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DIVISION OF ANIMAL HUSBANDRY

THE INFLUENCE OF PEANUTS AND RICE BRAN ON THE QUALITY OF PORK



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COLLEGE STATION, BRAZOS COUNTY, TEXAS.

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*As of March 1, 1918.

**In cooperation with A. & M. College of Texas.

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THE INFLUENCE OF PEANUTS AND RICE BRAN ON THE QUALITY OF PORK

BY L. B. BURK

Collaborating Animal Husbandman, Swine Investigations

Soft or oily hogs, as they are called by the packers, have been greatly increasing in numbers on the Southern markets during the past two years.

They are objected to by the packers because they will not get firm at ordinary cooler temperature—32 degrees Fahrenheit to 38 degrees Fahrenheit—but remain soft and flabby. It is also claimed that they will not stack without slipping, the pork loins cannot be pulled, the shrinkage is much greater, and the consumer objects to the quality of the pork.

In view of these objections, the packers first docked oily, or peanut hogs, one-half cent per pound. Later they docked one cent, then one and one-half cent, and now they are docking two cents per pound for all hogs that kill oily, provided, of course, that they have been bought subject to test.

Since it is impossible to tell soft hogs from firm ones when they are alive in the yards, if the buyers do not buy them subject to test they are compelled to depend upon the shipper telling them the truth about how the hogs are fed, or buy them according to the district from which they are shipped. This has not been satisfactory for either the packers or the shippers. The shipper objects to this arrangement for the reason that he does not want to wait two days* for his money after his hogs are sold. It is not satisfactory to the packer because he finds too many soft hogs in the lots that he bought without a guarantee. This condition is no doubt partly due to the hogs being fed other feed than peanuts that will also produce soft or oily pork.

In this test, it seems that the rice bran and rice polish have been the cause of the packers declaring that the shippers do not tell them the truth, and, in turn, the shippers claiming that the packers are not fair, because rice bran will produce soft pork. Since rice bran has been selling for a much lower price than corn or milo, there have been enormous amounts of it fed this year. The fact that oily hogs have been coming from every locality is no doubt the cause of much misunderstanding.

*The hogs are not passed on until they have been in the cooler forty-eight hours.

PURPOSES OF EXPERIMENT.

A recent experiment conducted by the Texas Agricultural Experiment Station at College Station, Texas, promises to solve this very important problem for the South.

The purposes of the experiment were as follows:

1. To determine the value of peanuts as a hog feed.
2. To determine the kind of pork peanuts will produce.
3. To learn if soft, or oily, pork could be profitably hardened by feeding a grain ration.
4. To determine whether or not the hogs could be prevented from getting soft grazing on peanuts by feeding a half grain ration.
5. To determine the kind of pork produced by milo, rice bran and a mixture of the two.
6. To compare the different rations as to their values in making gains.
7. To compare an unbalanced ration with a balanced one.

HOGS USED.

In this experiment 120 pure bred Duroc-Jersey and grade Essex and Poland China hogs were used. These hogs were divided as equally as practicable into 12 lots of 10 head each. All of these hogs were fed a balanced grain ration of milo chops and meat meal twenty days or more previous to being started on the experiment.

TIME OF EXPERIMENT.

The experiment was begun October 12, 1916, and closed January 19, 1917. The weather was cool and dry practically throughout the entire feeding period. Apparently the conditions were normal. All the feed was weighed as it was given to the hogs and a complete record kept of all the feeds, weights of hogs, and weather conditions. The hogs were weighed by lots three consecutive days at beginning, as they came off peanuts, and ending of the experiment.

PLACING THE HOGS ON EXPERIMENT.

On account of the fact that it was necessary for all of the lots to come off the experiment at the same time, and, also due to some of the lots being on the experiment longer than others, the lots were started at varying intervals, as follows:

Lot 8 was started October 12.

Lots 7, 9 and 10 were started October 26.

Lots 1, 2, 3, 4, 5, 11 and 12 were started October 31.

Lot 6 was started November 10.

Lots 6, 7, 8, 9 and 10 grazed peanuts 40 days, and Lots 3, 4 and 5 grazed peanuts for 80 days.

