will keep 60	3.7	4.4	5.	5.6	6.2	6.8	7.5	8.1	8.7
Will keep 70	3.2	3.7	4.3	4.8	5.3	5.8	6.4	6.9	7.5
Will keep 80	2.8	3.3	3.7	4.2	4.6	5.1	5.6	6.1	6.5

Gaumnitz, Wilson and Bassett concluded from these results that hogging off corn may be practiced with profit on many Minnesotafarms. The hogs in the corn field made faster gains and cheaper gains than the hogs fed ear corn or snapped corn in the feed lots. Good pasture was an asset to economical pork production, and rape was found to be a cheap and easily grown succulent pasture crop.

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Experiments at the Iowa Station.

Evvard, Kennedy and Kildee (4) of the Iowa Station found by corresponding with some 300 farmers, that hogging down corn was a common method of pork production in all the localities of Iowa, it being popular in 98 of the 99 counties. Of the 300 farmers replying to these inquiries, 194 had had an average of six years experience. A summary of the replies of the farmers is as follows:

Table V. Summary of Replies.

Practiced method how long ? Years	Number of hog raisers	Percent for each period of years
1 - 2	37	19.07
3 - 4	45	23.20
5 - 6	51	26.28
7 - 8	19	9.79
9 - 10	16	8 .25
11 - 12	4	2.06
13 - 14	3	1.55
15 - 16	4	2.06
17 - 20	4	2.06
21 - 24	3	1.55
25 - 29	3	1.55
30 - 35	5	2.58

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This experiment was started in 1909 and continued until 1911 inclusive. The object of the experiment was to learn how the hogging down method of pork production worked out under practical farm conditions, and to determine the advisability of hogging down corn from an economic viewpoint. Also to compare corn field and dry lot systems of feeding and to determine the values of different supplements under different systems of feeding. The pork production value of an acre of corn was another object of the experiment, as well as the comparative production costs of pork made under the feed lot and dry lot systems of feeding. Observations were made on the advantages and disadvantages of hogging down corn.

The corn plots used throughout the experiment were .9 acres in size. The hogs had access to plenty of fresh water and shelter. Labor, risk, interest and depreciation were assumed to be offset by the manure produced.

Evvard, Kennedy and Kildee found in their survey, previously mentioned, that the majority of the farmers fed a supplementary feed with the corn hogged down. Most of the farmers fed a supplementary pasture crop. Rape was by far the most popular. Rye, pumpkins, red clover, cow peas, soy beans, and mammoth red clover were the next popular in the order named.

The number of men that fed a supplementary concentrate along with a pasture crop and the number of men that did not

feed a concentrate were about equally divided. A very small percentage of the replies indicated that neither a pasture crop nor a supplementary concentrate were fed. Meat meal or tankage, skim milk, oil meal, middlings or shorts, oats, rye and barley were the most popular supplementary feeds mentioned by the farmers answering this inquiry.

A preliminary test of several of the pasture crops proved that crops of a succulent nature increased the rapidity of gains to a remarkable extent. This served as a basis for a comparison test of the most popular supplementary crops in 1910. The crops tested were rape and pumpkins versus soy-beans, versus Canadian field peas, versus hairy vetch. Each of these supplemented a field of standing corn. The results of this test is given in Table VI.

Table VI. Preliminary Test of Pasture Crops.

Supplements to standing corn	Average initial weight	Number of days	Average daily gain	Pounds of pork accredited to the acre
Rape and pumpkins	92.3	70	.931	651.7
Soy beans	92.3	51	.826	483.8
Field peas	49.6	42	.706	333.8
Hairy vetch	92.6	70	.418	292.8

Rape and pumpkins proved to be the best supplementary crop in this test as the preceding data shows. Soy beans excelled field peas both in average daily gain and in amount of pork

produced per acre. The results of this experiment showed that hairy vetch was practically a failure.

In 1911 an extensive experiment was conducted to determine the comparative values of home grown supplements and purchased supplements. This experiment, which served as a basis for most of the conclusions of the bulletin, was also conducted to determine the relative values of feeding supplementary feeds with corn in the field and in the dry lot, as against corn alone in the field and in the dry lot.

Six lots were fed as follows:

Lot 1. Standing corn in the field.

Lot 2. Standing corn plus 10 percent meat meal in the field.

Lot 3. Standing corn plus green soy beans in the field.

Lot 4. Standing corn, 10 percent meat meal and green rye.

Lot 5. Ear corn alone in the check lot.

Lot 6. Ear corn plus 10 percent meat meal in the check lot.

The comparative results of adding meat meal to the ration of corn in the field and in the check lot are found in Table VII.

Table VII. Results of supplementing corn with meat meal.

Ration	Average daily gain	Meat meal fed	Total cost of 100 lbs. gain
Standing corn only	.420		$4.12
Ear corn, check lot	.620	326.44	$4.35
Standing corn, 10% meat meal	1.230		$3.06
Ear corn, 10% meat meal	1.170	340.44	$3.70

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Prices used in Table VII were as follows:

Corn in the field 32 cents per bu.

Corn harvested 40 cents per bu.

Corn in the field was figured at 8 cents less per bushel on account of the cost of husking being eliminated. The yield of the lots was estimated by shucking representative rows.

A comparison of the two lots that consumed corn and no supplement reveals the fact that the hogs in the dry lot made a larger average daily gain than the field fed hogs. However, the field fed hogs produced 100 pounds of corn 23 cents cheaper, due to the fact that they consumed corn worth 8 cents less per bushel. The gains made by either of these lots does not compare favorably with the lots receiving 10 percent meat meal.

The two lots of hogs that consumed meat meal with the corn made favorable gains. The hogs in the field lot made .06 pounds larger average daily gains. The gains made by the lot hogging down the corn were produced at a rate of 64 cents cheaper per hundred weight.

This data served as conclusive evidence for the statement that hogging down corn supplemented with a protein feed is an economical method of pork production. This data is also conclusive evidence that corn should be supplemented with some feed preferably of a nitrogenous nature.

Table VIII summarizes the results of the six lots of hogs fed in 1911.

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Table VIII. Summary of Results in 1911.

	Standing corn only	Standing corn, 10% meat meal	Standing corn, green soy beans	Standing corn, green rye, 10% meat meal	Ear corn in dry lot	Ear corn 10% meat meal, dry lot
Yield of field corn, bu.	46.02	50.53	38.64	42.98	44.63	50.76
Meat meal fed	none	326.44	none	789.6	410.8	778.6
Gain on hogs, lbs.	357.2	795.	504.4	789.6	410.8	778.6
No. of days	76	58	54	49.5	60	60
Average daily gain, lbs.	.42	1.23	.84	1.44	.62	1.17
Cost of 100 lbs. gain	$4.12	$3.06	$3.11	$3.02	$4.35	$3.70

Six cents was credited to the price of the corn consumed in the field to offset the price of husking.

A comparison of the supplementary crops fed in this experiment are all in favor of the combination of rye and meat meal. This lot made the largest average daily gain and produced 100 pounds of gain, the cheapest of the six lots. No feeding trial was made of rape and pumpkins.

