

EXPERIMENTAL STUDIES OF SYSTEMS OF
FATTENING PIGS ON CORN, PEANUT OIL MEAL,
AND SMALL GRAIN IN THE GEORGIA COASTAL PLAIN

by

WILLIAM CONNER MCCORMICK

B. S., University of Florida, 1942

A THESIS

submitted in partial fulfillment of the

requirements for the degree of

MASTER OF SCIENCE

Department of Animal Husbandry

KANSAS STATE COLLEGE
OF AGRICULTURE AND APPLIED SCIENCE

1947

Docu-
ment
LD
2668
.T4
1947
M33
c.2

TABLE OF CONTENTS

PART I. PEANUT OIL MEAL AS A SUBSTITUTE FOR CORN IN FATTENING RATIONS FOR PIGS	1
INTRODUCTION	1
REVIEW OF LITERATURE	2
OBJECTS OF EXPERIMENT	3
RATIONS	4
EXPERIMENTAL PROCEDURE	4
DISCUSSION OF RESULTS	7
SUMMARY AND CONCLUSIONS	15
 PART II. FATTENING SPRING LITTERS OF PIGS IN THE GEORGIA COASTAL PLAIN	 17
INTRODUCTION	17
OBJECT OF STUDY	18
HOGGING-OFF SMALL GRAIN	18
HOGGING-OFF EARLY CORN	23
CARCASS DATA	26
DISCUSSION OF RESULTS	26
SUMMARY AND CONCLUSIONS	27
ACKNOWLEDGMENTS	28
LITERATURE CITED	29

12-13-57 S.D.

PART I. PEANUT OIL MEAL AS A SUBSTITUTE FOR CORN IN FATTENING RATIONS FOR PIGS

INTRODUCTION

The widespread use of peanut oil meal as a feedstuff is relatively new in the livestock feeding industry. A few years ago livestock producers doubted the value of peanut oil meal. Various types of research proved that it was comparable to other plant origin protein feeds. The increased production of peanuts has resulted in a larger supply of meal available at reasonable prices. This feed is high in protein content, high in total digestible nutrients, and palatable for all classes of livestock. Its use is now widespread in the South, especially by swine producers.

In the production of peanut oil meal the unhulled peanuts are screened to remove foreign matter. The peanut is then shelled and the kernel crushed. The crushed meats are cooked which facilitates the removal of the oil and drives off moisture. The cooked meats are pressed under heavy rollers to finish removing the oil. The pressed cakes are ground, usually in hammer mills, into the peanut oil meal.

Normally, high protein feeds cost more per pound than carbonaceous feeds; therefore, their use is limited to the actual quantity needed. Frequently, though, because of the

supply or the nearness to the centers of production, these feeds can be purchased more cheaply than the carbonaceous ones. This condition frequently occurs in the Georgia Coastal Plain. When peanut oil meal can be purchased more cheaply than corn, farmers are interested in feeding larger quantities than necessary to balance a ration. The following tests have been conducted to determine the value of peanut oil meal as a substitute for corn in fattening rations for pigs.

REVIEW OF LITERATURE

Research has shown that peanut oil meal is an excellent protein supplement for swine and compares favorably with supplements of plant origin (5, 6, 10, 11). Occasionally it has compared favorably with tankage. In these feeding trials, however, only the necessary quantity of peanut oil meal required to balance the ration was fed.

In Alabama (7), pigs were fed rations in dry lot consisting of seven parts of corn and one part of peanut oil meal, two parts of corn and one part of peanut oil meal, and one part of corn and one part of peanut oil meal. The author concluded that the best proportion of corn and peanut oil meal to feed depended on the relative price of the feeds which favored corn in most instances.

Pigs were fed rations of seven parts of milo chops and one part of peanut oil meal, two parts of milo chops and one

part of peanut oil meal, and one part of milo chops and one part of peanut oil meal (1, 2). The latter ration produced the fastest gain and was practically as efficient as the others. Soft or oily carcasses were produced when more than one-third of the ration consisted of peanut oil meal.

Failure accompanied attempts to self-feed a ration of three parts of peanut oil meal and one part of corn alone, but it was successfully hand-fed as a slop (1). When corn and peanut oil meal were self-fed, free-choice, pigs consumed approximately 16 per cent peanut oil meal (3). Efforts to feed peanut oil meal alone to pigs resulted in a failure. The pigs scoured and failed to eat (2). In the experiments reviewed, none of the pigs was fed on pasture.

