BULLETIN No. 154 FEBRUARY, 1911

ALABAMA

Agricultural Experiment Station

OF THE

Alabama Polytechnic Institute

AUBURN

Corn, Soy Bean Pastures, Tankage, Cotton Seed Meal for Fattening Hogs.

By

DAN T. GRAY, J. W. RIDGWAY,

E. R. EUDALY.

Opelika, Ala.:
The Post Publishing Company
1911

COMMITTEE OF TRUSTEES ON EXPERIMENT STATION.

HON. H. L. MARTIN ..... Ozark
HON. TANCRED BETTS ..... Huntsville
HON. A. W. BELL ..... Anniston

STATION STAFF.

C. C. THACH ..... President
J. F. DUGGAR ..... Director and Agriculturist
B. B. ROSS ..... Chemist and State Chemist
C. A. CARY ..... Veterinarian and Director of Farmers' Institutes
F. E. LLOYD ..... Plant Physiologist and Pathologist
P. F. WILLIAMS ..... Horticulturalist
J. T. ANDERSON ..... Chemist, Soil and Crop Investigation
DAN T. GRAY ..... Animal Industry
W. E. HINDS ..... Entomologist
C. L. HARE ..... Chemist
C. S. WILLIAMSON ..... Associate Chemist
T. BRAGG ..... First Assistant Chemist
E. F. CAUTHEN ..... Farm Superintendent and Recorder
W. F. WARD* ..... Junior Animal Husbandman
J. W. RIDGWAY ..... Assistant in Animal Industry
H. J. CHATTERTON* ..... Special Agent in Beef
L. W. SHOOK* ..... Special Agent in Beef and Hogs
I. S. MCADORY ..... Assistant in Veterinary Science
W. F. TURNER ..... Assistant in Entomology
M. J. FUNCHESS ..... Assistant in Agriculture
C. S. RIDGWAY ..... Assistant in Botany
J. C. PRICE ..... Assistant in Horticulture
E. R. EUDALY ..... Assistant in Animal Industry
O. H. SELLERS ..... Stenographer

*In co-operative beef work with Bureau of Animal Industry.

SUMMARY OF BULLETIN.

1. This bulletin records a summary of three years' work in swine production.

2. When corn was fed alone, unsatisfactory results were always secured; when corn was supplemented with a soy bean pasture, satisfactory results were secured.

3. When corn was used alone the average daily gain for each hog was only .375 of a pound. When a soy bean pasture was grazed along with a fourth, a half and a three-fourths ration of corn, the average daily gains were raised to 1.102, 1.006 and 1.329 pounds, respectively.

4. 609 pounds of corn were required to make 100 pounds of pork, when the grain was fed alone. When a soy bean pasture was grazed along with a fourth, a half, and a three-fourths ration of corn, only 68, 138, and 175 pounds of corn, respectively, were required to make the same amount of pork.

5. When nothing was fed except corn, each 100 pounds of pork cost $7.61. When a fourth, a half, and a three-fourths ration of corn was fed along with a soy bean pasture, the same gains were made for $0.85, $1.73 and $2.19, respectively (corn valued at 70 cents); when the cost of the pasture ($8.00 an acre) was also charged, against the gains each 100 pounds of pork was made at an expense of $2.59, $3.36, and $3.17, respectively.

6. The amount of corn that should be fed along with a soy bean pasture depends upon several factors. (See Table 2.)

7. One acre of soy bean pasture afforded grazing for 10 hogs (averaged 45 pounds in weight at beginning of test) for the following number of days:

When a fourth ration of corn was used.....43 days
When a half ration of corn was used.....48 days
When a three-fourths ration of corn was used...62 days

8. The total value of pork made on each acre of soy bean pasture varied from $25.84 to $39.13.

9. These experiments show that it pays to inclose the hogs in a dry lot, after the pasture crops are exhausted, and feed them for a short period of time on grain feeds. A ration of

corn and cotton seed meal seems to be the most satisfactory feed for this short dry-lot finishing period.

10. Tankage, a packing house by-product, saved a great amount of corn. Forty-two pounds of tankage took the place of 353 pounds of corn. The 42 pounds of tankage cost only 84 cents; the 353 pounds of corn were valued at $4.41. So an investment of 84 cents saved $4.41. These results were secured with hogs that averaged about 50 pounds, live weight, when the tests began.

11. When a corn ration was supplemented with a fifth part of tankage the results were more satisfactory than when a tenth part was used.

12. If it were not for the fact that cotton seed meal is a dangerous feed for swine, when fed for more than 30 days at a time, it would be a very valuable feed to go along with corn. However, it is an exceedingly valuable feed when used for short periods of time. In these tests 44 pounds of cotton seed meal took the place of 335 pounds of corn. The 44 pounds of cotton seed meal cost 66 cents; the 335 pounds of corn were valued at $4.19, or an investment of 66 cents in cotton seed meal saved $4.19 in terms of corn.

13. Tankage and cotton seed meal, pound for pound, proved to have practically the same feeding value. Cotton seed meal is the cheaper of the two, but tankage has the advantage in that there is no danger of ill results when it is used.

14. Excellent prices were realized on each bushel of corn when the corn was fed along with soy bean pastures. When corn was fed alone the usual market prices were not secured. When hogs sell for 7 cents a pound each bushel of corn was sold, by means of the hogs, for $1.93 to $4.33; when nothing but corn was fed, only 64 cents were realized on each bushel.

CORN, SOY BEAN PASTURES, TANKAGE AND COTTON SEED MEAL FOR FATTENING HOGS.

BY

DAN T. GRAY, J. W. RIDGWAY, E. R. EUDALY.

The people of Alabama are large meat consumers, but small meat producers. It is well known that a large proportion of the meat used in this state is shipped in from other states. It should be known, also, that this imported meat comes from states which do not have as many natural advantages for pork production as has our own state. So far, the farmers of the state have failed to take advantage of their own favorable circumstances. The most of the imported meat comes to us from northern states—states that do not have the advantage of long grazing seasons, mild climate, and cheap shelter, On account of the long grazing season, the mild climate, and the cheap shelter, this state can make pork as cheaply, and no doubt more cheaply, than it can be made in the North.

However, the farmers of our state are rapidly introducing hogs into their system of farming. Several factors are bringing this change about. First, hogs have been selling at a high price for several years; this has raised the price of purchased meats so high that the farmers can hardly afford to buy even the cheap cuts. Second, the boll weevil is advancing and many farmers are preparing for its coming by introducing hogs. Third, the hog is an animal that can be introduced upon almost every farm in the state; he fits into practically any system of farming that can be introduced into the state. He is well adapted to the large planter; but he is especially well suited to the farmer with small capital, as but a small amount of money is required with which to begin the business, and returns begin to come in within a few months after it is started. The sow is a rapid producer. Money is turned rapidly. With $25.00 invested in one sow it is easily possible to make 2,000 pounds of pork (live weight) in a year. In other words,

the yearly sales should be about four to five times the amount of investment, when hogs sell at seven cents a pound.

Some sections of the state are now raising sufficient hogs to meet home demands, and other sections have a surplus to ship to the Mobile, New Orleans, and Atlanta markets. But, as a whole, the state is yet a heavy importer of meats.

OUTLINE OF EXPERIMENTS.

This bulletin covers three years' experimental work, during which time 105 hogs were used. The work, in the main, was duplicated year after year, so the conclusions drawn can be relied upon. The lots, during the falls and winters of 1908-'09, 1909-'10, and 1910-'11, received the following feeds throughout the main part of the test:

TABLE 1. *Outline of the Work.*

No. Lot	Period I.	Period II.
1	Corn, 1-4 ration Soy bean pasture	Corn meal alone
2	Corn, 1-2 ration Soy bean pasture	Corn meal, 2-3 Cotton seed meal, 1-3
3	Corn, 3-4 ration Soy bean pasture	Corn meal, 2-3 Tankage, 1-3
4	Corn meal, 9-10 Cotton seed meal, 1-10	Corn meal, 9-10 Cotton seed meal, 1-10
5	Corn meal, 9-10 Tankage, 1-10	Corn meal, 9-10 Tankage, 1-10
6	Corn meal, 8-10 Tankage, 2-10	Corn meal, 8-10 Tankage, 2-10
7	Corn meal, 2-3 Cotton seed meal, 1-3	Corn meal, 2-3 Cotton seed meal, 1-3
8	Corn meal alone	Corn meal alone

It is noted that the first three lots were pasture or grazing lots, soy bean pasture being used in all cases. The hogs in Lots 4, 5, 6, 7, and 8 were confined in dry lots; they had no green or pasture feed at any time throughout these tests.

General view of soy bean pasture used for grazing the hogs in 1908. The hogs had been grazing these beans several days when the picture was taken. It is seen that the beans are beginning to form.

The soy bean pastures afforded grazing 42 days in the fall of 1908, 81 days in 1909, and 80 days in 1910. When these pastures were exhausted one pig from each lot was slaughtered, samples of the fat secured, and taken to the chemist, Prof. C. L. Hare, to have melting point determinations made, and the remaining pigs were placed in dry lots, next to Lots 4, 5, 6, 7, and 8, and fed for three or four weeks upon the feeds outlined in the above table. One lot of hogs was finished on a ration of corn alone, a second lot on corn and cotton seed meal, and a third lot on corn and tankage. The object of this second period of feeding was to study the effect of the above feeds on hardening the meat and fat after they had been rendered soft as a result of the animals grazing the soy bean pasture.

The hogs which were fed in the dry lots (Lots 4, 5, 6, 7, and 8), were continued to the end of the test on their initial feeds. At the end of Period 1 a hog was taken from each of these lots and slaughter data collected.

OBJECTS OF THE WORK.