Green soy beans as a supplementary crop did not prove to be of exceptional value. The rate of gain was faster in the lot getting only meat meal with the standing corn, and the cost of producing 100 pounds of pork was also five cents in favor of the lot getting only a supplement of meat meal.

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The cost of growing an acre of corn was estimated at $11.15 per acre. The cost of growing any supplementary crop was also added to this amount in those experiments where a green supplementary crop was grown. These costs were arrived at by the authors after a careful study of production costs for the different crops.

According to this data the comparative production cost of 100 pounds of pork under the different systems of field management is greatly in favor of rape and pumpkins. A test was made with soy beans each of the three years, and the comparative production costs ranged from $2.34 in 1909, $2.99 in 1910, to $2.87 in 1911. These results do not show that soy beans are a comparatively cheap supplement. Green rye plus meat meal, supplementing corn, produced 100 pounds of gain at $2.69, and ranks second to rape and pumpkins.

These results are in accordance with the information gathered by the authors. The replies of the men actually producing pork by hogging down corn were to the effect that rape was the most popular, rye second and soy beans third. The amount of pork produced from one bushel of corn as estimated by 62 farmers, was 12.02 pounds. The amount of pork produced by one bushel of corn under the different systems of feeding in 1911 was as follows:

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Table X. Pork per Bushel of Corn.

How fed	Supplement	Pork from 1 bu. corn
Standing corn in field	none	7.70 lbs.
Standing corn	Meat meal 10%	15.73
Standing corn	Meat meal, green rye	18.37
Standing corn	Soy beans	13.05
Ear corn, hand fed	Meat meal	15.30
Ear corn, check lot	none	9.20

The authors make no conclusive statements regarding the advantages of supplementing corn with the proper supplements, but indicate that good supplements as rye, meat meal with corn are very efficient producers of pork. They do not assert that the amount of pork produced from a bushel of corn is greater when the corn is consumed in the field than in the dry lot.

The authors concede that small fields are probably hogged down with less waste than large fields. They also advise that old sows should be confined to smaller areas than shotes, because they have a tendency to be more wasteful.

Evvard, Kennedy and Kildee found that the carrying capacity of an acre of corn was somewhat larger than that found by the Minnesota Station (3). However, the two are not technically comparable because the weight of the hogs used in the two hogging down experiments was not the same. Evvard, Et al.

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present the following table on the carrying capacity of an acre of corn with the varying yields. The average weight of the hogs used in this estimation was 125 to 150 pounds per head.

Table XI. Carrying Capacity per Acre of Corn.

Bushels to the acre	30 days	60 days	90 days	120 days
40	14-15	6-7	4-5	3
50	18-19	8-9	5-6	4
60	21-22	10-11	6-7	4-5
70	26-27	12-13	7-8	5-6

The replies of the farmers regarding fencing seem to indicate that temporary fences were probably not so popular as during the time of the Minnesota Station experiment on hogging down corn. The authors do not comment strongly in favor of putting in temporary fences.

The numerous disadvantages of hogging down corn are more than offset by the many advantages, according to the authors, who conclude that hogging down corn when properly supplemented, and under the proper field management, is a profitable, a practical and economic method of pork production.

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Experiments at the Ohio Experiment Station.

The Ohio Agricultural Experiment Station (5) reports the results of hogging down corn in three different annual Experiment Station reports. The first appears in the third annual report of the Miami County Experiment farm. The second and third experiments were reported in the 1914 and 1915 annual reports published in 1915 and 1916.

The first experiment began September 6, 1913. Sixty pigs, having an average initial weight of 76 pounds, were given access to two three-acre plots, one at a time. The standing corn was supplemented with tankage. A summary of the results is as follows:

Number of pigs	60
Average initial weight	76 lbs.
Average daily gain	1.51 lbs.
Feed consumed aside from standing corn,	
Shelled corn	355 lbs.
Tankage	754.5 lbs.
Returns per acre, pork at 6 cents per lb.	$34.31

The 1914 experiment (6) began Sept. 10th. Thirty-three pigs hogged down two plots of three acres each, one at a time. Rape had been sown in the corn at the last cultivation. Tankage also supplemented the first lot, but not the second lot. The summary included in the report is as follows:

Average initial weight	122.8 lbs.
Total gain	324.6
Average daily gain	1.76
Returns per acre, hogs at 6 cents	$31.54

The value of rape and tankage as supplements to standing corn is not brought out by this data because the comparative results of the gains made under the two systems of feeding were not published. However, a comparison of the average daily gains made in the 1914 experiment and the 1913 experiment might indicate that rape increased the average daily gain.

The 1915 annual report (7) of the Ohio Agricultural Experiment Station, published in 1916, contains the following data regarding an experiment in hogging down corn.

Three three-acre plots of corn were hogged down by one lot of pigs. Slight changes were made in the number of hogs during the second and third hogging down periods. The yield of the plots was estimated by harvesting each and every eighth row of corn, and a 15.5 moisture basis was used in computing the yield. Tankage supplemented the corn.

The report contains no explanation regarding the variations occuring in the results which are given in Table XII.

Table XII. Summary of Results.

Plot	Tankage consumed per A.	Estimated yield per A.	Number of pigs	Average initial weight per head	Period Days	Average gain Per head daily	Average gain Per acre	Acre Net Profit Hogs 8¢
1	104.5	39.9	57	92	22	1.52	635.5	48.23
2	92.91	49.7	62	121	18	1.57	584.5	44.44
3	90.0	48.8	60	153	18	1.66	596.8	45.49

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A summary of the averages of the three plots hogged down is as follows:

Average gain per pig daily, pounds	1.58
Average amount of corn consumed per pig, pounds	412.8
Amount of pork produced per acre	605.5
Amount of pork produced per bu. of corn	13.2
Gross returns per bushel of corn	.924
Less cost of tankage in producing 13.2 lbs. of pork	.052
Net returns per bushel of corn	.872

No expense was charged against the hogging down project and all the profit is credited to the standing corn.

The results of these feeding trials, although not comparative, show a very successful rate of gain. They also show a fair net return per bushel of corn fed. The current price of corn for that season was not mentioned. The amount of pork produced per bushel of corn consumed is approximately 2.5 pounds less than the amount produced under similar conditions in the Iowa Experiment (4).

10-20 5M

Experiments at the Illinois Experiment Station.

The results of a series of feeding trials with hogging corn at the Illinois Experiment Station was secured through the courtesy of Prof. Rice of that station.

This experiment began in the fall of 1914 and was continued in 1916 and 1917. Three lots of fifteen hogs each were fed in the first experiment. The lot number and ration fed in each lot is as follows.

Lot 98. Corn in field, tankage.4 pound daily

Lot 99. Corn in field, tankage and middlings .4 pound each daily.

Lot 100. Corn, picked, tankage .4 pound daily

A summary of the results of these three feeding trials is given in Table XIII.

