HISTORIC NOTE

The publications in this collection do not reflect current scientific knowledge or recommendations. These texts represent the historic publishing record of the Institute for Food and Agricultural Sciences and should be used only to trace the historic work of the Institute and its staff. Current IFAS research may be found on the Electronic Data Information Source (EDIS) <http://edis.ifas.ufl.edu/index.html> site maintained by the Florida Cooperative Extension Service.

Bulletin 157 June, 1920

UNIVERSITY OF FLORIDA

Agricultural Experiment Station

SOFT PORK STUDIES

PRELIMINARY REPORT

By

JOHN M. SCOTT

Bulletins will be sent free upon request to Experiment Station,
GAINESVILLE, FLORIDA.

SOFT PORK STUDIES

PRELIMINARY REPORT

By JOHN M. SCOTT

INTRODUCTION

The results of the experiment as given in this bulletin will be of interest to all hog raisers of the Southern States, as it gives evidence that the soft pork problem may not be so difficult to solve as many have considered it. It is of interest to those engaged in research, as it opens up a new line of work for investigation. Some of the problems are: Does heredity have any influence in producing soft pork? Does the rapidity of gain in weight during the finishing period have any influence? Does the kind of fat in the feed have any effect in producing soft pork? These and other questions must be answered before the soft pork question is finally settled.

It appears that the following report is the first one showing results obtained by work of this particular kind. This fact alone adds interest.

This report is made possible through the help given by other departments. The samples of fat were taken by Dr. A. L. Shealey of the Veterinary Department, College of Agriculture, University of Florida. The melting point of the fat was made in the Chemical Laboratory, Florida Agricultural Experiment Station.

During the past three or four years the Florida Agricultural Experiment Station has been conducting feeding experiments to determine, if possible, what percentage of the ration can be of peanuts or peanut meal and still produce hard pork. Altho a number of experiments were conducted no very definite conclusion could be drawn from the results. This was due to the fact that in nearly all the experiments, regardless of what the hogs were fed, some hogs in each lot would chill hard and some would remain soft after being in the cooler for 48 hours. This led to the belief that perhaps there were other factors aside from the feed that might have an effect in producing hard or soft pork. In other words, some hogs might produce soft pork no matter what the feeds were.

The all important question was to determine, before the feeding experiment began, whether the hogs to be used in the future feeding experiments were hard or soft. This was done by taking

a sample of fat from each hog that was to be used in the future feeding experiments. The melting point of the fat from each sample was then determined in the usual manner. All fat samples were rendered at a temperature of 110°C.

This, it is believed, is the first report of results obtained from taking samples of fat from live hogs, and determining the melting point of the fat before starting the feeding experiments.

The samples of fat were taken from the posterior part of the ham. An incision about two inches long was made, and a piece of fat taken out. No muscular tissue was removed with the fat sample. The samples after being rendered each gave about one-eighth of an ounce of fat. It was found that it was not advisable to take samples from exactly the same place each time, so they were taken first from the right side, then from the left. Where it was found necessary to take the third or fourth sample, these were taken just a little to one side from where the first or second sample was taken. The place of making the incision was thoroly disinfected before and after the operation; usually two stitches were taken to close up this incision. Much to our surprise we found that the taking of the samples did not interfere with the making of normal gains by the hogs during the experiment.

The results reported in this bulletin should not be considered conclusive evidence as to what effect certain feeds have on changing the melting point of the fat. This is due to the fact that the experiments here reported have been conducted with only three animals in each lot, or a total of nine hogs. A much larger number of animals would have been used had sufficient funds been available. These results do give important information that has not been available heretofore. Also information is given as to the melting point of the fat of individual hogs at the beginning, during, and at the end of the feeding experiment. Without knowing the melting point of the fat at the beginning of the experiment it is impossible to know what effect the feed might have on raising or lowering the melting point of the fat, but with this information the problem is greatly simplified. The results show that there was a difference of as much as 5°C. in the melting point of the fat from different individual hogs raised under the same conditions and on the same feeds.

FEEDING TEST

The feeding experiment began March 8, 1920, and was divided into two parts, each part lasting forty-four days. Each pig was

marked so that it could be identified. A record of the individual weights and gains was kept.

All the pigs used in this experiment were of about the same age, being about eleven months old at the beginning of the test. Nine pigs, of which the melting point of the fat had been determined, were selected for the experiment. These nine pigs were separated into three lots of three pigs each, two barrows and one sow in each lot.