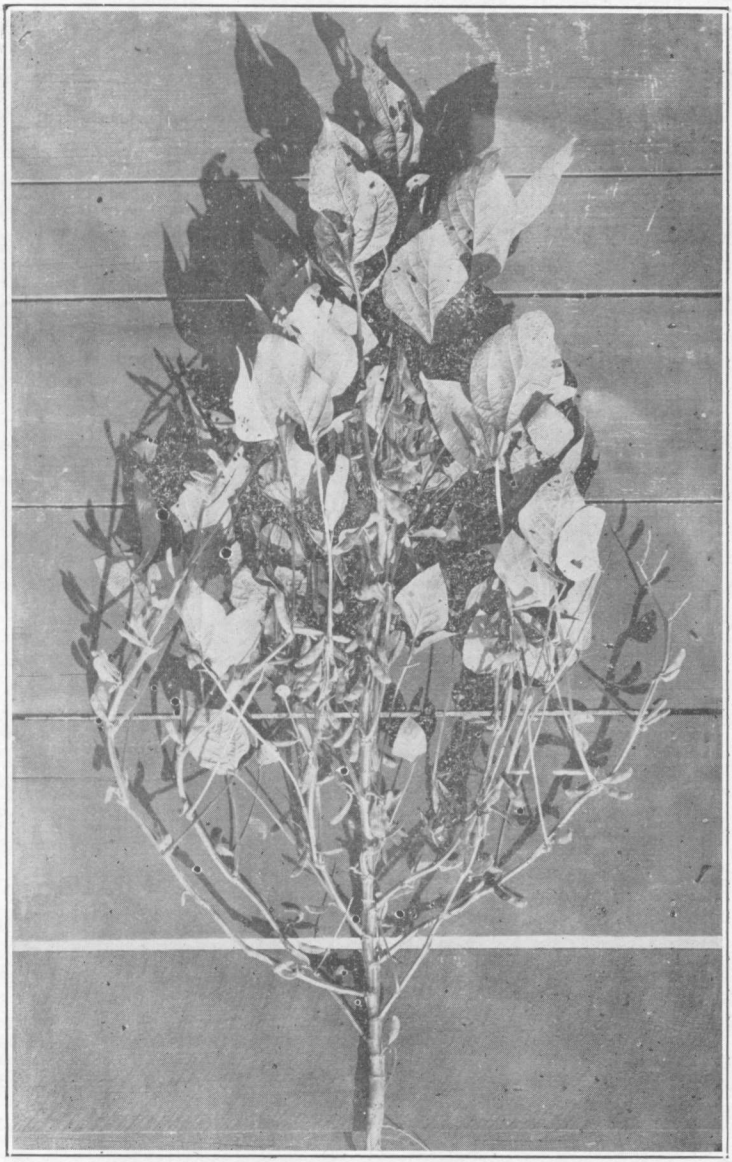
These experiments were planned with the following objects in view:

1. To learn the value of soy bean pastures for fattening hogs.
2. To determine the most profitable amount of corn to use along with these soy bean pastures.
3. To study the question of hardening the lard and meat after they had been rendered soft as a result of the bean pastures being grazed by the hogs.

Other problems were involved in the work, but are not presented in this report.

THE HOGS USED.

The pigs were all purchased from farmers who live within a few miles of the Experiment Station. The animals were no better in quality than the average hogs of the state, but practically all of them carried some improved blood, consisting of Poland China, Berkshire, and Duroc-Jersey crosses. At the beginning of the test the pigs averaged about 45 pounds in



A picture of an individual soy bean plant. The hogs were turned into the field two weeks before the picture was taken. The picture shows that the seed are beginning to assume some size.

live weight. They were not fat when the tests began, as they came directly off pastures; the pastures had been supplemented with a little corn, as a rule. However, the animals were all in good growing condition. The pictures show their general appearance and quality. If larger hogs had been used the daily gains would have been greater than the ones here reported. As a rule the gains were satisfactory.

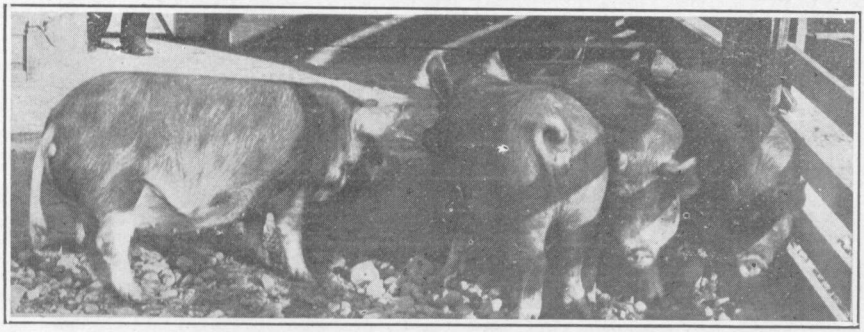
SHEDS, LOTS, AND FENCES.

The pasture lots, (Lots 1, 2, and 3), were given no artificial shelter at all until the soy beans were eaten down. The soy bean plants afforded ample protection from the sun for the first 40 days, after which time temporary wooden shelters were erected. The pigs which received no pasture were confined in small lots: each lot was 20 x 60 feet. Across the east side of these lots was a good shed which afforded ample protection from the rains and the hot sun. All of the hogs were made comfortable. The different areas of pasture were measured and hurdled off by temporary fences, so that an exact account could be kept of the area of soy bean pasture grazed by each lot of hogs: this was done so that the cost of the area grazed could be charged against the gains of the hogs. The hogs were not given the run of the whole field at one time; small areas (about 1 acre to 10 hogs) were fenced off and when the inclosed patches were consumed the fences were moved forward onto new plots.

METHOD OF FEEDING.

Each lot of hogs was fed twice a day. The corn was ground into a coarse meal: this meal was mixed with sufficient water to make a thin slop and poured into deep troughs. When cotton seed meal and tankage were fed with the corn meal they were mixed with the corn meal and the water. If ear corn is used the cotton seed meal and the tankage should be made into a thin slop and poured into a separate trough before the corn is thrown out. All of the grains and concentrated feeds were fed fresh: that is, none of the feed was fermented, soaked, or cooked.

The soy bean pastures were gathered by the hogs them-



LOT 1—1908—(Showing some individuals). End of soy bean pasture period. Received a three-fourths corn ration along with pasture. Made an average daily gain of 1.67 pounds. Each 100 pounds of pork cost $3.08 when both pasture and corn were charged against gains. When corn meal alone was fed (See Lot 7, page 59) each 100 pounds of pork cost $5.64.

selves. When this method of harvesting is followed the crop is never lost on account of rains or unfavorable weather. The hogs were turned into the pastures three or four weeks before the beans themselves were ready to be eaten: in fact, they were turned into the beans about one week after full bloom, or just about the time the first pods began to appear. Some farmers report unsatisfactory results with cowpeas and soy beans when used for grazing purposes, and it is probably true that these unsatisfactory results were due to the fact that the hogs were turned into the fields at too late a stage of maturity.

The lower leaves should not be wasted. It should be remembered that the leaves of the soy bean and cowpea plants are approximately equal in feeding value to wheat bran, pound for pound. The only way to make use of the leaves that ripen and fall early is to turn the hogs into the field when these leaves first begin to ripen. Care must be taken, though, not to overstock the pasture: if too many hogs are turned into the field at this immature stage the whole crop will be torn down within a few days. In the tests reported in this were turned onto each acre.

Some corn was used to supplement the pastures. As one of the objects was to learn the most profitable amount of corn to use along with a green pasture, various amounts of corn were

used. In Lot 1, one-fourth of a full ration of corn was used; that is, an amount of corn equal to 1 per cent of the total live weight of the lot was fed each day; or, one pound of corn to each 100 pounds of live weight was given daily. In Lot 2, two pounds of corn to each 100 pounds of live weight were fed each day. (This is a one-half ration of corn.) And in Lot 3, three pounds of corn to each 100 pounds of live weight were given daily. (This is a three-fourths ration of corn).

The amount of feed given the pigs confined in the dry lots was determined by their appetites. No feed was left in the troughs from one feeding time to the next. The aim was to give just enough feed so that the troughs would be clean within 30 minutes after feeding. If the ration is a palatable one, dry-lot-fed hogs will eat daily, an amount of grain equal to about four per cent of their total live weight.

PRICE OF FEEDS.

It is, of course, realized that the prices placed upon the feeds below do not meet all conditions of the state, but it is believed that the following prices closely represent the average conditions of the state:

Corn	$ .70 a bushel.
Tankage	$40.00 a ton.
Cotton seed meal	$30.00 a ton.
Soy bean pasture	$ 8.00 an acre.

All financial statements are based on the above quotations.

SLAUGHTER DATA.

At the end of each period one animal from each lot was slaughtered and careful notes taken upon the dressed weights, appearance of the carcasses, rapidity and extent of "setting" of the carcasses, appearance and weights of the internal organs, etc. Samples of fat were taken from each carcass and delivered to the chemist, Professor C. L. Hare, who made melting point determinations to ascertain the effect of each feed upon the fat or lard. The third, fourth, fifth, and sixth ribs were also taken from each animal with a view to making a study of the effects of the various feeds upon the framework of the animals.

LOT 4—1908—(Showing some individuals). Hogs fed corn 9-10 and cotton seed meal 1-10. Picture taken end of 42nd day of experiment. Made an average daily gain of .718 pounds, as compared to 1.67 pounds for the soy-bean-fed hogs. Cost $4.49 to make 100 pounds of pork as compared to $5.64 when corn was fed alone.

DETAILS OF THE EXPERIMENTS.

The general plan was to begin the experimental work the last week of August or the first week in September. To have the soy bean pasture ready for grazing by September 1, the beans must be planted by June 1. The beans may be planted as early as April 15 when grazing would be afforded by August 1. Various lots of hogs, which were being fed in dry lots, were carried along in the work, so that direct comparisons could be made between the soy bean pastures and the various dry lots.

SOY BEAN PASTURE.

General Remarks About the Crop.—The soy bean is a very valuable crop both for hay and for use as a pasture for hogs. The Tennessee station (bulletin 82) has compared the cowpea and the soy bean as to their habits of growth, yields, etc. According to this bulletin the cowpea has the following advantages over the soy bean:

(1). The soy bean may fail to come through a crust which would offer but little resistance to cowpeas.

(2). The germination of the cowpea seed is surer than that of the soy bean seed, which is liable to be spoiled by heating. The cowpea is, therefore, better than the soy bean for

broadcasting, especially on land that is heavy and liable to "bake."

(3.) The cowpea is much better suited than the soy bean for planting with either corn or sorghum.

(4). Cowpea hay is more easily cured by the methods in common use, without the increased loss of either leaves or fruit, than soy bean hay.