OBJECTS OF EXPERIMENT

Tests were conducted to determine:

1. The quantity of corn that could be economically replaced with peanut oil meal in fattening rations for pigs grazing green oats.
2. The proportion of feeds consumed when corn and peanut oil meal were self-fed, free-choice, to pigs grazing green oats.
3. The possibility of detrimental effects occurring when large quantities of peanut oil meal were fed to pigs.

RATIONS

Four lots of pigs were self-fed the following rations on oats pasture:

Lot 1.	Cracked corn . . .	87.5 pounds
	Peanut oil meal . .	12.5 pounds
Lot 2.	Cracked corn . . .	75.0 pounds
	Peanut oil meal . .	25.0 pounds
Lot 3.	Cracked corn . . .	50.0 pounds
	Peanut oil meal . .	50.0 pounds
Lot 4.	Cracked corn . . .	Free-choice
	Peanut oil meal . .	Free-choice

EXPERIMENTAL PROCEDURE

The experiments reported herein were conducted at the Georgia Coastal Plain Experiment Station, Tifton, Georgia. Comparable lots of pigs were used in each test. A single weighing at the beginning and end of each test was used for the initial and final weights. Weights were also recorded at 28-day intervals during the test. The experimental animals used in the first trial, 1942-43, were thrifty feeders purchased from local markets; hence, the previous record of feeding and breeding was not available. Pigs for the remaining trials were thrifty purebred Duroc Jerseys raised on the Station farm. Prior to being placed on test, these pigs were self-fed balanced rations. The pigs used in the experiment were immunized against cholera.

Each year the pigs were fed in open lots of approximately one acre each. Protection for the animals consisted of either a bed of straw or a windbreak. Shades were constructed when needed during the latter part of the tests. Float type water troughs furnished plenty of water. The lots were planted to oats pasture which furnished abundant grazing for three of the tests. In the 1944-45 test, only a limited amount of grazing was available.

The rations for Lots 1, 2 and 3 were mixed thoroughly before feeding. Open troughs were used as feeders during the first three tests and covered metal feeders for the last test. The pigs were fed four to six times weekly. Care was taken to keep plenty of feed before the pigs and also to prevent the feed from molding. Accurate feed records were kept.

Because of a scarcity of corn, both white and yellow varieties were fed. The peanut oil meal fed was 41 per cent protein grade. The mineral mixtures used were mixed at the Experiment Station as needed. Different mixtures were fed, but the main constituents of the mixtures were salt, bonemeal, and ground limestone. The feed prices used are listed in Table 1. An analysis of the feeds used in this test was not made. The analyses of the feeds given, Table 2, are taken from the twentieth edition of "Feeds and Feeding" by F. B. Morrison.

Table 1. Prices of feed.

	: :1942-: : 43 :	: :1943-: : 44 :	: :1944-: : 45 :	: :1945-: : 46 :	: : Av- : erage
Corn, cents per lb.	2.32	3.05	2.80	2.75	2.78
Peanut oil meal, cents per lb.	2.05	2.70	2.60	2.75	2.57
Mineral, cents per lb.	2.00	2.00	2.00	2.00	2.00

Table 2. Analysis of feeds.

Feed- stuff	: :Total : dry :matter	: :Diges- :pro- :tein	: :Total :tible :nutri- :ents	: :diges- :tible :Pro- :tein	Average total composition			
	: : Fat	: : Fiber	: : N-free	: : Min- : eral	: : extract	: : matter	: : per cent	
Corn, dent Grade No. 2	85.2	7.1	80.6	9.4	3.9	2.2	68.4	1.3
Peanut oil meal o.p., 43- 45% pro- tein	93.5	38.6	80.9	43.4	8.2	10.0	25.0	6.9

DISCUSSION OF RESULTS

First Test, December 31, 1942 - March 11, 1943. The feeding period began December 31 and continued 70 days. Pigs averaging approximately 107 pounds at the beginning of the test were fattened out to approximately 225 pounds. The pigs fed well during the test as indicated by the rates of gain. None of the pigs was off feed at any time. A mineral mixture composed of equal parts, by weight, of steamed bonemeal, ground limestone and salt was self-fed. To each 100 pounds of the mixture was added 0.01 pound of copper sulphate, 0.02 pound of potassium iodide, and 2.5 pounds of iron oxide.

Second Test, December 21, 1943 - May 9, 1944. A feeding period of 140 days was required to fatten the pigs to market weights of approximately 230 pounds for the second test. Smaller pigs averaging approximately 60 pounds at the beginning of the test were used and the rate of gain made was less. The four lots of pigs failed to make desirable gains from the fifty-sixth to the one-hundred-twelfth day. In general, the pigs were unthrifty during this period as indicated by their appearance, gain, and feed consumption.