FEEDS GIVEN

Lot I was fed peanuts only for forty-four days. Lot II was fed corn and shorts, equal parts by weight, and bright cottonseed meal, equal in weight to one-eighth of the corn and shorts. Lot III was fed corn, shorts and peanut meal, with the hulls, equal parts by weight. In addition to this grain ration lot III was given one and one-half gallons of skim milk daily.

WEIGHINGS

All weights given in this bulletin are the average of weights taken on three consecutive days.

TABLE 17.—PIG FEEDING EXPERIMENTS IN SOFT PORK STUDIES

Pig No.	Date	Age	Weight pounds	Sex	Melting point of fat	Date	Weight pounds	Gain in weight in 44 days lbs.	Melting point of fat	Difference in melting point of fat
Lot I.—Fed peanuts only										
3	Mch. 8	11 mos.	135	male	40.5°C	Apr. 20	173.3	38.3	35.0°C	—5.5°C
4	Mch. 8	11 mos.	110	female	40.1°C	Apr. 20	140.0	30.0	37.0°C	—3.1°C
7	Mch. 8	11 mos.	140	male	40.5°C	Apr. 20	171.6	31.6	36.1°C	—4.4°C
Lot II.—Fed corn and shorts equal parts by weight and 1-8 cottonseed meal										
2	Mch. 8	11 mos.	130	male	39.3°C	Apr. 20	165.0	35.0	44.3°C	+5.0°C
5	Mch. 8	11 mos.	100	male	37.5°C	Apr. 20	133.3	33.3	41.2°C	+3.7°C
6	Mch. 8	11 mos.	130	female	37.8°C	Apr. 20	173.3	43.3	39.5°C	+1.7°C
Lot III.—Fed corn, shorts and peanut meal, equal parts by weight and 1½ gallons skimmed milk										
1	Mch. 8	11 mos.	155	male	37.1°C	Apr. 20	216.6	61.6	38.9°C	+1.8°C
8	Mch. 8	11 mos.	125	male	36.4°C	Apr. 20	176.6	51.6	39.2°C	+2.8°C
9	Mch. 8	11 mos.	75	female	35.5°C	Apr. 20	108.3	33.3	39.7°C	+4.2°C

Table 17 gives in detail the date, age, weight, sex and melting point of fat of the nine pigs used in the experiment. The data given in the table is for the first half of the experiment. This shows that the pigs in Lot I were of the same age, of nearly equal weight, and that the melting point of the fat was very nearly the same.

From March 8 until April 20, 1920, a period of 44 days, the pigs in Lot I were fed white Spanish peanuts only. During this

time the three pigs, numbers 3, 4 and 7, made fairly satisfactory gains, so far as gain in weight was concerned.

The important fact in the table is that the melting point of the fat of pig No. 3 was lowered 5.5°C. (9.9°F.); pig No. 4, 3.1°C. (5.5°F.) and pig No. 7, 4.4°C. (7.9°F.) after being fed peanuts only for forty-four days. In other words, the feeding of peanuts only had a very marked effect on lowering the melting point, or softening the fat.

The results of lot II, fed corn and shorts equal parts by weight, and one-eighth bright cottonseed meal, are interesting. After feeding the above ration for forty-four days there was a satisfactory gain in weight of each animal. In fact, they made better gains in weight than did the pigs in lot I. The all important fact is that the ration had a very marked effect on hardening or raising the melting point of the fat of each hog in this lot, the difference being from 1.7°C. to 5°C. The melting point of the fat of pig No. 2 was raised 5°C. (9°F.); pig No. 5, 3.7°C. (6.6°F.) and pig No. 6, 1.7°C. (3°F.).

It is evident that a ration of corn, shorts and cottonseed meal will produce hard pork.

Lot III, fed corn, shorts and peanut meal, with the hulls, equal parts by weight, and skim milk, made better gains in weight than did the pigs in either of the other lots. This ration also had a marked effect on hardening the fat of each pig. The melting point of the fat was raised from 1.8°C. to 4.2°C. The melting point of the fat of pig No. 1 was raised 1.8°C. (3.2°F.); pig. No. 8, 2.8°C. (5°F.), and pig No. 9, 4.2°C. (7.5°F.).

REVERSING THE FEEDS

As stated before, this experiment was divided into two parts. The first part of the experiment closed April 20, 1920. The second part began on April 23, 1920, and continued for forty-four days, closing June 7, 1920. The same hogs were used thruout both parts of the experiment.