The soy bean, on the other hand, appears more valuable than the cowpea, (1) as a grain producer; (2) as an intensive farm crop; (3) as an early hay or grazing crop (for which purpose the early and medium varieties will produce either hay or seed several weeks ahead of any variety of cowpeas which had been tested at the Station; (4) the seed decay more slowly than those of the cowpea when left on the ground, so are better adapted to being pastured off by hogs.

Rabbits feast upon the soy bean while they will not bother the cowpea at all. Therefore, the farmer who plants soy beans should plant enough for both himself and the rabbits.

In 1910 the soy bean crop used in these tests was better than the average crop of the state: both the stand and the yield were excellent. But in 1908 and in 1909 the crops were just about what the farmer could expect to grow upon soils of average fertility. The beans were planted in the drill and cultivated. Two hundred pounds of commercial fertilizer, consisting of potash and 16 per cent acid phosphate, were used on each acre. Approximately, one-half bushel of seed was used to each acre: if the planting had been made for a hay crop more seed would have been used. When all of the expenses of making the crop were taken into consideration it was learned that each acre cost $8.00. The crop can be produced for less than $8.00 an acre upon the average farm of the state.

The Southern, or Mammoth Yellow variety, was used in all of the tests. Some varieties, as the Hollybrook, will mature earlier than the Mammoth Yellow, but will not make as large yields as the Southern variety.

Soy Bean Pasture Against Corn Alone.—It is generally considered that there is no other feed equal to corn for pork production. That is true, provided the corn is used judiciously.

LOT 5—1908—(Showing some individuals). Hogs fed corn 9-10 and tankage 1-10. Picture taken end of 42nd day of experiment. Made an average daily gain of .801 of a pound as compared to .527 of a pound when corn was used alone, or 1.67 pounds when corn was used along with a soy bean pasture. Cost $4.18 to make 100 pounds of pork, as compared to $4.39 when cotton seed meal was used, $5.64 when corn alone was used, and $3.08 when soy bean pasture was used.

But, as the following tests illustrate, when corn is fed alone for any length of time there are few feeds which give more unsatisfactory results. If, however, corn is fed in combination with other feeds, its use is to be highly commended, and it can be used to great economic advantage, too, even though it sells upon the market as high as $1.00 per bushel. The growing hog is not adapted to living on corn alone, and when we require it of him we are forcing him to do a thing which is not consistent with his nature. Man likes a mixture of feeds or a change in diet: so do the lower animals.

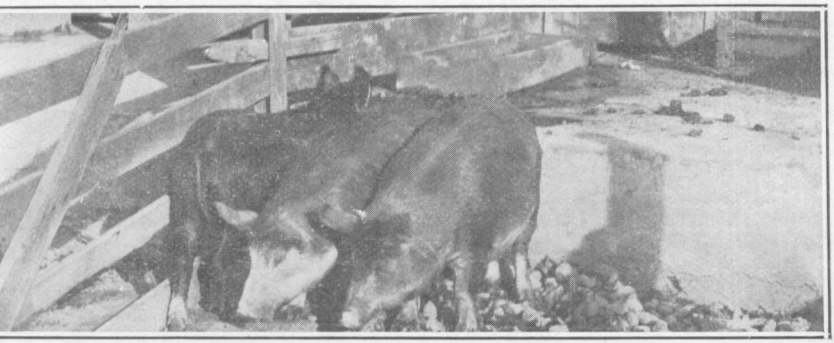
TABLE 2. *Soy Bean Pastures vs. Corn Alone, and the Most Profitable Amount of Corn to Use with the Pasture.*
(Average of three years' work.)

Lot No.	RATION	Average daily gains	Feed to make 100 pounds of pork	Cost of grain to make 100 pounds of pork	Grain plus pasture cost to make 100 pounds of pork	Value one acre in terms of corn
		Lbs.	Lbs.			Bushels
1	Corn, 1-4 ration Soy bean pasture	1.102	68 0.218 acre	$0.85	$2.59	44
2	Corn, 1-2 ration Soy bean pasture	1.006	138 0.204 acre	1.73	3.36	41
3	Corn, 3-4 ration Soy bean pasture	1.329	175 0.123 acre	2.19	3.17	63
4	Corn alone	.375	609	7.61	7.61	

Price feeds:
Pasture .....$8.00 an acre.
Corn .....$ .70 a bushel.

That soy bean pasture is an exceedingly cheap feed for hogs is the most striking point in the above table. That corn alone is an exceedingly poor feed for hogs is another impressive fact brought out. When the tests began the pigs averaged about 45 pounds in weight. Of course, if they had been more mature the corn would have shown up in a better light than it did, as corn is more suited to old than to young animals. When corn alone was used the average daily gain for the three years was only .375 of a pound, while the hogs that grazed the soy bean pasture averaged more than a pound per day; in one lot, Lot 3, the average daily gain per pig was 1.329 pounds. Or, the hogs which received the small amount of corn made greater gains (in one case 5 times as great) as did the hogs which were fed nothing but corn. The soy bean pasture was responsible for the large gains; it afforded the hogs a green feed and at the same time balanced the corn ration so that the corn which was eaten along with the pasture did the hogs more good than did the corn which was eaten alone. Corn is low in both protein and ash: soy bean pasture is high in both ash and protein. When corn was valued at 70 cents a bushel and the pasture at $8.00 an acre, the cost of 100 pounds of gain varied from $2.59 to $7.61. When corn was used alone it cost $7.61 to make 100 pounds of increase in live weight; when a one-fourth ration of corn was used along with the pasture the same gains cost $2.59. When a one-half ration of corn was fed with the soy bean pasture it cost $3.36 to make 100 pounds of pork, and $3.17 to make the same amount of pork when a three-fourths ration of corn was used. Or, in every case where the soy bean pasture was used pork was made for less than one-half (and in one case almost one-third) of what it cost when corn was used alone.

The last column in the above table shows the value of each acre of soy bean pasture in terms of corn. The figures represent an average of three years' experimentation. In many sections of the state where the soil is good, much greater soy bean yields, than were obtained on the Station farm at Au-



T 6—1908—(Showing some individuals). Hogs fed corn 2-3 and cotton seed meal 1-3. Picture taken end of 42nd day of test. Made an average daily gain of 1.1 pounds, as compared to .527 of a pound when corn was used alone, and 1.67 pounds when soy bean pasture was grazed. Cost $3.45 to make 100 pounds of pork, as compared to $5.74 when corn was used alone, and $3.08 when a soy bean pasture was grazed.

burn, can be secured; the soil on the Station farm is naturally a very poor one. However, the field upon which the beans were grown is one of the richest on the farm, so the above results represent what the average farmer may expect to secure after he has become acquainted with the soy bean plant. Each acre of soy beans was equal, in feeding value, to 44 bushels, 41 bushels, and 63 bushels of corn, when a one-fourth ration, a one-half ration, and a three-fourths ration of corn, respectively, were used along with the pasture. If corn had been grown no more than 30 bushels would have been raised, even with a liberal application of commercial fertilizers. In 1910-'11, an extra good crop of soy beans was grown (for the character of soil) and one acre of the pasture took the place of 53.8 bushels of corn in one lot, and 72 bushels in a second lot.

Proper Amount of Corn To Feed With a Soy Bean Pasture.—It is of great interest to the farmer to know just how much grain to feed along with the pasture crops. Feeders are not yet agreed as to the proper amount of corn to use with a pasture. Some claim that no grain at all should be used with a good pasture: others claim that better results are secured when a full ration of corn is used along with the pastures. Of course, all agree that the amount of grain fed depends upon the kind of pasture used and whether the animals

are just "being carried along," or are being rushed to a finish. The above work was outlined with a view to determining the proper amount of corn to use along with a pasture, as soy beans. Accurate account was kept both of the amount of pasture consumed by each lot of hogs, and the cost of putting in and cultivating the crops. On the average, it has cost the Station $8.00 an acre, to seed, fertilize, and cultivate a soy bean crop. The average farmer can make the crop cheaper than did the Station, as the farmer can secure labor more advantageously than could the Station.

Looking back to Table 2, it is seen that the largest daily gains were secured when a three-fourths ration of corn was fed along with the pasture. Still there was not a gradual decrease in the daily gains as the amount of grain was reduced, as the hogs which received the one-fourth ration of corn made larger gains than did those animals that were given a one-half ration of corn. So it cannot be said that the gains increased proportionately, with the increase in the amount of corn used. As far as the corn cost is concerned it is seen that the expense to make 100 pounds of gain increased gradually as the amount of corn was increased. But when the cost of making the pasture was also added to the gains it is further seen that, while the cheapest gains were made by the lot receiving the smallest amount of corn, still there was not a gradual decrease in the cost of gains as the amount of grain was reduced: it cost more to make the gains on the hogs in Lot 2 (one-half ration of corn) than on the hogs in Lot 3 (three-fourths ration of corn). The authors are unable to state why this should be.