The mineral mixture used during the second test consisted of 63 pounds of ground limestone, 32 pounds of salt, 4 pounds of iron oxide, 0.7 pound of manganese sulphate, and 0.3 pound of copper sulphate. Even though this mineral mixture was self-fed, the pigs apparently failed to consume the

necessary amount for bone development. One pig in Lot 3 broke its leg while being weighed and was removed from the test February 15, 1944. One pig in Lot 4 went off feed and died February 19, 1944. Two pigs in Lot 2 were removed from the test March 14, 1944 since they were partially paralyzed in the posterior parts. It was evident that a mineral deficiency existed because the total amount of mineral consumed in the feed and the mixture furnished approximately one-half the amount of calcium needed. To correct this deficiency, five per cent of mineral was mixed in the ration during the last 56 days of the test. The mixture was changed to two parts of steamed bonemeal, two parts of ground limestone, and one part of salt. Apparently the unthriftiness of the pigs was caused by insufficient mineral since the addition of five per cent mineral in the ration corrected this condition.

Third Test, December 20, 1944 - March 21, 1945. The third test lasted 91 days. The pigs used were similar to the ones used for the second test. The same mineral mixture fed during the first part of the second test was again self-fed. Similar mineral deficiency symptoms developed. One pig was removed from Lot 1 on March 8, 10, and 14, respectively. Following this incident, the necessary amounts of mineral mixture were added to the feed. No other difficulties were experienced thereafter. Even though this trouble developed, the pigs continued to eat and make good gains.

Fourth Test, November 20, 1945 - March 5, 1946. The pigs

used in the last trial averaged 48 pounds at the start of the test and fattened out to market weights of approximately 225 pounds in 105 days. These pigs made excellent gains. The mineral mixture fed contained two parts of ground limestone, one part of steamed bonemeal, and one part of salt. No difficulties resulting from insufficient mineral were encountered since an adequate quantity was mixed in the feed; however, a mild outbreak of erysipelas affected some of the pigs. After vaccinating the pigs with erysipelas serum, the outbreak subsided. One pig in Lot 4 continued to show skin lesions during the feeding period, resulting in a somewhat smaller gain for Lot 4.

Average of Four Tests. There was not any significant difference in the average daily gain made by the pigs fed 12.5 (Lot 1) and 25 per cent (Lot 2) and free-choice (Lot 4) peanut oil meal (Tables 3 and 4). These lots gained 1.54, 1.56 and 1.52 pounds per pig daily, respectively. During the first and fourth tests, the pigs in Lot 2 made the fastest gain while Lot 1 outgained the others during the second and Lot 4 during the third test. Variations in gains were also insignificant during each of the tests. The pigs fed 50 per cent peanut oil meal (Lot 3) gained 1.44 pounds daily which was the least gain made in each trial except one. For the second trial, the pigs in Lot 3 outgained those in Lots 2 and 4 by 0.1 of a pound.

Table 3. Weights, gains, feed consumed per 100 pounds of gain, and feed cost of 100 pounds of gain.

Year of test	Days on test	Pigs per lot	Average weight :Initial:	Average weight :Final:	Gain per pig	Av. daily gain	Feed consumed per :100 pounds gain	Feed cost per :100 pounds gain
					pounds			dollars
Lot. 1. Mixture cracked corn, 87.5 parts and peanut oil meal, 12.5 parts*								
1942-43	70	10	112.0	232.1	120.1	1.72	383.10	8.74
1943-44	140	10	60.8	248.3	187.5	1.34	486.21	14.48
1944-45	91	10**	67.6	203.6	136.0	1.55	416.25	11.52
1945-46	105	10	48.4	226.7	178.3	1.70	360.85	9.85
Average	101.5	10	72.2	227.7	155.5	1.54	415.06	11.38
Lot 2. Mixture cracked corn, 75 parts, and peanut oil meal, 25 parts*								
1942-43	70	10	106.0	229.2	123.2	1.76	406.48	9.15
1943-44	140	10**	60.0	221.8	161.8	1.26	509.05	14.95
1944-45	91	10	67.3	212.8	145.5	1.60	422.06	11.58
1945-46	105	10	48.6	232.1	183.5	1.75	378.04	10.33
Average	101.5	10	70.5	223.97	153.5	1.56	428.70	11.61
Lot 3. Mixture cracked corn, 50 parts, and peanut oil meal, 50 parts*								
1942-43	70	10	105.5	214.7	109.2	1.56	407.70	8.89
1943-44	140	10**	59.9	226.8	166.9	1.27	491.16	14.00
1944-45	91	10	64.9	194.9	130.0	1.43	418.69	11.27
1945-46	105	10	48.6	215.0	166.4	1.58	393.75	10.75
Average	101.5	10	69.7	212.85	143.1	1.44	430.47	11.46
Lot 4. Cracked corn and peanut oil meal, free-choice*								
1942-43	70	10	106.0	226.0	120.0	1.71	415.99	9.43
1943-44	140	10**	60.7	227.3	166.6	1.26	520.92	15.33
1944-45	91	10	68.1	217.0	148.9	1.64	392.01	10.75
1945-46	105	10	48.8	217.0	168.7	1.61	365.97	9.99
Average	101.5	10	70.9	221.95	151.05	1.52	425.05	11.54