On April 23, 1920, the feeds for the three lots were reversed. The feed for lot I was changed from peanuts only to corn, shorts, peanut meal with hulls, equal parts by weight, and one and one-half gallons skim milk daily. The feed for lot II was changed from corn and shorts, equal parts by weight, and one-eighth cottonseed meal, to peanuts only. The feed for lot III was changed from corn, shorts, peanut meal with hulls and skim milk, to corn and shorts equal parts by weight, and one-eighth

bright cottonseed meal. These changes in feed were made so as to make a further study of how feeds influence the melting point of fat.

TABLE 18.—PIG FEEDING EXPERIMENT, WEIGHTS, GAINS AND MELTING POINT OF FAT

Pig No.	Date	Weight pounds	Sex	Melting point of fat	Date	Weight pounds	Gain in weight in 44 days lbs.	Melting point of fat	Difference in melting point of fat
Lot I.—Pigs Fed Corn, Shorts, Peanut Meal and 1½ Gallons Skim Milk									
3	April 23	173.3	male	35.0°C	June 7	246.6	73.3	39.1°C	+4.1°C
4	April 23	140.0	female	37.0°C	June 7	196.6	56.6	38.1°C	+1.1°C
7	April 23	171.6	male	36.1°C	June 7	220.0	48.4	39.0°C	+2.9°C
Lot II.—Pigs fed peanuts only									
2	April 23	165.0	male	44.3°C	June 7	166.6	1.6	41.6°C	—2.7°C
5	April 23	133.3	male	41.2°C	June 7	150.0	16.7	43.2°C	+2.0°C
6	April 23	173.3	female	39.5°C	June 7	130.0	—43.0	37.5°C	—2.0°C
Lot III.—Pigs fed corn, shorts, equal parts by weight and 1-8 cottonseed meal									
1	April 23	216.6	male	38.9°C	June 7	253.3	36.7	40.0°C	+1.1°C
8	April 23	176.6	male	39.2°C	June 7	220.0	43.4	40.2°C	+1.0°C
9	April 23	108.3	female	39.7°C	June 7	128.3	20.0	42.0°C	+2.3°C

Table 18 gives the date, weight, sex, melting point of the fat, gain in weight, and the difference in the melting point of the fat.

Hogs in all lots, except lot II, made satisfactory gains during the second part of the experiment. It is difficult to give any reason or explanation just why the hogs in lot II failed to make satisfactory gains. The loss in weight of sow No. 6 can be explained. During the early part of this feeding period, April 28, Sow No. 6 farrowed a litter of five pigs and nursed them during the remainder of the experiment.

A glance at Table 18 shows that when the hogs in lot I, which had been fed only peanuts for a period of forty-four days, were changed to a feed of corn, shorts, peanut meal, with hulls, and skim milk, the melting point of the fat was raised, or in other words, the fat was hardened to a noticeable extent. The melting point of the fat of pig No. 3, after being fed peanuts for forty-four days, was 35°C. (95°F.). After being fed a ration of corn, shorts, peanut meal, with hulls and skim milk for forty-four days the melting point of the fat was raised to 39.1°C. (102.3°F.) or a difference of 4.1°C. (7.3°F.).

The melting point of the fat of pig No. 4, after being fed peanuts for forty-four days, was 37°C. (98°F.). After being fed corn, shorts, peanut meal with the hulls, and skim milk for forty-four days, the melting point of the fat was raised to 38.1°C. (100.5°F.) or a difference of 1.1°C. (2°F.).

The melting point of the fat of pig No. 7, after being fed peanuts for forty-four days, was 36.1°C. (96.9°F.). After being fed corn, shorts, peanut meal, with hulls and skim milk for forty-four days, the melting point of the fat was 39.0°C. (102.2°F.), or a difference of 2.9°C. (5.2°F.).

This shows clearly that the fat of peanut fed hogs can be hardened to a marked degree by feeding a ration of corn, shorts, peanut meal with hulls and skim milk. The table also shows that the melting point of the fat can be lowered, i. e., made softer, by feeding peanuts. However, pig No. 5 seems to be an exception. It is difficult to explain why in this case the feeding of peanuts only did not lower the melting point of the fat. It may be a case of the individuality of the hog. The table also shows that the ration of corn, shorts and bright cottonseed meal raised the melting point of the fat; that is, hardened the fat.