It seems clear that several points must be taken into consideration before one can determine what is the right amount of corn to feed along with pastures when hogs are being finished for the market. A definite answer cannot be given to the question, How much corn shall I use with my pasture? First, the condition of the hogs at the end of the feeding period must be taken into account. The hog that has received a light grain feed along with pasture will not be in as good killing condition at the end as will the hog that has received a heavy grain feed, notwithstanding the fact that the former may have

LOT 7—1908—(Showing some individuals). Hogs fed corn alone. Picture taken end of 42nd day of experiment. Made an average daily gain of .527 of a pound, as compared to 1.67 pounds when a soy bean pasture was used. Each 100 pounds of pork cost $5.64, as compared to $3.08 when a soy bean pasture was used along with the corn.

gained as rapidly as the latter. The first hog is not worth as much as the latter to the butcher. For instance, the hogs killed out of Lot 1 (one-fourth grain ration) dressed only 69.8 per cent, while those killed out of Lot 2 (one-half grain ration) dressed 72.7 per cent. The increased amount of grain had a beneficial effect upon both the carcass and the conformation. The hog which receives but a small allowance of grain, in addition to a pasture, comes through to the end with a big belly region which makes him dress a low per cent. The buyer will be compelled to deduct from the price of the hogs which have received the small grain ration on account of the low dressing per cent; although he may gain as rapidly as the animal which received a heavy grain ration, still he will not be in as acceptable killing condition as will the heavy grain-fed hog. Second, the amount of corn at the disposal of the feeder must also receive consideration. When there are large amounts of corn upon the farm to be disposed of, there is no better way to market it than through hogs on pasture, so the problem may resolve itself into a question of finding a good and high-priced market for corn. When this is the case, it would no doubt be wise to feed the animals liberally of the corn, so that the supply may all be used before the spring months arrive. No farmer can afford, under present conditions, to sell his corn directly upon the market, as corn,—even for $1.00 a bushel. In

the above tests from $1.96 to $4.25 were secured for each bushel of corn when hogs sold for seven cents a pound live weight, the larger price being secured when the light ration of corn was used. Some farmers hold that the most profitable method is to feed no grain at all when the hogs have the freedom of a good pasture, but it is seen from the above prices realized on corn that the man who has corn to sell can make more money by feeding it in conjunction with the pasture than by selling it as corn. Third, the amount of available pasture will have something to do with the amount of corn to feed. If the area of pasture is small for the number of hogs on hand, it would pay to be liberal with the corn in order that the pasture may be extended over as long a period of time as possible. The grain will save the pasture, as the above figures show , and all of the hogs will have a greater opportunity to get the benefit of some pasture. That is, it is no doubt better to save the pasture (when pasture is scarce) with an increased amount of grain, than to graze the pasture down rapidly on account of withholding grain. Fourth, the amount of grain used depends also upon the length of time the farmer has to get the animals ready for the market. If the animals must be killed or sold within a few weeks, it may pay to use a heavy grain ration with the pasture, as the hogs will gain much more rapidly upon a full grain than upon a light grain ration. Many farmers claim that hogs while on pasture will gain no more rapidly when a full corn ration is added than when it is withheld, but the results secured in these tests show that when a three-fourths corn ration was used along with pasture the gains were one-third faster than when a one-fourth ration of corn was used. When prices are ruling low, and there is a good prospect for an advance, it may be wise to simply carry the hogs along on the pasture, plus a light grain ration (or no grain at all) until the prices advance. If hogs are selling at a good figure, and there is danger of their depreciating in value on account of prices falling, it would be the part of wisdom to finish rapidly through the liberal use of grain. There is still a fifth factor that has to do with the amount of grain that should be used

LOT 1—1910.—End of soy bean pasture period. Hogs fed pasture and one-fourth ration of corn. Made an average daily gain of .9 of a pound, as against .238 of a pound when corn was fed alone (See Lot 7, page 73). Cost $2.62 to make 100 pounds of pork (pasture $8.00 an acre. corn 70 cents a bushel), as against $9.16 when corn was used alone.

along with the pasture crop. It is well known that our common pasture crops, as peanuts, soy beans, etc. make soft pork. If the hogs are to be sold upon a market which discriminates against soft meat, it would pay to use some corn along with the grazing crop: the corn prevents the meat from becoming as soft as when pastures alone are used; the greater the amount of corn used the harder the meat at the end of the grazing period.

Carrying Capacity Of One Acre Soy Beans.—It should be again noted that the pigs, to begin with, averaged about 45 pounds in live weight. At the end of the grazing tests they averaged about 125 pounds in live weight. Of course, the length of time that one acre of soy bean pasture lasted depended upon the amount of supplementary grain: the more corn used the longer each acre of grazing lasted.

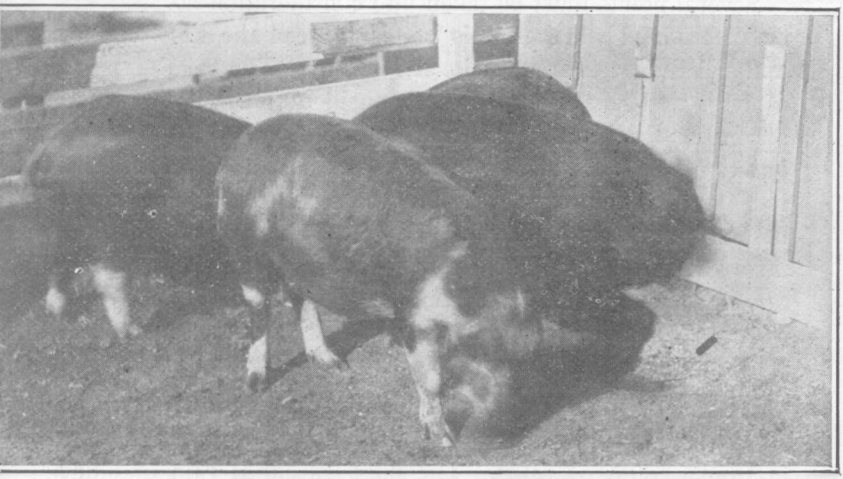
TABLE 3. *Number of Days One Acre of Soy Beans Carried Ten Hogs.*
(Summary of three years).

No. Lot	RATION	Average weight each hog at the beginning	Number days one acre carried ten hogs
		Lbs.	Days
1	Corn, 1-4 ration Soy bean pasture	44	43
2	Corn, 1-2 ration Soy bean pasture	46	48
3	Corn, 3-4 ration Soy bean pasture	43	62

The farmer who has a good soil well adapted to soy beans may expect to get better grazing than was secured on the station farm. In 1910 (the year that an exceptionally good crop was secured) one acre of soy beans afforded grazing for the hogs 55, 57, and 82 days in Lots 1, 2, and 3, respectively. The poorest results were secured in 1908, when in one case one acre afforded grazing for 10 hogs for only 35 days. But, on the average, soy bean pasture has exceedingly satisfactory carrying capacity. It is seen above that one acre of the pasture carried 10 hogs 43, 48 and 62 days when the pasture was supplemented by a fourth, a half, and a three-fourths ration, respectively, of corn. In bulletin No. 143 of this station are reported results where one acre each of peanut, sorghum, and chufa pastures carried 10 hogs for 53, 47, and 32 days respectively, where a half ration of corn was fed along with the pastures.

During the first few weeks of the grazing period the pigs ate no part of the plant except the leaves; but when supplemented with some corn good gains were made. During the last few weeks of the grazing period the animals ate nothing except the beans which had fallen from the plants; during this time excellent gains were always realized.

Pounds of Pork Made on Each Acre of Soy Beans.—Some farmers claim that it is not a profitable method to dispose of a pasture crop, as soy beans, by grazing with hogs: it is often claimed that the crop can be disposed of in other ways, as



OT 2—1910.—End of soy bean pasture period. Hogs fed pasture and a half ration of corn. Made an average daily gain of 1.16 pounds, as against .238 of a pound when corn was fed alone in a dry lot. Cost $3.09 to make 100 pounds of pork (pasture $8.00 an acre, corn 70 cents a bushel), as against $9.16 when corn was fed alone.

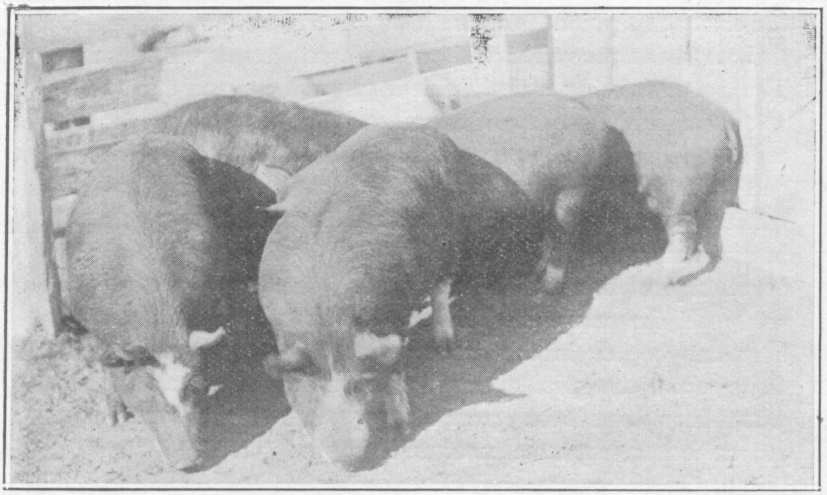
making it into hay, to better advantage. Some hold to the idea that great losses by trampling and riding down the plants are sustained when hogs are turned into a hay crop. The question is, Can the crop be sold profitably through hogs, or should it be made into a hay and used, or sold, as a hay? The following table will, in part, answer the question:

TABLE 4. *Pounds of Pork Made on Each Acre of Soy Bean Pasture.*
(*Average of three years.*)

No. Lot	RATION	Total pounds of pork made on each acre	Total value pork made on each acre, (7 cents)	Total value pork made on each acre after corn is deducted
		Lbs.		
1	Corn, 1-4 ration --- Soy bean pasture --	459	$32.13	$28.23
2	Corn, 1-2 ration --- Soy bean pasture --	490	34.30	25.84
3	Corn, 3-4 ration --- Soy bean pasture---	813	56.91	39.13

Several points must be taken into consideration before it can be determined whether it is better to feed the crop to hogs and sell the hogs or to make it into hay. The relative prices of hogs and hay enter into the consideration. If hogs were selling at 4 cents a pound and hay at $20 a ton there is no question but that it would be more profitable to make the crop into hay. When hogs are selling at 7 cents a pound there is no doubt but that the crop can be sold for a greater final profit through the hogs than as a hay. In these tests each acre returned a value, in terms of pork, of $28.23, $25.84, and $39.13 in Lots 1, 2, and 3, respectively. This is an average return of $31.07 an acre when hogs are valued at 7 cents a pound.