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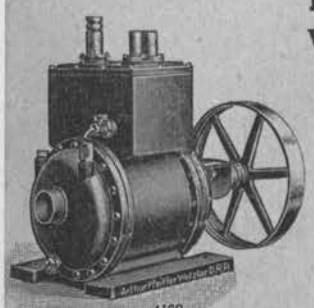

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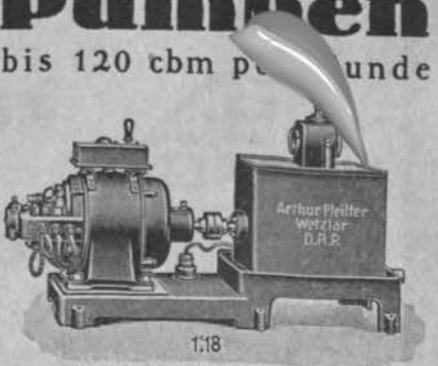

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Table XIII. Summary of Results in 1914

Lot number	98	99	100
Ration	Corn in field Tankage .4 lb.	Corn in field Tankage and middlings .4 lb.	Corn (picked) Tankage .4 lb.
Number of pigs	15	15*	15**
Days on experiment	44	48	49
	lbs.	lbs.	lbs.
Weight			
Avg. initial per pig	100	100	101
Avg. final per pig	139	146	151
Gain			
Total per lot	582	692	752
Avg. daily per pig	.88	1.02	1.04
Feed consumed per lot			
Corn	3041	3040	3041
Tankage	264	277	290
Middlings		277	
Total	3305	3594	3331
Avg. daily ration per pig	4.61	4.50	4.19
Corn			
Tankage	.40	.41	.40
Middlings		.41	
Total	5.01	5.32	4.59
Feed per 100 lbs. gain			
Corn	523	439	405
Tankage	45	40	38
Middlings		40	
Total	568	519	443

* pig taken out Oct. 21, weight 142 lbs.
**pig taken out Nov. 25, weight 60 lbs.

In this feeding test, the hogs in Lot 100 made the largest average daily gain per head, consumed a smaller average daily ration per head, and produced 100 pounds of gain on less feed than either of the other two lots. Lot 99 made approximately the same average daily gain per head as Lot 100. The average daily ration per head, however, was .31 pounds of corn and .41 pounds of middlings larger than the amount consumed by Lot 100. Lot 99 required 3 pounds more corn, 2 pounds more of tankage, and 40 pounds of middlings to produce the 100 pounds of gain, equal to that produced by Lot 100.

Lot 98 made a smaller average daily gain per head as compared to the hogs of the other two lots. The hogs of this lot consumed 4.61 pounds of corn in the average daily ration, which was.11 pounds more than Lot 99 consumed, and .41 pounds in excess to the amount consumed by the pigs of Lot 100. The amount of tankage consumed in the average daily ration of all the three lots was the same, or .4 pounds. Lot 98 required the largest total amount of feed to produce 100 pounds of gain, or 568 pounds. This is 49 pounds in excess of the amount consumed by Lot 99 and 125 pounds in excess of the amount consumed by Lot 100. Of this amount consumed, 523 pounds was corn. This was 84 pounds more of corn than was required by Lot 99, and 118 pounds more than required by Lot 100. The amount of tankage consumed to produce 100 pounds of gain was 7 pounds more than required by Lot 100, and 5 pounds more than the amount consumed by Lot 99.

Judging by the comparative amounts of feeds consumed by the three lots in this experiment, and with the relative prices of feeds of that period in mind, especially the price of corn in the field and in the crib, it is doubtful whether or not this experiment in hogging down corn was as profitable as husking the corn and feeding it in the dry lot.

The hogs in the dry lot produced 100 pounds of gain on less feed and made a larger average daily gain than the pigs in the corn field. This corresponds to the results of the Iowa Station (4), but does not correspond to the work of the Minnesota Station (3).

Four lots of hogs were fed in 1916 as follows:

Lot 101, Corn in field, tankage and middlings .4 lbs. each.

Lot 102, Corn in field, tankage .4 lbs.

Lot 103, Corn (picked), tankage and middlings, 4 lbs. each.

Lot 104, Corn (picked), .4 lbs. tankage.

The results of these feeding trials are given in Table XLV.

Table XIV. Summary of Results in 1916.

Lot number	101	102	103	104
Ration	Corn in field Tankage & middlings .4 lb.each	Corn in field Tankage .4 lb.	Corn (picked) Tankage & middlings .4 lb.each	Corn (picked) Tankage .4 lb.
Number of pigs	20	20	20	20
Days on experiment	35	28	33	33
	lbs.	lbs.	lbs.	lbs.
Weight				
Avg.initial per pig	107	106	107	105
Avg. final per pig	155	162	157	154
Gain				
Total per lot	965	915	1004	969
Avg.daily per pig	1.38	1.63	1.49	1.47
Feed consumed per lot				
Corn	3311	3311	3311	3311
Tankage	280	224	264	264
Middlings	280		264	
Total	3871	3534	3839	3575
Avg. daily ration per pig				
Corn	4.73	5.91	5.02	5.02
Tankage	.40	.40	.40	.40
Middlings	.40		.40	
Total	5.53	6.31	5.82	5.42
Feed per 100 lbs. gain				
Corn	343	362	336	342
Tankage	29	24	27	27
Middlings	29		27	
Total	401	386	390	369

12-21-6M

The addition of middlings to the ration is not an economical practice and should not be recommended, according to this data. The average daily gain per head was lower in the field lot than when no middlings was fed. In the dry lot the pigs receiving middlings made only .02 pounds larger average daily gain. The corn field lot that received middlings required a longer period of time to clean up the corn in the plot hogged down, and consumed more feed to produce 100 pounds of gain than the lot that did not receive middlings. Lot 103, the dry lot receiving middlings, also required more feed to produce 100 pounds of gain than Lot 104.

The hogs of Lot 102 required a total of 17 pounds more feed to produce 100 pounds of gain than Lot 104. This lot consumed 3 pounds less tankage but consumed 20 pounds more corn. This gain made by Lot 102 was very economical as compared to Lot 104, and when the price of harvesting the corn hogged down is taken into consideration Lot 102 made the most economical gains.

The relative value of soy beans as a home grown supplement was brought out by the four lots of hogs fed in 1917. The forty hogs were divided into four lots of ten hogs each as follows:

Lot 105, Corn in field, tankage self fed.

Lot 106, Corn and soy beans in field, tankage.

Lot 107, Corn and soy beans in field.

Lot 108, Corn, picked, tankage self fed.

12-21-6M

The results of these feeding trials are summarized in Table XVIII.

Table XVIII. Summary of Results in 1917.

Lot Number	105	106	107	108
Ration	Corn in field Tankage self-fed	Corn and soybeans in field Tankage self-fed	Corn and soybeans in field	Corn (picked) Tankage self-fed
Number of pigs	10	10	10	10*
Days on experiment	36	36	36	36
	lbs.	lbs.	lbs.	lbs.
Weight				
Avg. initial per pig	102	100	101	102
Avg. final per pig	148	149	130	142
Gain				
Total per lot	456	493	283	359
Avg.daily per pig	1.27	1.37	.79	1.03
Feed consumed per lot				
Corn	2117	2117	2117	2117
Tankage	171	175		88
Soybeans		99	99	
Total	2288	2391	2216	2205
Avg. daily ration per pig				
Corn	5.88	5.88	5.88	6.07
Tankage	.48	.49		.25
Soybeans		.27	.28	
Total	6.36	6.64	6.16	6.32
Feed per 100 lbs. gain				
Corn	464	430	748	589
Tankage	38	35		25
Soybeans		20	35	
Total	502	485	783	614

* pig taken out Oct. 31, wt. 105 lbs.