TABLE 19.—SHOWING EFFECT OF FEED ON MELTING POINT OF FAT

Pig No.	Date	Weight in lbs.	Melting point of fat	Date	Weight in lbs.	Melting point of fat	Date	Weight in lbs.	Melting point of fat
	Fed peanuts only for 44 days.						Fed corn, shorts, peanut meal and skim milk 44 days.		
3	March 8	135.0	40.5°C	April 23	173.0	35.0°C	June 7	246.6	39.1°C
4	March 8	110.0	40.1°C	April 23	140.0	37.0°C	June 7	196.6	38.1°C
7	March 8	140.0	40.5°C	April 23	171.0	36.1°C	June 7	220.0	39.0°C
	Fed corn, shorts and cottonseed meal for 44 days.						Fed peanuts only 44 days.		
2	March 8	130.0	39.3°C	April 23	165.0	44.3°C	June 7	166.6	41.6°C
5	March 8	100.0	37.5°C	April 23	133.3	41.2°C	June 7	150.0	43.2°C
6	March 8	130.0	37.8°C	April 23	173.3	39.5°C	June 7	130.0	37.5°C
	Fed corn, shorts, peanut meal and skim milk 44 days.						Fed corn, shorts and cottonseed meal 44 days.		
1	March 8	155.0	37.1°C	April 23	216.6	38.9°C	June 7	253.3	40.0°C
8	March 8	125.0	36.4°C	April 23	176.6	39.2°C	June 7	220.0	40.2°C
9	March 8	75.0	35.5°C	April 23	108.3	39.7°C	June 7	128.3	42.0°C

Table 19 shows at a glance the effect of the feed on the melting point of the fat. The melting point of the fat of pigs Nos. 3, 4 and 7 at the beginning of the test was 40.5°, 40.1° and 40.5°C., respectively. After being fed peanuts only for forty-four days the melting point of the fat was 35°, 37° and 36.1°C. The feeding of peanuts had a very softening effect on the fat. From April 23 to June 7 these three hogs were fed corn, shorts, peanut meal and skim milk. On June 7 the melting point of the fat was 39.1°, 38.1° and 39.0°C. That is, the feeding of corn,

TABLE 20.—SHOWING DATE, SEX, AGE, WEIGHT, FEEDS FED, BREED, CONDITION AND MELTING POINT OF FAT TAKEN FROM LIVE HOGS

Date	Ear mark or number and sex	Age	Weight pounds	Feeds Fed	Breed	Condition	Melting point of fat; deg. Centigrade
1920 Jan. 21	Sow— R. ear cropped	Over 3 years	400	⅓ corn, ⅔ velvet beans	Berkshire	Good	34.2
Jan. 21	Sow— Both ears cropped	Over 3 years	295	⅓ corn, ⅔ velvet beans	Berkshire	Good	39.5
Jan. 21	Sow— Hole in both ears	Over 3 years	130	⅓ corn, ⅔ velvet beans	Berkshire	Thin in flesh, just weaned pigs	37.1
Feb. 14	1 barrow	11 mos.	155	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	37.1
Feb. 14	2 barrow	11 mos.	130	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	39.3
Feb. 14	3 barrow	11 mos.	135	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	40.5
Feb. 14	4 sow	11 mos.	110	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	40.1
Feb. 14	5 barrow	11 mos.	100	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	37.5
Feb. 14	6 sow	11 mos.	130	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	37.8
Feb. 14	7 barrow	11 mos.	140	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	40.5
Feb. 14	8 barrow	11 mos.	125	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	36.4
Feb. 14	9 sow	11 mos.	75	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	35.5
Feb. 14	10 sow	1½ yrs.	150	2 parts corn, 3 parts shorts, 1 part peanut meal	Tamworth	Good	38.4
Feb. 14	11	4 mos.	65	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	38.4
Feb. 14	12	4 mos.	60	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	36.0
Feb. 14	13	4 mos.	50	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	37.6
Feb. 14	14	4 mos.	25	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Under size	34.7
Feb. 14	15 sow	1½ yrs.	90	⅓ corn, ⅔ velvet beans	Berkshire	Under size, thin in flesh	40.5
Feb. 14	16 sow	1½ yrs.	85	⅓ corn, ⅔ velvet beans	Berkshire	Under size, thin in flesh	40.8
Feb. 14	17	4 mos.	35	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Fairly good	38.1
Feb. 14	18	4 mos.	30	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Fairly good	33.4
Feb. 14	19	4 mos.	50	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	37.9
Feb. 14	20 boar	2 years	315	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Good	40.1
Feb. 14	21 sow	2 years	105	2 parts corn, 3 parts shorts, 1 part peanut meal	Berkshire	Nursing litter of pigs	44.2
Feb. 14	23	4 weeks	16	Nursing mother	Berkshire	Good	27.5
Feb. 14	24	4 weeks	15	Nursing mother	Berkshire	Good	26.3
Feb. 14	25	4 weeks	11	Nursing mother	Berkshire	Good	35.6
Feb. 14	26	4 weeks	15	Nursing mother	Berkshire	Good	34.5

shorts, peanut meal and skim milk hardened the fat to some extent.