Grazing a crop by hogs has several advantages over trying to save it as hay. In the first place, the crop when grazed is never lost on account of rains. The hogs gather it rain or shine. In the South a heavy proportion of the hay crops are either totally lost or badly damaged on account of unfavorable weather conditions. In the second place, not as much labor and machinery are required to gather the crop when it is grazed as when it is made into hay. When the fences are good the labor involved in grazing a crop is almost a negligible item. In the third place, the soil is built up very much more rapidly under the grazing than under the haying system. When the crop is grazed practically all of the crop, root and top, are returned to the soil; of course, some fertilizing value is taken off in the body of the hogs. When the crop is removed as hay only the roots and stubble are returned to the soil; the hay, which has a fertilizer value of practically $9.00 a ton, is taken away from the land when the hay is sold from the farm. The effect upon the soil of growing a legume and grazing it off with hogs is remarkable. The Arkansas station did some work upon this point. That station had two plots of land. Upon one plot corn was grown. Upon a second plot soy beans were grown. The corn was gathered in the usual way. The soy beans were grazed off by hogs. The succeeding year cotton was planted upon both plots. The corn plot yielded 1005 pounds of seed cotton. The soy bean plot yielded 1588 pounds of seed cotton. The two plots were identically the same in every respect except that one had had a soy bean

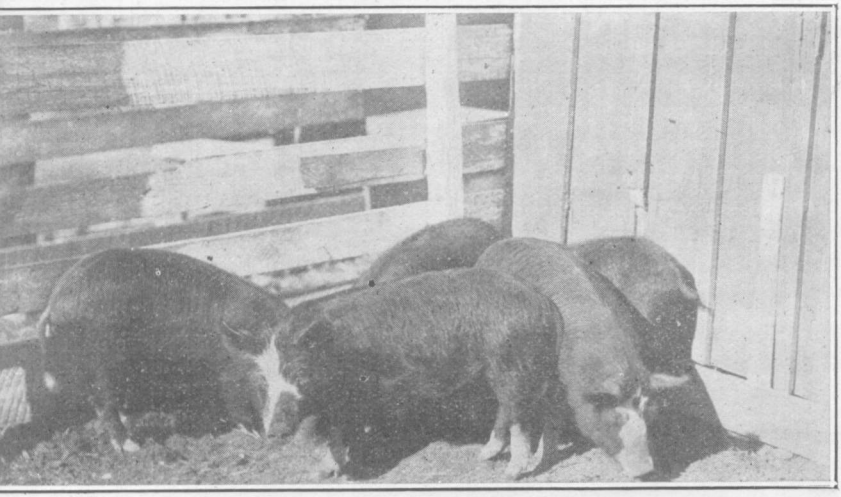


LOT 3—1910.—End of soy bean pasture period. Hogs fed pasture and a three-fourths ration of corn. Made an average daily gain of 1.06 pounds, against .238 of a pound when corn was fed alone in a dry lot. Cost $3.44 to make 100 pounds of pork (pasture $8.00 an acre, corn 70 cents a bushel), against $9.16 when corn was fed alone.

crop upon it, which had been grazed off, while the other had had nothing but corn. When lint is valued at 13 cents a pound and seed at $24.00 a ton the increase in value of the succeeding cotton crop, due to the soy bean crop and the grazing, was $29.92 an acre; this was due entirely to the soy bean crop which had been grazed off by hogs.

Finishing The Hogs in a Dry Lot After the Pastures Are Exhausted.—The majority of the farmers of the South who make use of green crops for fattening hogs sell, or slaughter, the animals when the crops are gone without finishing them upon grain for a short time in a dry lot. It is the usual custom in Alabama to shut the hogs up in a small pen when the fattening time arrives; this is not a wise practice as the preceding figures show. But there is a time when the hogs should be penned up in a dry lot and fed grain alone, but that time is not at the beginning of the fattening operations. They should be inclosed in a dry lot and fed grain alone for a short time after the grazing crops are exhausted. There are two reasons for following this plan. First, the hogs after coming off the pasture are in just the proper condition to make gains

rapidly and economically for a short time. The table below illustrates this point. They are in excellent health and, as a rule, their frames not covered with as much fat as they should carry. The pasture, being a feed rich in protein, has tended to develop the frame work and muscles at the expense of fat, especially if they are young animals. After they are fed in a pen from 21 to 28 days they look better, and are better, than when they came off the pasture; they are worth more to the butcher, or consumer, as they are fatter and dress out a higher percentage of marketable meat than if they had been sold directly off the pastures. There is a limit though, to the time hogs can be fed in this finishing period; they soon reach a stage where the gains are made at a heavy expense. Second, when hogs have been grazed upon peanuts, soy beans, and several other crops the meat and the lard have become soft; this makes the carcass objectionable to the butcher as well as for home consumption. The soft meat is hardened very materially when the hogs are fed upon grain for only a short time after the crops are exhausted. Some feeds are better than others during the hardening process. The longer the animal is fed upon a finishing feed the harder becomes the flesh and lard, but, of course, the feeder must give due consideration to the question of economy, so cannot extend this period over a very long period of time. The following table shows that the gains are usually put on at a profit during a short finishing period:



OT 4—1910.—End of soy bean period. Hogs fed a ration of corn 9-10, plus cotton seed meal 1-10. Made an average daily gain of .431 of a pound, as against .400 of a pound when the corn was supplemented with a tenth part of tankage, as against .238 of a pound when corn alone was fed. When soy bean pastures were grazed the average daily gain varied from .900 to 1.16 pounds. In Lot 4 each 100 pounds of pork cost $6.26, as against $9.16 when corn was used alone, and $2.62 when corn was used along with a soy bean pasture.

TABLE 5. *Finishing Hogs In a Dry Lot After The Soy Bean Pastures Are Exhausted.*
(Average of three years.)

No. Lot	Ration during Finishing period	Ration during period preceding finishing period	Average daily gain	Feed to make 100 pounds of pork	Cost to make 100 pounds of pork
			Lbs.	Lbs.	
1	Corn alone	Corn, 1-4 ration Soy bean pasture	.987	503	$6.29
2*	Corn, 2-3 Cotton s'd m. 1-3	Corn, 1-2 ration Soy bean pasture	.900	274 137	5.48
3	Corn, 2-3 Tankage, 1-3	Corn, 3-4 ration Soy bean pasture	1.305	357 178	8.02
4**	Corn alone	Corn alone	.128	1360	17.00

*During the test of 1910-1911 good cotton seed meal could not be obtained just at the time this part of the test was in progress, so the hogs were fed a very poor quality of meal. They would hardly eat it at all so made very poor gains: it cost $14.95 to make 100 pounds of pork. This was very abnormal so only two years' work, instead of three, are incorporated in the above cotton seed meal lot.

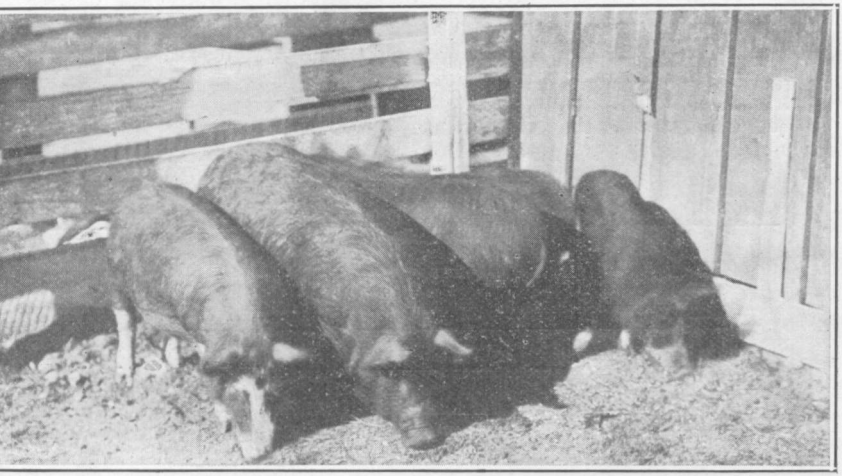
**While this continuous corn-fed lot of hogs made an exceedingly unsatisfactory showing during the second period of 28 days, still the actual results, for the three years, are even worse than shown in the table, as the hogs actually lost in weight one year; that year's data is left out of the above table.

The above lots are not comparable (except that each one is comparable to Lot 4) so the reader should not think that the table illustrates the relative value of the various feeds used. They are not comparable because of the fact that the hogs were not fed on the same rations during the period preceding the finishing period.

In Lot 1, corn is at an advantage when compared to the ration of corn and tankage in Lot 3; this is due to the fact that the hogs, which were being finished on corn and tankage, had had a preceding period of heavy grain feeding (a three-fourths ration of corn along with soy bean pasture), while the ones which were finished on corn alone had had a former period of light grain feeding (a one-fourth ration of corn along with soy bean pasture.)

But the reader will be able to gather some valuable points from the above table. In the first place there were two lots of hogs, Lots 1 and 4, which were finished on corn alone. In Lot 1 it cost $6.29 to make 100 pounds of pork; in Lot 4 it cost $17.00 to make the same amount of pork. Why the difference? It was all due to the different methods of feeding the hogs the 90 days preceding the finishing period. The hogs in Lot 1 had had the run of a soy bean pasture. The hogs in Lot 4 had had no pasture at all; they had been inclosed in a dry lot and fed corn alone. This difference was not due to the fact that the hogs in Lot 4 were fat and finished before the above finishing period began. The pictures show that the hogs in the corn lots were never finished. Corn will not finish a young hog; it retards his development very materially, and often completely stops it.

Cotton seed meal has proven to be an excellent supplement to corn to be used in the short finishing period. It is good for two reasons. First, the gains are made economically when it is used. And, second, the lard and meat are hardened much more rapidly when cotton seed meal is used along with the corn than when corn is used alone. Corn and cotton seed meal harden the lard and meat more rapidly than does a mixture of corn and tankage. Cotton seeed meal, when fed for long periods of time, is a dangerous feed. However, there is no danger of ill results when the cotton seed meal is



OT 5—1910.—End of soy bean period. Hogs fed a ration of corn 9-10 and tankage 1-10. Average daily gain was .400 of a pound, as against .238 of a pound when corn was fed alone and 1.16 pounds when a half ration of corn was fed along with a soy bean pasture. Cost $7.10 to make 100 pounds of pork, as against $2.62 when a fourth part of corn was fed along with a soy bean pasture.

used for no more than 28 days. If the hogs must be kept in the finishing period for more than 25 to 28 days the cotton seed meal part of the feed should be eliminated; from this time on the ration should consist of corn alone, corn and shorts, or corn and tankage.

TANKAGE.