*Self-fed on oats pasture.

**Pigs removed during test.

Table 4. Peanut oil meal as a substitute for corn in fattening rations for pigs
(average of four tests).

	Lot 1	Lot 2	Lot 3	Lot 4
	Cracked corn	Cracked corn	Cracked corn	Cracked corn
	87.5 parts	75 parts	50 parts	and
	Peanut oil meal	Peanut oil meal	Peanut oil meal	Peanut oil meal,
	12.5 parts	25 parts	50 parts	free-choice
Experimental time, days	101.5	101.5	101.5	101.5
Pigs per lot	10	10	10	10
Av. initial weight, lbs.	72.2	70.5	69.7	70.9
Av. final weight, lbs.	227.7	224.0	212.8	221.9
Av. gain, lbs.	155.5	153.5	143.1	151.0
Av. daily gain, lbs.	1.54	1.56	1.44	1.52
Av. ration, lbs.	6.41	6.67	6.19	6.62
Cracked corn, lbs.	5.49	4.90	3.03	5.11
Peanut oil meal, lbs.	0.78	1.63	3.03	1.38
Mineral, lbs.	0.14	0.13	0.13	0.12
Feed consumed per 100				
pounds gain, lbs.	415.06	428.70	430.47	425.05
Cracked corn, lbs.	355.30	315.26	210.75	328.36
Peanut oil meal, lbs.	50.76	105.09	210.75	88.80
Mineral, lbs.	9.00	8.35	8.97	7.89
Feed cost per 100 pounds				
gain, dollars	11.38	11.61	11.46	11.54
Cracked corn, dollars	9.91	8.74	5.86	9.10
Peanut oil meal,	1.30	2.70	5.42	2.28
dollars				
Mineral, dollars	0.17	0.17	0.18	0.16

The feed consumed for 100 pounds of gain was 415, 429, 430, and 425 pounds for Lots 1, 2, 3 and 4, respectively. The difference between the feed requirement for 100 pounds of gain is insignificant for Lots 2, 3 and 4. Slightly less feed was needed by Lot 1 to make 100 pounds of gain. Lot 1 made the most efficient gain in the first and fourth trial, Lot 3 in the second, and Lot 4 in the third. As with the daily gains, the differences in the feed required per 100 pounds of gain are not particularly significant.

The cheapest feed cost of 100 pounds of gain was \$11.38 for the pigs fed 12.5 per cent peanut oil meal. This was due primarily to the more efficient gains made by these pigs. The pigs fed 50 per cent peanut oil meal ranked second with a cost of \$11.46 per 100 pounds of gain. Even though this group of pigs required the most feed per 100 pounds of gain, the feed cost for 100 pounds of gain ranked second, due to the lower price of peanut oil meal. The cost of 100 pounds of gain for the pigs fed free-choice peanut oil meal was \$11.54. The remaining lot, fed 25 per cent peanut oil meal, had a feed cost of \$11.61 per 100 pounds of gain.

The gains made by the four lots were analyzed statistically. The analysis was based on the last three tests. The pigs in the first test failed to fit into the analysis because of the heavier initial weights. The pigs removed while the test was in progress were also eliminated. By analysis of covariance (14) it was found that variation among lots was

well within the bounds of sampling error (P was equal to or greater than .20).

When based on the rate of gain, efficiency of gain and the feed cost of 100 pounds of gain, the determining factor regarding these rations would be the cost of the feed. When corn costs more than peanut oil meal, then the peanut oil meal should be fed and vice versa. There was no variation in the price of the hogs sold during this experiment because of the urgent demand for meat; however, the pigs in Lot 3 lacked the finish and quality shown by the other lots during each test.

The pigs were slaughtered at a local packing plant and the carcasses graded after being chilled 24 hours. The carcass data were based on the last three years' carcasses since the feeding record of the pigs used in the first test, prior to the test, was unknown. These pigs were large enough for the feeding before the test to affect the firmness of the carcasses. The following table gives the carcass data.