The results of supplementing corn with soy beans in this experiment are very similar to the results obtained by the Iowa Station (4), in that the hogs made a relatively small average daily gain, and they required a large amount of feed to make 100 pounds of gain.

However, the lot receiving standing corn and soy beans supplemented with tankage, made the largest average daily gain per head, and produced 100 pounds of feed on less feed than either of the other three lots. Lot 105 ranked second in both average daily gain and total number of pounds of feed consumed to produce 100 pounds of gain.

The results of feeding corn and tankage in the dry lot in this feeding trial do not compare with corresponding feeding trials of this experiment. The hogs of this lot required more feed to produce 100 pounds of gain than either of the two lots hogging down corn and receiving tankage, and also made smaller average daily gains per head than either Lot 105 or 106.

The results of the Illinois Station (21) emphasises the necessity of supplementing corn with tankage. When the standing corn was properly supplemented, hogging down was an economical method of producing pork and practically did away with the necessity of husking. The hogs fed corn and tankage in the dry lot, in two feeding trials out of three, made gains on less feed than the hogs fed corn and tankage in the corn field.

Middlings were not economically used in either feeding system, but soy beans were economically used and increased the rate of gain when they were supplemented with tankage.

Experiments at the Nebraska Experiment Station.

Unpublished data secured from the Nebraska Station represents the results of an experiment conducted at that station this past year.

Three lots of fifteen hogs each were fed; one lot was fed in a dry lot and two lots hogged down corn. Tankage and alfalfa hay supplemented the corn in the dry lot and in one field lot. Alfalfa hay was the only supplement fed Lot 3, the second field lot.

The average daily ration consumed by the hogs of the different lots during the 35 days of the experiment are as follows:

Table XVI. Average Daily Rations.

Average daily rations. Pounds per head.	Lot 1. Dry lot self-fed	Lot 2. Corn field	Lot 3. Corn field
	Shelled corn 4.257	Shelled corn 4.994	Shelled corn 4.913
	Tankage .676	Tankage .590	
	Alfalfa Hay .167	Alfalfa Hay .142	Alfalfa Hay .549
Total	5.1	5.726	5.462

The average initial weight per head, the average final weight per head, the average gain per head, and the average daily gain are given in Table XVII.

Table XVll. Average Weight and Gain per Head.

	Lot 1	Lot 2	Lot 3
Average initial weight per head	149.04	148.3	147.23
Average final weight per head	204.97	197.22	178.8
Average gain per head	55.93	48.92	31.57
Average daily gain per head	1.598	1.397	.90

This data does not point favorably toward the supplementing of corn in the field with alfalfa. Lot 2 consumed the largest average daily ration per head and made good average daily gains but did not surpass Lot 1 in rate of gain. The pigs of Lot 1 consumed the least corn, the most tankage and more alfalfa hay than Lot 2 and made the largest average daily gain.

The amount of feed consumed to produce 100 pounds of gain and the cost of 100 pounds gain are given in Table XVlll.

Table XVlll. Feed and Cost per 100 pounds gain.

Feed per 100 pounds gain	Lot 1	Lot 2	Lot 3
Shelled corn	266.39	357.48	545.88
Tankage	42.302	42.23	
Alfalfa hay	10.45	10.16	61.00
Cost of 100 pounds gain	$2.24	$2.57	$2.22

Shelled corn 20 cents per bushel.

Tankage @ $3.00 per cwt.

Alfalfa @ $10.00 per ton.

12-21-6M

The cost of harvesting was not deducted from the price of corn consumed by the hogs in the corn field. The amount of tankage and alfalfa hay consumed by the two lots, 1 and 2, was approximately the same. Lot 2 consumed more corn than Lot 1, to produce 100 pounds of gain, and with the price of corn the same for the two lots, Lot 1 made the most economical gains.

The relative price of tankage as compared to the price of corn in this experiment is high. This accounts for the fact that Lot 3 produced 100 pounds of gain cheaper than either Lot 1 or Lot 2, although having consumed more than twice as much corn as Lot 1 and approximately 40 percent more than was consumed by Lot 2.

The profit and loss returned from these three feeding trials, figured at current prices, is summarized in Table XlXI.

Table XlXI. Financial Statement.

	Lot 1	Lot 2	Lot 3
Initial cost per head at $8.50 per cwt.	$12.67	$12.60	$12.51
Feed cost per head	1.25	1.26	.70
Interest on investment at 8%	.12	.12	.12
Total cost per head	14.04	13.98	13.33
Returns per head at home, at $7.00 per cwt.	14.35	13.80	12.52
Returns per head at home, at $6.50 per cwt.	13.32	12.82	11.62
Profit or Loss per head, at $7.00	.31	-.18	-.81
Profit or Loss per head, at $6.50	-.72	-1.16	-1.71

12-21-6M

Market value of feeds: Shelled corn @ 20 cents per bu.
Tankage @ $3.00 per cwt.
Alfalfa @ $10.00 per ton.

Lot 1 returned the most profit, Lot 2 ranked second, and Lot 3, third. Having in mind the fact that Lot 3 made the cheapest gain per pound and the smallest total feed cost, with the initial purchasing price and selling price the same, these returns in profit are hard to interpret. The cost of 100 pounds of gain made by the pigs of Lot 1 was 2 cents more than the cost of 100 pounds of gain made by the pigs of Lot 3. Then the profit in favor of Lot 1 might possibly be due to the fact that the pigs of each lot were making a large profit over the cost of producing gains, and as Lot 1 made the largest gain, that lot would consequently make the largest profit.

Summary of Findings.

One conclusion to be drawn from the results of the Experiments reported, is that daily gains made by pigs pasturing corn are practically equal to gains made by pigs receiving a full feed of corn in the dry lot. In the majority of the trials, daily gains were slightly larger with the lots receiving ear corn fed by hand. There were, however, one or two exceptions to this in which pigs pasturing corn made slightly larger average daily gains than pigs fed corn in the dry lot. With one or two exceptions the pigs pasturing corn required more corn to produce 100 pounds of gain than was required by the hogs fed in the dry lot.

Considerable light is thrown on the question of supple-

menting corn in the field by these several experiments. It was quite definitely shown that it does pay to supplement corn in the field with tankage. It was also shown that there is no advantage to be gained by feeding a supplement that is medium or low in protein content. In fact such supplements have the effect of reducing gain and increasing the cost of gains.

It was shown that pigs receiving tankage from a self-feeder while getting corn only in the dry lot, ate quite a little more tankage than pigs receiving tankage from a self-feeder while pasturing corn.

An average of the results in all of these trials shows that the practice of hogging corn did prove successful and economical, and that it has the advantage of releasing the labor required in husking the corn and feeding the pigs so that it may be employed in the times when it is badly needed in the fall of the year.

CHAPTER 111.

A Feeding Trial in Hogging Down corn.

Objects.

In order to secure some first hand information relative to the practice of hogging down corn, and experiment was planned and outlined in the spring of 1921 to be conducted under the supervision of the Animal Husbandry Division of the University of Minnesota. The feeding trials were conducted during the following fall.