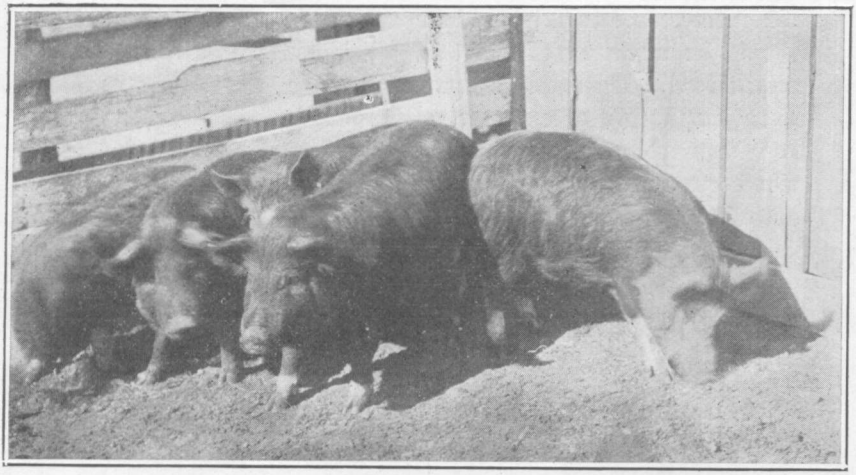
Some few farmers of the South are acquainted with the value of tankage as a feed for hogs. The farmer who cannot arrange grazing areas for his hogs is especially interested in feeds that are suitable for supplementing corn. Tankage is extremely rich in protein and ash; corn is naturally poor in both protein and ash. So tankage is especially well suited for supplementing the corn ration. It is a slaughter house by-product, and can be secured from either the large packing houses of the North and West or from the smaller packing houses and abbatoirs of the South. As tankage is an extremely rich feed it should be used in small amounts. Since it is in part produced from the carcasses of dead animals the question

often arises in the farmer's mind whether it may not carry diseases to animals fed on it. None of the many stations and farmers who have fed it have reported any trouble of such nature. It is thoroughly steam-cooked under pressure and comes out a sterilized product.

TABLE 6. *Tankage Plus Corn vs. Corn Alone.*
(Average of three years.)

No. Lot	RATION	Average daily gains	Feed to make 100 pounds of pork	Cost to make 100 pounds of pork	Value of one ton of the supplement in terms of corn
		Lbs.	Lbs.		Bushels
1	Corn alone	.198	732	$9.15	
2	Corn, 9-10 Tankage, 1-10	.972	379 42	5.58	300

When the above tests began the pigs avergaed about 45 pounds in live weight. They were fed for 110 days. It is seen that when corn alone was fed the pigs made very small daily gains; the gains were extremely unsatisfactory. The photographs show that the corn-fed hogs were unthrifty. Corn does not satisfy a young growing hog. 732 pounds of corn, or 13.1 bushels, were required to make 100 pounds of pork, at a cost of $9.15; money was lost, of course, as the hogs sold for only 8 cents a pound. The hogs in Lot 2 were fed corn with a small amount of tankage mixed with it. The corn meal and the tankage were mixed together and sufficient water poured into the bucket to make a thin slop. When this very small amount of tankage was used (about .4 of a pound daily to each 100 pound of live weight) along with the corn the gains were satisfactory; the average daily gain was .972 of a pound. When corn was fed alone the hogs made a daily gain of only .198 of a pound. When corn was used alone 732 pounds were required to make 100 pounds of pork, but when the tankage was used as a supplementary feed only 379 pounds of corn and 42 pounds of tankage were required to make the same gains. Or, under the conditions of these tests, one pound of tankage took the place of 8.4 pounds of corn; one ton of tankage was equal, in feeding value, to 300 bushels of corn. The ton of tankage cost $40.00. When compared to feeding



LOT 6—1910.—End of soy bean period. Hogs fed a ration made up of corn 8-10, plus tankage 2-10. Made an average daily gain of .608 of a pound, as against .400 of a pound when only one-tenth of the ration was tankage. Cost $5.35 to make 100 pounds of pork, as against $7.10 when a tenth part of the ration was tankage.

corn alone to small shoats, the tankage was really worth $210.-07 a ton. The older the pigs the less valuable the tankage as a supplement to corn. When the hog is mature, when his bones and muscles are fully developed, when he has nothing to do but put on fat, the tankage can probably be dispensed with. But the above data show it to be an exceedingly valuable feed for immature animals as the cost of making 100 pounds of pork was decreased from $9.15, when corn was used alone, to $5.58, when corn was reinforced by the tankage.

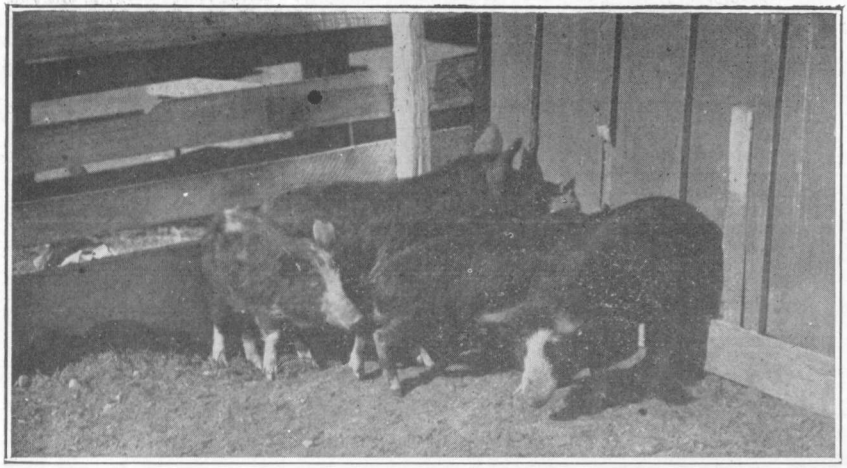
The reader should not be led to believe from these data that the very small amount of tankage used saved the great amount of corn on account of the nutrients contained in the tankage. The small amount of tankage had additional effects. First, it increased the palatability of the corn ration and therefore its digestibility. Second, the tankage increased the amount of feed eaten; therefore a smaller proportion of the ration was used for mere maintenance. Third, the tankage itself added some nutrients to the ration, mainly in the form of the much needed ash and protein.

Amount of Tankage To Use With Corn.—It is of interest to the farmer to know just what part of the whole daily feed should be made up of tankage. It is a comparatively high priced feed and should be used with judgment. If too much were fed the probable profits on the hogs would soon be lost. A part of this experimental work was outlined to determine whether a tenth or a fifth part of the whole ration should consist of tankage.

TABLE 7. *Amount of Tankage To Feed With Corn.*
(One year's work.)

No. Lot	RATION	Average daily gains	Feed to make 100 ponnds of pork	Cost to make 100 pounds of pork	Value of one ton of tankage in terms of corn
		Lbs.	Lbs.		Bushels
1	Corn, 9-10	.505	475	$7.00	269
	Tankage, 1-10		53		
2	Corn, 8-10	.843	293	5.12	284
	Tankage, 2-10		73		
3	Corn alone	.117	874	10.93	

In Lot 1, tankage constituted a tenth part of the ration while in Lot 2 it made up two-tenths part of the whole daily feed. Nothing but corn was used in Lot 3. It is seen again that when corn was used alone exceedingly poor results were secured; the corn-fed pigs (which averaged about 45 pounds in weight at the beginning of the test) made a daily gain of only .117 of a pound, and 874 pounds of corn, at a cost of $10.93, were required to make 100 pounds of pork. In Lot 1, 475 pounds of corn and 53 pounds of tankage were required to make a gain of 100 pounds, while in Lot 2, where a fifth part of tankage was used, only 293 pounds of corn and 73 pounds of tankage were required to make the same pounds of pork. The cost to make 100 pounds of pork was $7.00 and $5.12 in Lots 1 and 2 respectively. The heavy ration of tankage proved to be more satisfactory than the light ration of tankage. In Lot 1, where the tenth part of tankage was used, the pigs made an average daily gain of .505 of a pound, but in Lot 2, where a two-tenths part of tankage was fed, the average daily gains were raised to .843 of a pound.



LOT 7—1910.—End of soy bean period. Hogs fed corn alone. Made an average daily gain of .238 of a pound, as against .900 of a pound when a fourth ration of corn was used along with a soy bean pasture. It cost $9.16 to make 100 pounds of pork in this lot; where the soy bean pasture was grazed along with a fourth ration of corn the same pork was made for $2.62.

It should again be noted that these were immature hogs. And when hogs of small size and young age are fed these tests show it to be more profitable to feed a one-fifth than a one-tenth part of tankage along with corn.

The experiment was continued for 110 days.

As the farmer raises the corn upon his own farm and often has as much, or more, than he expects to feed to his hogs, it is often difficult to get him to see that he can profitably buy extra feeds to supplement the corn. But it will almost always pay to sell part of the corn and use the proceeds to buy a good supplement. In comparing Lots 1 and 3 in Table 6, it is seen that 53 pounds of tankage was equal to 399 pounds (7.12 bushels) of corn. The 53 pounds of tankage cost $1.06; the 7.12 bushels of corn were worth $4.98. Or, expressing it in terms of tons, it would have been an excellent business transaction to have sold 268 bushels of corn (worth $187.60) and purchased one ton of tankage (worth $40.00). $147.60 would have been made on the transaction provided, of course, that the feeder could make use of a ton of this supplement.

COTTON SEED MEAL.

The deaths that sometimes occur as a result of feeding cotton seed meal to hogs deter the majority of farmers from using it. There is no doubt but that cotton seed meal will often kill hogs; several hogs were killed in these tests. It is a feed that, if used at all, must be used in moderation and with judgment. There is a risk when used for long periods of time, and the man who feeds it must bear in mind the risk. The exact danger point has not yet been determined; it is not yet known just how long cotton seed meal can be fed to pigs with safety, and it is not known, either, how long very small amounts can be fed without injuring the animals. It is reasonably well established, though, that there is no danger to the hogs when it is fed in either large or small amounts for periods of no more than 25 days. This station has killed hogs before the 35th day on a ration made up of two-thirds corn and one-third cotton seed meal. Cotton seed meal is not a feed for the farmer to experiment with.