Table 5. Firmness of carcass (average last three trials).

Lot	Medium hard to hard per cent	Medium - soft
1	92.2	7.8
2	92.9	7.1
3	39.7	60.3
4	73.1	26.9

The per cent of medium-soft carcasses for the pigs in Lot 3 was considerably greater than for the other lots. Part of this probably was caused by a lack of finish since the medium-soft carcasses in all the lots were approximately 28 pounds lighter than the medium-hard carcasses. Unfinished carcasses are not as firm as finished carcasses. The carcasses for Lot 4 should have been as firm as those for Lot 2 since these pigs actually consumed less peanut oil meal.

Proportion of Feed Consumed by Lot 4. The pigs self-fed cracked corn and peanut oil meal, free-choice, consumed 81.4 per cent corn and 18.6 per cent peanut oil meal in the first trial, 75.5 per cent corn and 24.5 per cent peanut oil meal in the second trial, 76.2 per cent corn and 23.8 per cent peanut oil meal in the third trial, and 83.5 per cent corn and 16.5 per cent peanut oil meal in the fourth trial. The average proportion of feed consumed was 79.2 per cent corn and 20.8 per cent peanut oil meal. The free-choice method of feeding had an advantage in that when the pigs were young and growing, larger quantities of peanut oil meal in proportion to the body weight were consumed. Later on when the pigs needed less, smaller quantities were consumed. Trial four was considered an average trial for Lot 4. The quantity of peanut oil meal consumed in proportion to the body weight by 14-day periods was as follows:

Period	:Average:Feed eaten, per cent of body weight		
	:weight : Peanut oil meal : Cracked corn		
	:pounds :		
First	55.8	2.15	5.75
Second	72.5	2.19	5.69
Third	90.1	1.52	5.56
Fourth	110.9	1.43	7.43
Fifth	137.1	1.08	6.74
Sixth	163.0	0.91	5.43
Seventh (21 days)	196.6	0.64	6.79

Detrimental Effects. No detrimental effects could be attributed to the feeding of large quantities of peanut oil meal to pigs (Lot 3). Even though difficulties were encountered, they were caused by a deficiency of mineral and not the feeding of peanut oil meal.

SUMMARY AND CONCLUSIONS

1. Rations containing 12.5, 25, and 50 per cent and free-choice peanut oil meal were self-fed with corn to fattening pigs grazing on oats.

2. There was no significant difference in the daily gains of the pigs fed 12.5 and 25 per cent and free-choice peanut oil meal. A slightly smaller daily gain was made by the pigs fed 50 per cent peanut oil meal.

3. The most efficient gain was made by the pigs fed 12.5 per cent peanut oil meal. Only slightly less efficient gains were made when the other percentages of peanut oil meal were

fed.

4. When the feed cost per 100 pounds of gain was used as a basis of comparison, the 12.5 per cent peanut oil meal ration proved slightly better than the other combinations.

5. Firmer carcasses were produced by the 12.5 and 25 per cent peanut oil meal rations.

6. The percentages of cracked corn and peanut oil meal consumed when self-fed, free-choice, to pigs grazing oats were 79.2 and 20.8, respectively.

7. It may be concluded that when corn costs less per pound than peanut oil meal then only the amount of peanut oil meal necessary to balance a ration should be fed. When peanut oil meal is considerably cheaper than corn, it can be used to replace as much as one-half of the corn in a fattening ration for pigs on pasture.

PART II. FATTENING SPRING LITTERS OF PIGS IN THE GEORGIA COASTAL PLAIN

INTRODUCTION

A planned system of feed crop production is essential in connection with the fattening of spring litters of pigs in the Georgia Coastal Plain. An adequate system consists of a sequence of crops adapted to the area that will furnish feed throughout the fattening period. Southwell (15) has shown that feed crops can be used immediately to fatten spring pigs that are weaned approximately May 1. Mature small grains were used in May and June and early varieties of corn in July, August, and September. Hogging-off or forcing the pigs to gather their own feed was considered an economical method of utilization. Protein supplements were self-fed.

The economy of production, time of marketing, and type of carcasses produced are important points to consider in fattening spring pigs. Hogs marketed during the summer or early fall sell for higher prices during normal times. Hard of firm carcasses result in higher prices. Soft carcasses are discriminated against somewhat. The method of utilization of the feed crop as well as the type of grain grown may directly influence returns. It is the purpose of this study to examine some of the methods by which spring litters of pigs can be fattened on small grains and corn.