The fields of corn, two in number, were planted, cultivated, and grown to maturity under the supervision of the Division of Animal Husbandry. The pigs were also grown under the supervision of the Division of Animal Husbandry. The writer took charge of the experiment immediately after the hogs were turned into the corn field in the fall, or on October first.

The objects of the trial were:-

1st. To determine the adaptability of the practice of hogging down corn to central Minnesota conditions.

2nd. To determine the comparative gains made by fattening hogs when pasturing corn, with gains made by feeding hogs ear corn in the feed lot.

3rd. To determine the comparative economy of gain and profits secured from the two systems of feeding.

4th. To determine the effect of rape added to the ration, the rape being seeded in the corn at the last cultivation.

12-21-8M

Growing the Corn.

The variety of corn used in these feeding trials was Rustlers White Dent. This variety was selected because previous experience in growing it had shown it to be a variety suitable to the soil and climatic conditions at the University Farm. This variety usually matures during the early part of September and it usually results in a satisfactory yield. Two fields, approximately one acre in size, were planted during the latter part of May. The two fields were manured during the early part of the spring and were plowed about the middle of April, the depth of plowing averaged approximately 6 inches. After the fields were plowed they were allowed to stand until planting time when they were disked and harrowed. The corn was drilled, the rows were 3 feet, 8 inches apart, and the planter was set to drop one to two kernels every 12 to 14 inches in the row. A satisfactory stand of corn was secured. The season was favorable. to the growth of the corn and what appeared to be a satisfactory growth continued through out the season, resulting in what appeared to be a normal average yield.

The corn was cultivated four times during the summer and all coarse weeds were hand pulled after the third cultivation. The coarse weeds and grass between the corn rows and the fence were mowed twice during the summer. Dwarf Essex Rape was sown broad cast in field two following the last cultivation of the corn at the rate of two and one-half pounds per acre. Dry weather followed the seeding of the rape and a very thing stand was secured. Those plants that did come up, however, responded well to rains that came later and they made a good growth.

4-21 6M

The stand of rape, however, was not enough to furnish grazing for more than one week. Both fields of corn remained comparatively free of weeds until the time the hogs were turned into the fields, except for a little growth of pidgeon grass that had sprung up along the edges of the fields, Due to the dry, hot, weather during the month of August, this pidgeon grass had dried off and furnished very little if any feed for the pigs.

The Pigs Used.

The pigs used for the feeding trial were all purebred pigs and were taken from the University Farm herd. They had been grown under the usual farm conditions for spring farrowed pigs, and were farrowed during the latter two weeks of March and first two weeks of April. The groups from which the pigs for this trial were selected had been carried through the summer months on rape pastures, and were fed a grain ration made up of shelled corn, red dog flour, and tankage, from a self feeder. They were dipped at about one month intervals in a weak solution of Kreso stock dip to keep them free from lice and to keep their skins in good shape. Small field-hog-houses, eight feet by eight feet in size, supplied shelter and shade during the summer and automatic hog watering tanks supplied water.

Forty five hogs representing five breeds, namely, Duroc-Jersey, Poland-China, Chester-White, Hampshire and Berkshire were taken from the groups of spring farrowed pigs. The pigs had grown well through the summer months and when grouped for the feeding trials were in a thrifty, healthy, growing condition,

averaging in the neighborhood of 140 pounds in weight and were ready to go on a fattening ration preparatory to being marketed.

Grouping and weighing of pigs.

The two plots of corn to be hogged down were ripe enough to be pastured about September 5th. At about this time a siege ~~of~~ of about two weeks of extremely rainy weather set in and it was considered advisable to postpone moving the hogs into the corn until more settled weather prevailed. As a result the hogs were not turned into the corn field until September 26th.

Object number three of the trial made it necessary to determine as accurately as possible the yield of corn in the two plots that were to be pastured. Consequently three representative rows of corn were chosen in each field and these were shucked out. The weight on one row of corn was then estimated by taking the average of the three rows shucked. The average estimated weight of one row multiplied by the number of rows gave the estimated yield of each of the corn plots. Field number one was 1.26 acres in size and field number two was .849 acres in size. The yield of corn on field one was 66.6 bushels, or at the rate of 52.86 bushels per acre. Field two had a yield of 61.07 bushels, or at the rate of 73.56 bushels per acre. The amount of corn husked from each field and used in calculating the estimated yield was not returned, consequently, it was deducted from the total amount produced for consumption on each plot.

Forty five hogs were chosen from a group of sixty of the spring farrowed pigs. This made it possible to get a fairly

uniform bunch of pigs, all showing a good thrifty condition. The variation in weight ranged from 93.3 to 185.3 pounds.

These forty-five pigs were divided into three lots of fifteen each, the pigs for each lot being selected with a view to getting them as uniform as possible, also to get the lots as nearly the same weight as possible. They were weighed individually for three successive days, the weights being taken as near the same hour each day as possible. One lot of 15 pigs was placed in a dry feed lot near the central hog house, this lot hereafter being known as Lot 1. A second lot of 15 was placed in conn field number one, this lot hereafter being known as Lot 11. The third lot was placed in cornfield number two and designated Lot 111.

The pigs were placed in the respective lots immediately after weighing on the second day, the feeding then beginning at that time. They were weighed again on the the third day. The average of the three days weights was taken as the initial weight for the beginning of the feeding trial.

Lot 1 served as a check lot in order to have something with which to compare the results secured from Lots 11 and 111. The pigs of Lot 1 had access to a permanent hog shed and an automatic hog-waterer was placed in one corner of that lot.

One "A" type hog house was placed in a corner of each of the two field lots previous to the time of turning in. Automatic hog waterers were also placed in the two lots. "Swifts Digester Tankage" was fed as a supplement to the corn in each lot. This was fed in self feeders.

The pigs were grouped and weighed the first time on September 25th. After the second weighing was taken on September 26th, they were put in their respective lots, this being known as the initial day of the experiment.

Method of Feeding.

The pigs in lot 1 were hand fed all the corn they would consume through out the experiment. This corn was taken from a field of the same variety and grown under the same conditions as the corn in Lots 11 and 111. A fresh supply of corn was brought in each week. This, of course, was supplemented with tankage.

T he hogs in the field lots were forced to break down the stalks and work the ears out of the husks themselves. This was the essential difference in the two systems of feeding. Tankage supplemented the corn, and the rape, previously mentioned, also furnished some food for the hogs in Lot 111.

The length of the feeding trials was determined by the rate at which the hogs consumed the corn in the fields lots. The supply of corn in Lot 111 appeared to be completely exhausted at the end of 31 days, while the larger amount of corn in Lot 11 lasted 37 days. The exhaustion of the corn completed the duration of the feeding trials.

Weighing Out.

Final weights were taken by weighing three days in succession, the average of the three days was taken as the final weight. The morning feed on the second day of weighing was taken as

the close of the feeding trial as far as the feed was concerned. A liberal feed of corn was given the hogs previous to the weighing on the third day. The error introduced in this way, however, would be less than had the final weights been taken from one days weighing.

The final day of the experiment for Lots 1 and 11 was November 2nd. For Lot 111 it was October 27th.