The melting point of the fat of pigs Nos. 2, 5 and 6 at the beginning of the test was 39.3°, 37.5° and 37.8°C. After being fed corn, shorts and cottonseed meal for forty-four days the melting point was 44.3°, 41.2° and 39.5°C. This shows that the ration fed had a very marked effect on raising the melting point of the fat. From April 23 to June 7 these three pigs were fed peanuts only. On June 7 the melting point of the fat was 41.6°, 43.2° and 37.5°C. This shows that the feeding of peanuts only had a softening effect on the fat of the two pigs, but not on the third.

The melting point of the fat of pigs Nos. 1, 8 and 9 at the beginning of the test was 37.1°, 36.4° and 35.5°C. After feeding corn, shorts, peanut meal and skim milk for forty-four days the melting point of the fat was 38.9°, 39.2° and 39.7°C. After feeding corn, shorts and cottonseed meal for forty-four days the melting point of the fat was raised to 40°, 40.2° and 42°C.

SOME COMPARISONS

Table 20 will be found of considerable interest as it gives data regarding all hogs from which samples of fat were taken, and the melting point determined. Hogs No. 1 to 9, inclusive, were the hogs used in the experiment reported in this bulletin.

This data shows the wide variation in the melting point of the fat from the different individual hogs. A part of this variation may be due to the age of the animals. In other cases it is impossible to give any satisfactory explanation.

There is one point in the table that is of more than usual interest; that is, the melting point of the fat of Nos. 20 and 21, also Nos. 23 to 26, inclusive. No. 20 is the sire and No. 21 is the dam of Nos. 23 to 26, inclusive. This shows a wide variation in the melting point of the fat of the sire and dam when compared with the melting point of the fat of the offspring. There is also a wide variation in the melting point of the fat of the four pigs. For instance, the melting point of the fat of Nos. 23 and 24 is 27.5°C. and 26.3°C. respectively, and that of Nos. 25 and 26 is 35.6°C. and 34.5°C. respectively. This indicates that the individuality of the hog may play an important part in the production of hard or soft pork.

HARD, SOFT AND OILY SAMPLES

The data given in Table 21 is the melting point of the fat of samples obtained at Armour & Company's Packing Plant, Jacksonville, Fla. These samples were taken from carcasses in the cooler. As seen in the table part of the samples were taken from what were called hard, part from soft and part from oily carcasses. The results secured from these few samples show that there is considerable difference in the melting points of hard and soft fat, and also of soft and oily samples. All samples taken from carcasses called hard pork had a melting point of from 44.5°C. to 47°C. In other words the melting points of these hard samples were quite uniform. This does not mean that all hard pork must have a melting point of 44°C. or higher. In nearly every case the soft fat melted at a higher temperature than did the oily samples; hence, there is some indication that a difference may be found in the melting point of the fat of soft and oily pork.

TABLE 21.—SHOWING THE MELTING POINT OF SAMPLES OF FAT TAKEN FROM HARD, SOFT AND OILY CARCASSES

(Samples taken from the ham)

Date	Hard	Soft	Oily
February 9, 1920	45.6°C.	26.9°C.	24.8°C.
April 2, 1920	44.5°C.	31.0°C.	32.0°C.
	44.5°C.	32.4°C.	27.0°C.
	45.0°C.	33.6°C.	25.6°C.
	46.0°C.		
	47.0°C.		
	46.2°C.		

CONCLUSIONS

1. This is, apparently, the first report of a series of experiments conducted that shows the melting point of the fat at the beginning, at intervals during the test, and also at the close of the experiment.

2. The number of animals used is not sufficient from which to draw final conclusions.

3. The results of this experiment show that there is a wide field of usefulness in this line of investigation.

4. From the experiments it is evident that the melting point of fat is radically influenced by the character of the feed.

5. The data indicates that there is a large variation in the melting point of fat of different individuals regardless of the feed consumed.