OBJECT OF STUDY

The object of this experiment was to study methods of fattening spring pigs. A comparison of mature oats was made with a mixture of small grain (oats, wheat and rye) for weanling pigs self-fed a protein supplement. The economy of self-feeding shelled corn and protein supplement to pigs on mature oats was considered. A mineral mixture was compared with a protein supplement when both were self-fed to pigs hogging-off corn.

HOGGING-OFF SMALL GRAIN

Small grains, oats, wheat, and rye, but predominantly oats, play an important role in swine production in the Georgia Coastal Plain. Small grain pastures are grazed from December until May. During May, June, and July the mature grain can be hogged-off by all classes of swine. Older animals utilize the grain to a better advantage than young ones since they are able to utilize bulky feeds more easily and require less protein supplement. Native grasses and vegetation in the grain fields furnish the needed green grazing.

Rations. Three comparable lots of weanling pigs were fed the following rations:

Lot 1. Hogging-off mature oats plus protein supplement, self-fed.

Lot 2. Hogging-off a mixture of mature small grain (oats, wheat, and rye) plus protein supplement, self-fed.

Lot 3. Hogging-off mature oats plus shelled corn and protein supplement, self-fed.

Procedure. The small grain lots were seeded in November, 1945. An application of 400 pounds of 2-12-16 fertilizer per acre was made at planting and in February nitrate of soda was applied at the rate of 125 pounds per acre. Lots 1 and 3 were seeded at the rate of 80 pounds of oats per acre and Lot 2 at the rate of 40 pounds of oats, 30 pounds of wheat, and 30 pounds of rye.

Yellow corn was used. The protein supplement fed was mixed as follows:

40 pounds of digester tankage, 60 per cent protein grade
16 pounds of cottonseed oil meal, 41 per cent protein grade
16 pounds of peanut oil meal, 41 per cent protein grade
16 pounds of soybean oil meal, 41 per cent protein grade
12 pounds of mineral mixture consisting of six pounds of ground limestone, three pounds of steamed bonemeal, and three pounds of salt.

Single weights were used for the initial and final weights. Adequate shades and water were provided for the pigs. Covered metal feeders were used as feed troughs. The areas of grain hogged-off were divided into sections to eliminate

as much sprouting and spoilage of grain as possible. Representative samples of grain taken from each section just prior to hogging-off were used to estimate the yield of grain.

The feeding period began May 15 and extended until July 9, or 55 days. A few late weaned pigs were placed on test May 21. The pigs were placed on the grain just after it had passed through the soft dough stage.

Results. The results, Table 6, as measured by rate and economy of gain were very similar for Lots 1 and 2. The pigs self-fed a protein supplement on oats, Lot 1, gained 0.77 pound daily while those self-fed protein supplement on oats, wheat and rye, Lot 2, gained 0.78 pound daily. The feed consumed per 100 pounds of gain by the pigs on Lots 1 and 2 was 362 and 368 pounds, respectively. Fifty-two per cent of the feed consumed by Lot 1 was protein supplement whereas 44 per cent of the feed eaten by Lot 2 was supplement. The protein supplement consumed by Lot 3 was only 21 per cent of the ration which indicates that both groups of pigs consumed more supplement than needed.

The yield of grain per acre was 1640 pounds for Lot 1 and 1359 pounds for Lot 2. In hogging-off the mixture of grains the pigs tended to leave the rye. Apparently the beards on the rye heads caused it to be unpalatable for the pigs.

The pigs self-fed shelled corn and protein supplement on oats, Lot 3, gained 1.09 pounds daily. The feed consumed

per 100 pounds of gain was 47 pounds of oats, 212 pounds of corn, and 67 pounds of protein supplement, or a total of 326 pounds. The pigs in Lot 3 gained faster and made a more efficient gain than those in Lots 1 and 2; however, the gain was somewhat costlier since the corn consumed increased the cost.

As a result of the additional growth the pigs in Lot 3 were in better condition and more uniform. The pigs in Lots 1 and 2 were growthy and had developed a large frame but lacked the condition of those in Lot 3. All the pigs were thrifty.

As indicated by this test, oats alone gave better results than a mixture of oats, wheat, and rye when both were hogged-off by weanling pigs being self-fed protein supplement. The rate and economy of gain was similar for both groups; however, the oats alone yielded more grain per acre and the rye in the mixture was not as palatable as oats. Similar pigs made faster and more efficient but somewhat costlier gains when self-fed shelled corn and protein supplement on oats.

Table 6. Weights, gains, and feed consumed per 100 pounds of gain for pigs hogging-off small grain, May 15 to July 9, 1946.