Composition of Feed.

A composite sample of corn was taken from the corn in Lots, 11 and 111, also from the corn being fed in Lot 1, on October 23d. A composite sample of the tankage was taken on the same day. The feed analysis of these feeds is given in Table, XX .

Table XX. Composition of feed.

Sample from	Moisture	Moisture free basis			
		Ether extract	Crude fibre	Ash	Nitrogen free extract
Lot 1	19.40	4.56	1.17	1.18	80.45
Lot 11	14.16	4.99	1.41	1.43	79.28
Lot 111	16.97	5.45	1.64	1.32	79.30
Tankage	9.07	4.34	.92	18.61	14.85

The composition of each of the three samples of corn was very similar except for the moisture content. The difference in moisture content can be explained by the observation that the corn fed the pigs in the dry lot came from a field planted a little later and maturing a little later than the corn in Lots

11 and 111. The low moisture content of the corn in Lot 11 may be explained by the fact that the topography of the field was a slope to the south and east with the result that the soil dried out and the corn rippened earlier than that in Lot 111, the topography of which was level and low, the soil holding the moisture longer, the corn consequently maturing a little later.

In order to get results which could be compared more accurately it was considered advisable to reduce the corn consumed by all three lots to a 14% moisture content basis. This amount of moisture was chosen because it is the standard moisture content of corn grading number one.

The amount of corn consumed by each of the three lots on a shelled corn basis is given in Table XXl.
T his corn reduced to a 14% moisture content basis is also included in the same table.

Table XXl. Corn consumed by lots of Hogs.

	Lot 1	Lot 11	Lot 111
As in field	3668	3520	3226.6
14% moisture basis	3437.6	3513.5	3115.2

Price of Feeds.

The price of corn on the standing stalks was taken at 25¢ per bushel. This seemed to be a fair price of unharvested corn in view of the fact that farmers were getting only 35 to 40 cents for corn at the elevators. The price for corn in the crib was taken at 31 cents. Six cents was assumed to cover the cost of husking, hauling and cribbing. The price used for the tankage consumed by the hogs in this experiment was $52.50 per ton.

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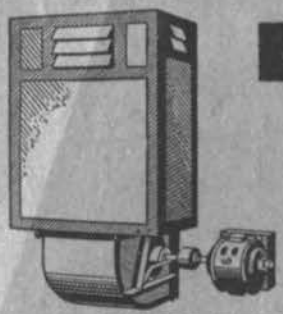
Discussion of Data.

It will be noticed in Table XXII that the average daily gains per pig in the three lots differed considerably. The gain in Lot 1 being 1.71 pounds, Lot 11, 1.44 and Lot 111, 1.49 pounds. The average daily gains made by the hogs in Lots 11 and 111 were practically the same, but the gain made by the hogs of Lot 1 was considerably higher. This would indicate that dry lot feeding of ear corn is conducive to more rapid gains than when the corn is pastured off by the hogs in the corn field. A search of the figures and observations on the trial for an explanation of this leads to the belief that the more rapid gains in Lot 1 were due partly to a slight difference in the proportionate amount of corn to tankage consumed by the pigs. For some reason or other the pigs in Lot 1 ate quite a little more tankage than did the pigs in Lots 11 and 111. This had the effect of giving them a ration with a narrower nutritive ratio, which might account for a part of the difference in the rate of gain. The reason the pigs in this lot ate more tankage than the pigs in the field may have been due to the fact that they were more closely confined and were constantly close to the self feeder containing tankage and thus were inclined to visit the tankage feeder more frequently. The smaller consumption of tankage in the corn field might have been due to the fact that the hogs in the field secured more material from the ground, such as roots, or possibly they ate some grass and weeds, and as a result did not care for quite so much tankage.

Another factor that might account for the difference in rate of gain may be that the large amount of exercise taken by the pigs in the corn field in rustling their own corn and wandering



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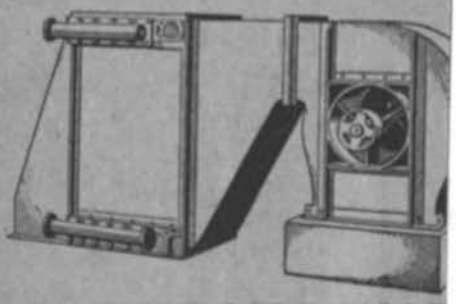

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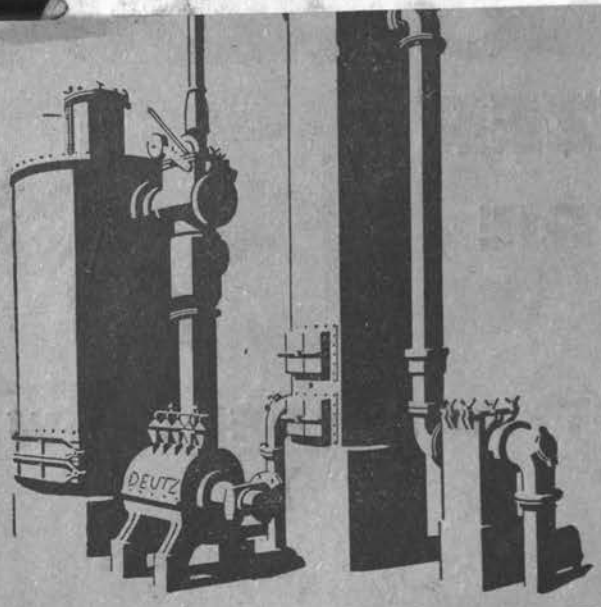

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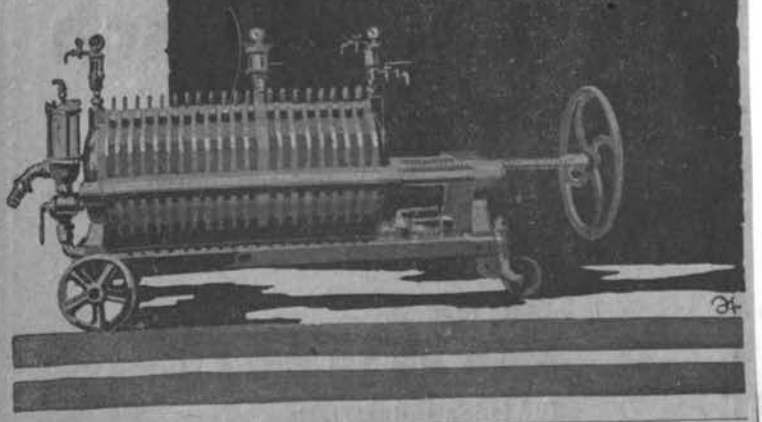

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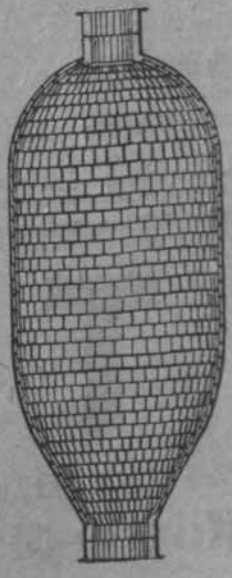

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over the larger fields would affect their gains adversely.