Aside from the deaths that may occur, cotton seed meal is an excellent feed; it is one of our very best feeds for balancing the corn ration. It is seen from the following table that when cotton seed meal is fed along with corn the cost of the gain is greatly reduced,—provided no deaths occur:

TABLE 8. *Cotton Seed Meal Plus Corn vs. Corn Alone.* (*Average of two years.*)

No. Lot	RATION	Average daily gains	Feed to make 100 pounds of pork	Cost to make 100 pounds of pork	Value of one ton of cotton seed meal in terms of corn
		Lbs.	Lbs		Bushels
1	Corn alone	.186	727	$9.09	
2	Corn, 9-10	.616	392	5.56	272
	Cotton seed meal, 1-10		44		

During the above two years' work no hogs died as a result of eating the cotton seed meal. But one year's work, that of the winter of 1909-'10 is not included in the above average on account of the fact that all of the pigs, except one, in the cotton seed meal lots were dead before the experiment had been

in progress 81 days. The experiments continued 110 and 106 days respectively in the years of 1910-'11 and 1908-'09; these are the two years reported in Table 8. The cotton seed meal was mixed with the corn meal and enough water poured onto the mixture to make a thin slop. It was fed sweet.

When no deaths occurred the cotton seed meal proved to be an excellent feed to go along with the corn. When corn alone was fed each 100 pounds of pork cost $9.09, but when cotton seed meal constituted a tenth part of the ration the cost was reduced to $5.56 for each 100 pounds of pork made. Under the conditions of the test one ton of cotton seed meal took the place of 272 bushels of corn. These pigs were young ones; they averaged about 45 pounds in weight at the beginning of the test.

Cotton Seed Meal and Tankage Compared.—Cotton seed meal and tankage are both rich feeds. They are both excellent feeds with which to balance corn. At the present time cotton seed meal is the cheaper feed, but tankage has the advantage in that there is no danger of its killing the hogs. It is hoped that some one will soon evolve a plan for feeding cotton seed meal so that it can be fed for long periods of time with absolute safety. Tankage is considered, by many, to be the ideal supplementary feed for hogs, but the following table shows that cotton seed meal ranks along with tankage.

TABLE 9. *Cotton Seed Meal and Tankage Compared.*
(*Average of two years.*)

No. Lot	RATION	Average daily gains	Feed to make 100 pounds of pork	Cost to make 100 pounds of pork	Value of one ton of supplementary feed in terms of corn
		Lbs.	Lbs.		Bushels
1	Corn alone	.186	727	$9.09	
2	Corn, 9-10 Tankage, 1-10	.936	390 43	5.74	280
3	Corn, 9-10 Cotton seed meal, 1-10	.616	392 44	5.56	272

When tankage was used as the supplementary feed the daily gains were somewhat larger than when cotton seed meal was used, but the cotton seed meal proved to be the cheaper feed, in the long run. One hundred pounds of pork was made at an expense of $5.56 when the cotton seed meal was used; the same gains cost $5.74 when tankage was fed. Pound for pound, the two feeds, though, have practically the same value as hog feeds.

Amount of Cotton Seed Meal to Feed With Corn.—It is generally known that the larger the amounts of cotton seed meal fed to hogs the greater is the danger of unfavorable results. In the tests reported below no hogs died, although the experiment continued 106 days. As cotton seed meal is a cheap and rich feed, large amounts as possible should be used, but the large amounts must be used for short periods of time. There is danger of ill results when cotton seed meal is fed as long as it was in this test. But, as stated before, it is hoped that some one will soon offer a safe plan for feeding it with absolute safety; then the following facts will be of great value to the feeder.

TABLE 10. *Amount of Cotton Seed Meal to Feed.*
(One year's work.)

No. Lot	RATION	Average daily gains	Feed to make 100 pounds of pork	Cost to make 100 pounds of pork	Value of one ton of cotton seed meal in terms of corn
		Lbs.	Lbs.		Bushels
1	Corn alone	.256	581	$7.26	
2	Corn, 9-10	.845	350	4.96	212
	Cotton seed meal, 1-10		39		
3	Corn, 2-3	.780	236	4.72	104
	Cotton seed meal, 1-3		118		

In both lots the cotton seed meal saved a great amount of corn. In Lot 2, where the tenth part of cotton seed meal was fed, the gains were better than in Lot 3, where cotton seed meal constituted one-third of the whole ration. But the gains were made cheaper in Lot 3 than in Lot 2. When the ration was made up of one-third cotton seed meal it cost only $4.72 to

make 100 pounds of pork; when cotton seed meal constituted a tenth part of the whole feed the same gains cost $4.96.

It is noted in the test that the smaller the proportion of supplementary feed used, the greater was its value per pound, in terms of corn saved. For instance, in the above test one ton of cotton seed meal replaced 212 bushels of corn when it constituted only a one-tenth part of the whole ration; but when it constituted one-third of the ration its replacement value was only 104 bushels of corn. The greater profit, however, was not made in Lot 2, where the replacement value of cotton seed meal was at its highest; pork was made more economically where the large amount of supplement was fed. One pound of cotton seed meal was worth more in Lot 2, than in Lot 3, but there were not enough pounds of the supplement used in Lot 2 to make the pork as cheaply as it was made in Lot 3, where more cotton seed meal was used.

PRICES SECURED FOR EACH BUSHEL OF CORN.

When Pasture Was Used.—The farmer who feeds corn to hogs should realize, at least, the market price for the corn. If this cannot be done, the fattening of hogs cannot be put forward as a means of disposing of the corn crop. In the great corn and hog sections of the country the hog is largely used as a means of marketing the corn; the hog transfers the rough, bulky corn into a compact shape so that it can be placed upon the market easier and cheaper than if the corn were sold in the shape of grain. In many of the great corn sections it is further claimed that greater prices can usually be realized upon the corn when it is fed to hogs than when it is sold as corn. The price realized on the corn depends upon whether the corn is fed alone, or whether it is fed in conjunction with other feeds, and also, of course, upon the selling price of the finished hogs. The following table brings out the point that corn, when used properly, can be sold, through hogs, for high prices.

TABLE 11. *Price Realized Upon Each Bushel of Corn When Soy Bean Pasture Was Used.*

(Average of three years.)

No. Lot	RATION	Selling price of corn when hogs sell at:			
		5 cents	6 cents	7 cents	8 cents
1	Corn, 1-4 ration Soy bean pasture	$2.68	$3.55	$4.33	$5.15
2	Corn, 1-2 ration Soy bean pasture	1.37	1.77	2.18	2.58
3	Corn, 3-4 ration Soy bean pasture	1.29	1.61	1.93	2.25
4	Corn alone	.46	.55	.64	.74
5	Corn, 9-10 Tankage, 1-10	.78	.96	1.15	1.33
6	Corn, 9-10 Cotton seed meal, 1-10	.67	.82	.97	1.12

The cost of making the soy bean crop is taken into consideration in the above table; the crop is charged against the gains at the rate of $8.00 an acre. Even when hogs were sold for only 5 cents a pound high prices were obtained for the corn when it was fed along with the pasture, the price ranging from $1.29 to $2.68 per bushel. But when the corn was fed alone the usual market prices were not obtained, as each bushel sold for only 46 to 74 cents, depending upon the price of the hogs. When tankage and cotton seed meal were used with the corn the value of the corn was raised considerably, as $1.15 per bushel were secured for the corn when the tankage was fed and 97 cents when cotton seed meal was the supplement (hogs 7 cents). When hogs sell for as much as 6 cents a pound a price greater than the market price of corn was realized in every lot except where corn was fed alone. During the past two years hogs have been selling for 8 cents a pound (live weight) on the Auburn market; at this price $5.15 were realized on each bushel of corn fed in Lot 1, where a fourth ration of corn was used along with the soy bean pas-

ture. When hogs sell for 8 cents a pound the market price can be secured upon the corn used even when the corn is not reinforced by other feeds, but the farmer cannot afford to feed the corn alone because it is rendered very much more valuable when these other feeds are used along with it.

The table plainly shows that the farmer cannot afford to sell his corn as grain. It also shows that he cannot afford to feed the corn without a supplement. And it further shows that the most valuable supplement is a good pasture; each bushel of corn was, in one case, increased in value seven times through the use of a good pasture.

Price Realized On Each Bushel of Corn When No Pasture Was Used.—In Table 11 are presented some figures to illustrate the price that can be realized upon each bushel of corn when fed alone, when fed in conjunction with a soy bean pasture and when fed with certain concentrated supplements. The following table shows the prices that can be realized on corn when the hogs are fed in dry lots for periods of 110 days.

TABLE 12. *Price Realized On Each Bushel of Corn When No Pasture Was Grazed.*

Group	No. Lot	RATION	Price realized on each bushel of corn when hogs sell at:			
			5 cents	6 cents	7 cents	8 cents
A	1	Corn alone	$0.38	$0.46	$0.54	$0.61
	2	Corn, 9-10 Tankage, 1-10	0.61	0.76	0.91	1.06
B	1	Corn, 9-10 Tankage, 1-10	0.46	0.58	0.70	0.82
	2	Corn, 8-10 Tankage, 2-10	0.68	0.87	1.06	1.25
	3	Corn alone	0.32	0.38	0.45	0.51
C	1	Corn alone	0.38	0.46	0.54	0.61
	2	Corn, 6-10 Tankage, 1-10	0.59	0.74	0.88	1.03
	3	Corn, 9-10 C. S. M., 1-10	0.59	0.73	0.87	1.02
D	1	Corn alone	0.48	0.58	0.67	0.77
	2	Corn, 9-10 C. S. M., 1-10	0.68	0.84	1.00	1.16
	3	Corn, 2-3 C. S. M., 1-3	0.77	1.00	1.24	1.48

The various lots in Table 10 are not comparable: the brackets show the lots that can be compared to each other. As in Table 9, the most striking point of the whole table is that when corn was fed alone the usual market prices were not realized. In every case where a supplement was used each bushel of corn was rendered more valuable than when the corn was fed alone. For instance, in Group A the value of each bushel of corn was almost doubled as a result of supplementing the corn with a little tankage, while in Group B the value of the corn was more than doubled when a one-fifth part of the ration was tankage. In Group C only 61 cents were realized for each bushel of corn when it was fed alone and hogs sell for 8

cents a pound; where a tenth part of tankage was fed with the corn each bushel of corn was sold for $1.03. Cotton seed meal proved to be practically equal to tankage as a supplementary feed in the experiments of Group C. In Group D, it is seen that the large amount of cotton seed meal enabled the feeder to sell the corn at a higher price than the small amount; the same thing was found to be true in feeding tankage. Where cotton seed meal constituted one-third of the ration each bushel of corn was sold for $1.48 (hogs 8 cents); when the cotton seed meal made up only one-tenth of the whole each bushel of corn was sold for only $1.16; when corn was fed alone 77 cents were realized on each bushel.