	Lot 1	Lot 2	Lot 3
		Mature oats, wheat & rye & protein supplement	Mature oats, shelled corn and protein supplement
Number pigs on test	30*	29*	30*
Days on test	55	55	55
Average initial weight (lbs.)	38.57	38.28	38.97
Average final weight (lbs.)	79.73	79.97	97.47
Average gain (lbs.)	41.16	41.69	58.50
Average daily gain (lbs.)	0.77	0.78	1.09
Total feed consumed per 100 lbs. of gain (lbs.)	361.98	367.75	325.90
Crop hogged-off (lbs.)	171.29	204.56	46.70
Shelled corn (lbs.)	0	0	212.31
Protein supplement (lbs.)	190.69	163.19	66.89
Area of crop hogged-off (acres)	1.29	1.82	0.564
Yield per acre (lbs.)	1639.91	1358.85	1453.07

* Seven pigs on test May 21, 1946.

HOGGING-OFF EARLY CORN

Early varieties of corn planted during early spring are ready for hogging-off in July. Experiments have shown that self-feeding a protein supplement is beneficial for pigs fattened on corn in dry lot (5), on pasture (9), or when hogged-off in the field (8). Older animals require less protein than younger ones and especially when on excellent pasture. Pasture is utilized to a better advantage if protein supplement is omitted or limited in rations of swine. Considerably better results are obtained if a mineral mixture is self-fed when protein supplements are omitted. Corn fields in the Coastal Plain contain an excellent covering of palatable vegetation. Since the pigs removed from the small grain test were growthy, thrifty animals, and since pasture was plentiful in the corn fields, it was considered worthwhile to feed two groups. One group was fed a mineral supplement and one a protein supplement.

Rations. The pigs used for the small grain test were divided into two similar lots and fed the following rations:

Lot 1. Corn, hogged-off, and a mineral mixture, self-fed.

Lot 2. Corn, hogged-off, and protein supplement, self-fed.

Procedure. The procedure followed was similar to that followed with the pigs on small grain. The mineral mixture fed to Lot 1 was composed of two parts of ground limestone, one part of bonemeal, and one part of salt. The protein supplement

fed to Lot 2 (same supplement fed to pigs on small grain) contained the above mineral mixture. The hogs were placed on corn July 9 and marketed 78 days later on September 25. The pigs were slaughtered, and the firmness of the carcasses was determined.

Results. The pigs self-fed a mineral mixture, Lot 1, gained 1.47 pounds daily while those self-fed a protein supplement gained 1.68 pounds, Table 7. The total feed consumed per 100 pounds of gain was 486 for Lot 1 and 655 for Lot 2. The pigs in Lot 2 consumed 40 pounds of protein supplement per 100 pounds of gain.

The additional gain made by the pigs fed protein supplement was significant; however, the efficiency of gain was not in accordance with results of other workers (8). The pigs should have made equally as efficient gains as those fed mineral mixture. Even though samples of corn were taken carefully, it is believed that the estimated yield was not representative of the actual yield for Lot 2. Probably inaccurate sampling was the cause of the greater amount of feed consumed per 100 pounds of gain for Lot 2. In any event further work will be necessary before definite conclusions can be made.

Both groups of pigs were marketed at the same time. The pigs in Lot 2 were better finished and a more uniform lot. The smaller pigs in Lot 1 failed to gain as well as the larger ones resulting in a lack of uniformity for the lot.

Table 7. Weights, gains, and feed consumed per 100 pounds of gain for pigs hogging-off corn, July 9 to September 25, 1946.

	: Lot 1 :	Lot 2
	:Mineral:mixture:	Protein sup- plement
Number pigs on test	40	38*
Number days on test	78	78
Average initial weight (lbs.)	83.55	85.26
Average final weight (lbs.)	198.08	212.89
Average gain (lbs.)	114.53	127.63
Average daily gain (lbs.)	1.47	1.68
Feed consumed per 100 pounds of gain (lbs.)	485.65	655.20
Corn, hogged-off	480.04	614.87
Protein supplement	0	40.33
Mineral mixture	5.61	0
Corn hogged-off (acres)	8.16	8.90
Yield per acre (bushels)	48.10	59.80
Live weight gain per acre (lbs.)	561.39	544.94

* Two pigs added to test August 13, 1946.

CARCASS DATA

The experimental animals were slaughtered at a local packing plant. Firmness of carcass was determined after the carcass had been chilled 24 hours. All the carcasses from both lots graded hard as determined by physical examination.