There was also a slight difference in the type of shelter provided which may have had a slight effect on gain though this is doubtful. Nothing in the way of sickness entered in that could explain any difference in the rate of gain.

There is so little difference in the rate of gains made by the two field lots that it may be said their gains were practically as equal as could be expected. The slight advantage in rate of gain by Lot 111 as compared to Lot 11 might possibly have been due to a beneficial effect from the small amount of rape that was available in Lot 111.

Another significant result is the fact that the pigs in Lot 1 made 100 pounds of gain on less feed than either Lots 11 or 111. This would indicate that pigs showed greater efficiency in making gains from corn when it is fed to them in a dry lot than when it is pastured off in the corn field. The difference is distincly in favor of the dry lot fed hogs, while the amount of feed consumed in Lots 11 and 111 to produce 100 pounds of gain was practically the same.

A partial answer as to why the pigs receiving corn in the dry lot should make more efficient use of their feed than pigs in the corn fields is found in the figures showing that they ate quite a little more tankage than those in the corn fields, thus giving them a more evenly balanced ration. This explanation appears still more logical when we remember that these pigs were of an age and weight where they would be growing bone and muscle as well as fattening.

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The more efficient use of feed by Lot 1 may also be partly due to the accessibility of their feed, the comfort of their shelter and the fact that they rested a great deal more than the pigs in the cornfield.

So far as cost of production is concerned the item of chief interest in this trial is the comparative feed cost or relative economy of the method of feeding where the corn is harvested and fed to the pigs as compared to the economy of the practice of turning the pigs into the corn field. So far as care is concerned the item of supplying shade, water, and tankage would differ but little in cost for the pigs in the cornfield as compared to these same essentials for pigs being fed in a dry lot.

By consulting Table XXll it will be seen that there was little difference in the relative feed cost per one hundred pounds gain in the three lots. The respective feed costs per 100 pounds gain, figured from the previously mentioned feed prices, for each of the three lots is as follows:- Lot 1, $2.69; Lot 11, $2.54; Lot 111, $2.61. The higher cost of the corn in Lot 1 and the larger amount of tankage consumed by that lot slightly more than over balanced the greater efficiency of this lot in the utilization of feed. There was not enough difference in feed cost per 100 pounds gain to prove an important factor determining relative profits from the two systems of feeding. There was enough difference however so that one is justified in saying that so far as feed costs are concerned the pasturing of corn is fully as economical a method of feeding as the harvesting of the corn and feeding it in the dry lot. The difference of a few cents in the feed costs

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per 100 pounds gain in Lot 111 as compared to Lot 11 is accounted for by the fact that Lot 111 consumed a trifle more corn and tankage to produce 100 pounds of gain than Lot 11 consumed. In this connection, however, it must be remembered that the corn consumption by Lots 11 and 111 was based on an estimated yield, and the small difference is therefore within the range of experimental error.

It should also be noticed that the feed cost per 100 pounds of gain for all three lots was very low and with hogs weighing from 175 to 200 pounds, as these hogs were at the close of the experiment, at the current price of hogs for that time, or around 7 dollars per hundred , a very comfortable margin was left to cover other costs.

The hogs from the three lots were near enough the desired weight and condition and were uniform enough in size and type to command the same price per unit for the entire 45 head. In as much as they were needed for class room slaughter they were not sold on foot, which is another reason why a complete financial statement has not been attempted.

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Table XXll. Summary of Data.

Lots	1	11	111
Ration	Corn, full hand fed Tankage self fed.	Corn in field, tankage self fed	Corn and rape in field tankage, self fed.
Number of pigs	15	15	15
Days on experiment	37	37	31
Weight			
Average initial weight per pig	140.6	139.21bs	142.4 lbs
Average final weight per pig	204.1	192.5	188.7
Initial weight of lot	2109.	2088.6	2136.
Final weight of lot	3061	2888.3	2830
Gain			
Total per lot	952.	799.7	694
Average daily gain per pig	1.71	1.44	1.49
Feed consumed per lot			
Corn, shelled	3437.6	3573.5	3115.2
Tankage	252.0	178.0	160.0
Total	3689.6	3691.5	3275.2
Feed consumed per 100 lbs. gain			
Corn	361.1	439.4	448.9
Tankage	26.5	22.25	23.1
Total	387.6	461.65	472.0
Average daily ration per pig			
Corn	6.19	6.33	6.69
Tankage	.45	.32	.34
Total	6.64	6.65	7.03
Feed cost of 100 pounds gain			
Corn	1.99	1.96	2.00
Tankage	.70	.58	.61
	2.69	2.54	2.61

Corn in field @ 25¢ per bu.
Corn in crib @ 31¢ per bu.
Tankage @ $52.50 per ton.

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Individual weights and gains of pigs.

One factor that may always enter in to influence the results of any feeding trial is the individuality of the animals used. Seldom are two animals found that will make equal gains on the same kind of feed and on equal amounts of feed. This has been proven in part by carefully conducted experiments at the Minnesota Station in 1915 by Ashby (10). Naturally when pigs are fed in groups, as they were in this experiment, it is impossible to determine the amount of feed consumed by each individual pig. The weights and gains of the pigs, however, were determined individually. Tables, XXll, XXlll, and XXlV give the variation in the average initial weight and the variation of the average daily gain for each individual of each lot.

The average fluctuation from the mean weight for each lot was 14.36%, 11.38%, 13.89%, for Lots 1, 11, and 111 respectively. The average fluctuation from the mean average daily gain for Lots 1, 11, and 111, was 15.1%, 23.6%, and 23.7% respectively. Ashby (11) found in the previously mentioned experiment that even when pigs are quite uniform in weight to begin with a fluctuation by individuals of anywhere up to ten percent from the average daily gain is to be expected. When the pigs comprising the lot vary quite widely in initial weight, as they did in this experiment, a somewhat greater fluctuation from the average daily gain is to be expected. A glance at the average percent fluctuation from the mean or average daily gains shows that there was an average fluctuation in Lot 1 of 15.1%, as compared to 23.6% for

Lot 11 and 23.7% for Lot 111. The fluctuation in Lot 1 may be explained by the fluctuation in initial weight, but in as much as the fluctuations in initial weights of Lots 11 and 111 were no greater than Lot 1, something must have entered in to account for the greater fluctuation in average daily gains in these two lots. A probable explanation is that some pigs in Lots 11 and 111 were much better corn harvesters than others, or that some of the pigs in these two lots did not have the ambition or ability to gather feed from standing corn and utilize it as well as did others. A search of the tables for a correlation between initial weights and daily gains show that there is no correlation between the two. Some of the pigs that were heaviest at the beginning made the greatest daily gain, while some made small daily gains. Some of the pigs that were lighter than the average at the beginning, made some of the largest daily gains. Neither do the observations on the pigs during the trial reveal the cause for the larger fluctuations in Lots 11 and 111. There was a difference in breeds represented, also some differences in type, but here again there seems to be no correlation, therefore, of this wider fluctuation in Lots 11 and 111 must be due to the individual disposition or inclination of the pigs to rustle his own feed, and this cannot be foretold before the pigs are put into a cornfield.

Table XXIII. Variations in Weights and Gains.