PRICES REALIZED ON THE SUPPLEMENTARY FEEDS WHEN CORN IS VALUED AT 70 CENTS A BUSHEL.

Many feeders refuse to buy high-priced supplementary feeds for hogs. Many farmers believe that the good these extra feeds do will not repay their original cost. The following table shows that the supplementary feeds were usually sold, through the hogs, for more than they originally cost. Rather than feed corn alone it will pay the farmer to sell part of the corn and use the proceeds for buying a supplementary feed, as tankage or shorts.

TABLE 13. *Value Of A Ton Of Supplementary Feed.*

Group	No. Lot	RATION	Price realized on each ton of supplementary feed when oorn sells af 70 cents a bushel and hogs sell at:			
			5 cents	6 cents	7 cents	8 cents
A	1	Corn alone				
	2	Corn, 9-10 Tankage, 1-10	$12.50	$60.11	$107.74	$155.35
B	1	Corn, 9-10 Tankage, 1-10	Nothing	2.35	40.10	77.83
	2	Corn, 8-10 Tankage, 2-10	36.64	64.04	91.44	118.69
	3	Corn alone				
C	1	Corn alone				
	2	Corn, 9-10 Tankage, 1-10	5.81	52.33	98.84	145.35
	3	Corn, 9-10 C. S. M., 1-10	4.55	50.00	95.45	140.91
D	1	Corn alone				
	2	Corn, 9-10 C. S. M., 1-10	32.05	83.33	134.62	185.90
	3	Corn, 2-3 C. S. M., 1-3	34 75	51.69	68.64	85.59

It should be noted that the cost of the corn is deducted from the selling prices of the hogs before credit is given the supplementary feeds. In one case, when hogs are valued at 5 cents a pound, it is seen that no price at all was realized on the tankage used; that is, after the cost of the corn was deducted from the 5 cents nothing was left to credit to the tankage. This means that money was lost in this particular instance. But the reader's attention should also be called to the fact that although nothing was left, after the price of the corn was deducted, to credit to the tankage fed, still not as much money was lost when the tankage was used as when it was not used. (See Table 6). This point should be borne in mind in studying the above table. When hogs sell at 5 cents a pound the prices realized on the supplementary feeds seem to be small, but

these supplementary feeds saved enough corn to reduce the losses far below what they were when corn was fed alone. When hogs sell at 6, 7, and 8 cents a pound, the prices realized on the supplementary feeds, after the full value of the corn is deducted, show that both the corn and the supplements were fed at a profit. That is, the supplementary feeds enabled the feeder to sell the corn at 70 cents a bushel and at the same time make an excellent profit upon each ton of supplementary feeds purchased. When corn was used alone it was not sold at a profit.

FEEDS SUPPLEMENTARY TO CORN FOR SOUTHERN PORK PRODUCTION.

(*Summary of Alabama Station Bulletin No.* 143.)

Bulletin No. 143, (now out of print) was issued from this station in July, 1908. In it is found the summary of the three years' work in swine production from 1905 to 1908. It was thought wise to summarize the work of that bulletin in the present publication.

Corn was made the basal ration, or check lot. The corn ration was compared to other rations, all of which had corn as a large part of the mixture. A ration of corn alone was first compared to corn when used along with soy bean pastures. A ration of corn alone was also compared to corn when used along with tankage in one case and with cotton seed meal in other trials.

The following table presents in a tabulated form a summary of the three years' pasture work from 1905-1908:

TABLE 14. *Value of Pasture Crops for Hogs. Work Done at Alabama Station from* 1905-1908.
(Taken from Alabama Bulletin 143.)

No. of experiment	RATION	Average daily gains	Feed to make 100 pounds of pork	Grain cost to make 100 pounds of pork	Total cost* to make 100 pounds of pork	Value of one acre in terms of corn
		Lbs.	Lbs.			Bushels
1	Corn alone	.69	611	$7.43	$7.43	
	Corn, 1-2 ration Peanut pasture	1.01	148 .45 acre	1.85	5.45	18.4
2	Corn alone	.67	560	7.00	7.00	
	Corn, 1-2 ration Peanut pasture	.91	177 .12 acre	2.22	3.18	56.9
	Corn, 2-3 \} 1-2 C.S.M., 1-3 \} ration Peanut pasture	1.00	107 51 .08 acre	2.10	2.74	
3	Corn alone	.78	456	5.70	5.70	
	Corn, 1-2 ration Sorghum pasture	.37	437 .57 acre	5.46	10.02	0.6
	Corn, 2-3 \} 1-2 C.S.M., 1-3 \} ration Sorghum pasture	.51	206 103 .37 acre	4.12	7.08	
4	Corn, 2-3 C. S. M., 1-3	1.18	212 106	4.24	4.24	
	Corn, 2-3 \} 1-2 C.S.M., 1-3 \} ration Grazed sorghum	.43	314 157 .15 acre	6.28	7.48	Damage
	Corn, 2-3 \} 1-2 C.S.M., 1-3 \} ration Soiled sorghum	.75	181 90 .13 acre	3.61	4.65	4.3 bus. corn 123lbs.C.S.M.
5	Corn, 1-2 ration Chufa pasture	.72	305 .41 acre	3.81	7.09	11.9
6	Corn alone	.78	456	5.70	5.70	
	Corn, 1-2 ration Soy bean pasture	1.02	157 .28 acre	1.96	4.20	19.1
7	Corn, 1-2 ration Sorghum pasture	.37	437 .57 acre	5.46	10.02	
	Corn, 1-2 ration Soy bean pasture	1.02	157 .28 acre	1.96	4.20	

* Price feeds:

Corn	70 cents a bushel
Tankage	$40 00 a ton
Cotton Seed Meal	30 00 a ton
Pastures	8 00 an acre

It is seen that several different pasture crops were tested. It is also seen that some of them proved to be excellent hog pastures while some proved to have no value at all. It is stated in Bulletin 143 that the peanut crop in Experiment 1 above was not a good one, being poor both in stand and yield. In Experiment 2 the crop was a good one and the test represents fairly well the results the farmers of the state may expect to secure when the nuts are grown upon sandy soil. The sorghum and chufa crops were average crops. The soy bean crop was a poor one on account of an extremely dry period just before time for the seeds to ripen.

The peanut and soy bean pastures were used with satisfaction and profit, but very unfavorable results were secured when sorghum pastures were used: in fact, in one test, Experiment 4, the sorghum pasture did harm instead of good. Rather unsatisfactory results were secured from the chufa pasture also.

When the peanut crop is charged against the gains at $8.00 an acre, the corn at 70 cents a bushel, and the cotton seed meal at $30.00 a ton, each 100 pounds of gain made by the hogs cost from $2.74 to $5.45. When the soy bean crop was used each 100 pounds of gain made cost $4.20, when both the expense of the crop and the corn were charged against the gains, or only $1.96 when the corn alone was taken into account; when corn was used as the sole feed the same gains cost $5.70. These results were secured with a poor crop of soy beans.

In Experiment 3, sorghum pasture was tried. When the grains and pasture were both charged, as above indicated, the gains were not made as cheaply when the pastures were used as when corn was used by itself. When corn was fed alone 100 pounds of pork were made for $5.70, but when the sorghum pasture was used along with the corn the same gains cost $10.02. It was learned that a small addition of cotton seed meal improved the feed of corn and sorghum pasture, but even when both corn and cotton seed meal were used along with the sorghum pasture the gains were made at a loss, each 100 pounds of pork costing $7.08. In Experiment 4, a test was made to determine whether it would be profi-

table to cut the sorghum each day and carry it to the hogs; the hogs were confined in a small lot. While the hogs which had the sorghum carried to them made faster and cheaper gains than did the ones that grazed it, yet one acre of soiled sorghum was of very little value to the animals, as one acre of the soiled sorghum took the place of only 4.3 bushels of corn plus 123 pounds of cotton seed meal. Sorghum is a good feed for some kinds of live stock but it has no value as a hog feed. In Experiment 7 is found a direct comparison of sorghum and soy bean pastures. Although the soy bean pasture was a poor one and the sorghum pasture a good one still the poor soy bean pasture was worth approximately 2 1-2 times as much per acre as the sorghum crop.

In Bulletin 143 is also found some experimental work where no pastures were used. Some of the hogs were inclosed in small pens and fed nothing but concentrated feeds. The following table summarizes the dry-lot feeding work:

TABLE 15. *Corn Alone vs. Corn and Other Concentrates.* (Taken from Alabama Bulletin 143).

No. of experiment	RATION	Average daily gains	Feed to make 100 pounds of pork	Cost to make 100 pounds of pork	Value of one ton of the supplementary feed
		Lbs.	Lbs.		
8	Corn alone	.74	478	$5.97	
	Corn, 1-2	.93	395	11.00	$35.00
	Cowpeas, 1-2				
9	Corn alone	.60	575	7.18	
	Corn, 9-10	1.04	352	5.18	139.50
	Tankage, 1-10		40		
10	Corn alone	.65	590	7.38	
	Corn, 2-3	1.00	303	6.13	45.60
	Cotton seed meal 1-3		157		

In Experiment 8, cowpeas (the seed) were used along with corn. When the test was made cowpeas were selling at 80 cents a bushel, at which price they could be used in large amounts as a hog feed. But when they are worth $2.50 a bushel the farmer cannot, of course, use them in large amounts.

When the ration was composed of equal parts of corn and cowpeas each 100 pounds of pork made cost $11.00, or the peas were worth only $35.00 a ton when fed as they were in this test. If cowpeas are to be used at all now they should not make up more than one-tenth of the whole ration.

The tankage was used at a very great profit in the 9th test. When corn was used alone each 100 pounds of pork cost $7.18, but when one-tenth of the whole ration consisted of tankage the same gains cost only $5.18, or, as used in this test, the tankage proved to be worth $139.50 a ton. The cotton seed meal was also used at a profit in Experiment 10, as no hogs died. But there is always danger of deaths when cotton seed meal is used for more than 25 to 28 days. While there were no deaths in this particular test still there was a great risk to run. The farmer who feeds cotton seed meal to hogs for more than 25 to 28 days at a time runs the risk of losing some of them. In this particular test the cotton seed meal proved to be worth $45.60 a ton.