DISCUSSION OF RESULTS

In normal times, two major factors affecting the economy of swine production in the Georgia Coastal Plain are the firmness of carcass and the time of marketing. None of the feeds used in this study apparently caused a softening effect on the carcass. The pigs were also marketed in time to bring higher prices as a result of earlier marketing. The economy of the different rations used depends to a great extent on the above factors.

Whether or not feeding shelled corn to pigs on oats is more economical depends upon the above factors. If the pigs are large enough to reach market weights while high prices prevail, then self-feeding corn probably would not be the most economical practice. Self-feeding a protein supplement to pigs hogging-off corn is the best practice to follow, especially if corn is not fed while the pigs are on oats.

SUMMARY AND CONCLUSIONS

Weanling pigs were fattened to market weights on small grains and corn. Oats alone gave better results than a mixture of oats, wheat, and rye when both were hogged-off with weanling pigs, self-fed a protein supplement. The main advantages were an increased yield of grain and a more palatable feed. The pigs self-fed shelled corn and protein supplement on oats made a faster rate of gain and a more efficient gain than either of the above groups, but the gain was somewhat costlier. Pigs hogging-off corn and self-fed a protein supplement made faster but not as efficient gains as pigs self-fed a mineral mixture while hogging-off corn. Further work will be necessary to draw conclusions on this test since the results were not in accordance with other workers.

The time of marketing and the type of carcasses produced are two important factors affecting the above methods of fattening spring pigs. Normally spring pigs have to be marketed by October 15, if advantage is taken of the higher prices. At this time, the number of hogs ready for slaughter begins increasing greatly resulting in lower prices. Firm carcasses sell for a higher price than soft or oily ones. When planning a feeding program the above factors should be considered.

ACKNOWLEDGMENTS

Acknowledgment is made of the assistance of Mr. B. L. Southwell, Animal Husbandman, Georgia Coastal Plain Experiment Station, in conducting these experiments. The author is also indebted to Dr. A. D. Weber, Head of the Department of Animal Husbandry, and to Dr. H. C. Fryer, Professor of Mathematics, Kansas State College, for assistance in preparation of this thesis.

LITERATURE CITED

- (1) Burk, L. B.
Peanut oil meal and ground whole pressed peanuts for hogs. Texas Agr. Expt. Sta. Bul. 201. 19 p. 1916.
- (2) Burk, L. B.
The influence of peanut meal on quality of pork. Texas Agr. Expt. Sta. Bul. 228. 18 p. 1918.
- (3) Dvorachek, H. E. and H. A. Sandhouse.
Peanut meal and velvet bean meal for fattening swine. Ark. Agr. Expt. Sta. Cir. 45. 4 p. 1918.
- (4) Edwards, F. R. and Z. A. Massey.
Peanut meal in livestock production. Ga. Agr. Expt. Sta. Bul. 216. 19 p. 1941.
- (5) Godbey, E. G. and A. L. DuRant.
Protein supplements to corn in dry lot for fattening pigs. S. Car. Agr. Expt. Sta. Bul. 235. 14 p. 1926.
- (6) Godbey, E. G. and L. V. Starkey.
Dry lot rations for fattening hogs. S. Car. Agr. Expt. Sta. Bul. 281. 14 p. 1931.
- (7) Grimes, J. C. and W. D. Salmon.
Peanut meal as a protein supplement to corn for fattening hogs in the dry lot. Ala. Agr. Expt. Sta. Bul. 224. 16 p. 1924.
- (8) Kirk, W. G. et al.
Comparative value of grazing crops for fattening pigs. Fla. Agr. Expt. Sta. Bul. 389. 15 p. 1943.
- (9) Kyser, E. D. et al.
Winter forages for fattening hogs. S. Car. Agr. Expt. Sta. Cir. 54. 12 p. 1936.
- (10) Massey, Z. A.
Peanut meal in the swine ration. Ga. Agr. Expt. Sta. Cir. 138. 8 p. 1942.
- (11) Massey, Z. A.
Protein supplements for swine. Ga. Agr. Expt. Sta. Cir. 118. 8 p. 1939.
- (12) Morrison, F. B.
Feeds and feeding, 20th ed. Ithaca, New York. Morrison Pub. Co. 1050 p. 1940.

- (13) Robinson, W. L.
Supplements to corn for fattening swine. Ohio Agr.
Expt. Sta. Bul. 349. 183 p. 1921.
- (14) Snedecor, G. W.
Statistical methods. Ames, Iowa. Iowa State College
Press. 485 p. 1946.
- (15) Southwell, B. L. and Kenneth Treanor.
Hogging-off crops in the Coastal Plain. Ga. Coastal
Plain Expt. Sta. Bul. 527. 61 p. 1946.