Lot 1. Feeding Period 37 days.

Hog Number	Initial Weight	Variation from average initial wt.	Final weight	Total gain	Av. daily gain	Variations from av. daily gain
	pounds	per cent	pounds	Pounds	lbs.	lbs. %
1	114.3	18.7	175.0	60.7	1.64	-.07 4.
2	171.3	21.8	217.6	46.3	1.25	.46 26.9
3	137.3	2.3	180.3	43.0	1.17	.54 31.5
4	156.6	11.3	202.6	46.0	1.24	.47 27.4
5	139.6	.7	199.6	60.0	1.62	.09 5.2
6	185.3	31.7	263.3	78.0	2.10	.39 22.8
7	104.6	25.6	164.6	60.0	1.62	-.09 5.2
8	130.3	7.3	201.0	90.7	1.91	.20 11.6
9	119.3	15.1	190.6	71.3	1.93	.21 12.2
10	150.0	5.9	214.6	64.6	1.74	.03 1.7
11	170.3	21.1	235.6	65.3	1.76	.05 2.9
12	143.3	1.9	211.3	68.0	1.84	.13 7.6
13	132.3	5.1	223.6	90.3	2.44	.73 42.6
14	159.3	13.3	215.3	56.0	1.51	.20 11.6
15	93.3	33.6	165.3	72.0	1.95	.24 14.0
Average variation		1436				15.1

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Table XXlV. Variations in Weights and Gains.

Lot 11. Feeding Period 37 days.

Hog No.	Initial Weight	Variation from average initial weight	Final weight	Total gain	Average daily gain	Variation from Average daily gain	
	pounds	per cent	pounds	pounds	pounds	pounds	percent
1	120.6	13.3	148.0	27.4	.74	- .70	48.6
2	172.0	24.2	191.6	19.6	.53	- .91	63.2
3	126.0	9.5	179.6	53.6	1.45	.01	.7
4	134.3	3.5	197.6	63.3	1.71	.26	18.
5	124.3	10.0	184.6	60.3	1.63	.19	13.1
6	135.0	3.0	198.3	63.3	1.71	.26	18.
7	141.0	1.	188.3	47.3	1.28	.16	11.1
8	143.3	2.2	186.6	43.3	1.17	.27	18.7
9	127.6	8.3	204.3	76.7	2.07	.63	43.7
10	103.0	26.0	164.3	61.3	1.66	.22	15.2
11	192.3	38.1	237.3	45.0	1.22	- .22	15.2
12	123.0	11.6	185.0	62.0	1.68	.24	16.6
13	149.3	7.2	206.6	57.3	1.56	.12	8 .3
14	146.6	5.3	222.0	75.4	2.03	.59	40.9
15	150.0	7.7	194.3	44.3	1.19	- .25	17.
Average variation		11.38					23.6

Table XXV. Variations in weights and gains.

Lot 111. Feeding period 31 days.

Hog number	Initial weight	Variation from average initial weight	Final weight	Gain	Average daily gain	Variation from average daily gain.	
	Pounds	Percent	Pounds	Pounds	Pounds	Pounds	Percent
1	134.6	5.4	173.0	38.4	1.24	.25	16.7
2	124.3	12.2	159.0	34.7	1.12	.37	24.8
3	175.3	23.1	226.0	50.7	1.64	.15	10.0
4	137.3	3.5	195.0	55.7	1.78	.29	19.0
5	151.0	6.0	209.9	58.9	1.89	.40	26.8
6110	111.0	22.0	148.0	37.0	1.19	.30	20.0
7	133.0	6.6	161.7	28.7	.93	.56	37.5
8	165.0	15.7	202.7	37.7	1.22	.27	18.0
9	119.3	16.2	170.7	51.4	1.66	.17	11.4
10	130.7	8.2	193.0	62.3	2.00	.51	34.2
11	115.7	18.5	166.3	50.6	1.63	.14	9.3
12	178.3	25.2	234.0	55.7	1.79	.30	20.0
13	151.0	6.0	211.0	60.0	1.94	.48	32.0
14	183.0	28.5	237.0	54.0	1.74	.25	16.7
15	126.3	11.3	145.3	19.0	.61	.88	59.0
Average variation		13.89					23.7

Pork production value of a bushel of corn.

The average pork production value of a bushel of corn fed in the dry lot in this experiment, figured on a 14% moisture content basis, not allowing for tankage consumed, was 15.35 pounds. In the field lots 12.5 pounds of pork was produced for each bushel of corn consumed. The fact that more pork was produced from a bushel of corn fed in the dry lot than from a bushel of corn fed in the corn field agrees with the majority of the feeding trials, those at the Minnesota Station (3) and one of the feeding trials at the Illinois Station (8) being excepted.

Carrying capacity of an acre of corn.

The approximate number of days in which 140 pound pigs can be expected to hog down an acre of corn of varying yields is given in Table XXVl. This table is figured on the average number of days one bushel of field corn was found to carry one pig in this experiment, which was approximately eight days.

This table gives the carrying capacity of an acre of corn as somewhat larger than reported by the Iowa station (4), but considerably smaller than reported by the Minnesota Station (3) in 1909.

Table XXVl. Carrying capacity of an acre of corn.

No of pigs	Yield of corn per acre								
	30bu. days	35bu. days	40bu. days	45bu. days	50bu. days	55bu. days	60bu. days	65bu. days	70 bu. days
20	13.0	15.2	17.4	19.5	21.7	23.9	26.1	28.2	30.4
25	10.4	12.3	13.9	15.6	17.4	19.1	20.8	22.6	24.0
30	8.7	10.1	11.6	13.0	14.5	15.9	17.4	18.8	20.3
35	7.4	8.7	9.9	11.1	15.2	13.6	15.5	16.1	17.4
40	6.5	7.6	8.7	9.0	10;8	11.9	13.0	14.1	15.0
45	5.7	6.7	7.7	8.7	9.6	10.4	11.6	12.5	13.5
50	5.2	6.0	6.8	7.8	8.7	8.1	10.4	11.3	12.0

Conclusion.

1. In this feedingtrial hogging down corn proved to be a successful method of feeding and it seems adapted to central Minnesota conditions.
2. The gains made by hogs pasturing corn in the corn field compares favorably with the gains made by hogs fed in the dry lot.
3. More feed is required to produce 100 pounds of gain in the corn field than in the dry lot. The feed cost for 100 pounds of gain produced in the cornfield is less than the feed cost for 100 pounds of gain in the dry lot, due to the fact that cheaper corn is consumed in the corn field.
4. The pork production value of a bushel of corn is lessened when it is hogged down.
5. The carrying capacity of an acre of corn may be estimated by figuring that one bushel of field corn will carry one pig eight days.
6. Considerable variation in the daily gains of the individual pigs hogging down corn may be expected.
7. Sowing rape in the corn at the last cultivation to be used as a supplementary feed in hogging down corn does not always result in a successful stand.

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ACKNOWLEDGEMENTS.

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Figure 1. Lot 1 - Corn full hand fed and tankage self-fed.

Figure 2. Lot 2 - Standing corn, tankage self-fed.

Figure 3. Lot 3 - Standing corn, rape, tankage self-fed.

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