Rations and feeding periods were as follows:

Lot 1.	Milo chops alone	80 days:
Lot 2.	Cottonseed meal, 1 lb.;* milo chops, 6 lbs.....	80 days.
Lot 3.	Peanuts alone	80 days.
Lot 4.	Peanuts together with 2 lbs. milo chops per 100 lbs. of live weight.....	80 days.
Lot 5.	Peanuts together with a 2 per cent. grain ration of 1 lb. cottonseed meal, 6 lbs. milo chops.....	80 days.
Lot 6.	Peanuts	40 days.
	Cottonseed meal, 1 lb.; milo chops, 6 lbs.....	30 days.
Lot 7.	Peanuts	40 days.
	Cottonseed meal, 1 lb.; milo chops, 6 lbs.....	45 days.
Lot 8.	Peanuts	40 days.
	Cottonseed meal, 1 lb.; milo chops, 6 lbs.....	60 days.
Lot 9.	Peanuts	40 days.
	Milo chops alone.....	45 days.
Lot 10.	Peanuts	40 days.
	Meat meal, 1 lb.; milo chops, 10 lbs.....	45 days.
Lot 11.	Cottonseed meal, 1 lb.; rice bran, 10 lbs.....	80 days.
Lot 12.	Rice bran, 4 lbs.; milo chops, 4 lbs.; cottonseed meal, 1 lb.....	80 days.

It was intended that the hogs in the peanut lots should graze 40 days, but the peanuts did not last quite long enough, and Lots 4, 5 and 6 were fed peanuts in dry lots for 7, 7 and 20 days, respectively. Lots 7, 8, 9 and 10 were fed peanuts three days each.

All of the lots except 1, 2, 11 and 12 grazed on peanuts a part of the time.

Lots 3, 4 and 5 grazed in similar sized plats, while Lots 6, 7, 8, 9 and 10 all grazed together in the same field. With the exceptions of Lots 4 and 5, the hogs received nothing but water and peanuts while grazing. The dry lots in which the hogs were fed were all the same size, and equipped with same space of concrete troughs, concrete floor, and shelter.

At the beginning the hogs averaged 107 pounds each, and 227 pounds at the close. Their value at the beginning was \$7.50 per hundred, and they sold for \$10.90 on the Fort Worth market.

COST OF FEEDS.

Milo chops	\$48.00 per ton.
Cottonseed meal	45.00 per ton.
Meat meal	60.00 per ton.
Rice bran	25.00 per ton.
Peanuts	1.25 per bushel.
Peanuts grazed	12.00 per acre.

*The mixtures of grain refer only to the proportion of each feed given in the ration and not the amount fed daily per hog or per lot. After the hogs were on full feed they were given all of the grain they would clean up twice each day. The feed was weighed and mixed dry, then it was weighed again just before feeding and enough water added to it to make a thick slop.

Fifty hogs grazing on 16 acres of peanuts made a total gain of 2,540 pounds, or the peanuts produced an average of 158 pounds of pork per acre. This low yield was due to the fact that the estimated yield of peanuts was only 19 bushels per acre.

Considering the cost of peanuts grazed at \$12 per acre, 100 pounds gain costs \$7.55. Had these hogs been finished on peanuts costing \$12 per acre, instead of being finished on grain at the price stated above, provided they received the \$2.00 dockage, they would have sold for \$37.34 less money than was received. In other words, by feeding grain the docking was avoided, and the difference in profit on the 5 lots or 50 hogs was \$37.34 in favor of hardening on grain.

This is significant, since the packers are now paying \$2.00 per hundred less on the Fort Worth market for hogs that kill oily than they do for those that kill firm.

HOW HOGS WERE FED WHEN TAKEN OFF PEANUTS.

Owing to the fact that sudden changes in feeding often throw animals "off feed," it was deemed advisable to change gradually from peanuts to a grain ration. This was done by taking the hogs off the peanuts in the morning and keeping them off until after they were fed a grain ration in the evening. Then they were turned into the peanut field and left until the next morning. This practice was kept up during the three days that the hogs were weighed off the peanuts. The success of this method was shown when every lot made its best gains during the week of the change. There was no sign whatever of hogs going off feed.

Table 1.—Result of experiment.

Lot	1	2	3	4	5	6
Rations and number of days fed.	Milo chops alone for 80 days.	Milo chops 6 lbs. of cottonseed meal 1 lb. 80 days.	Peanuts 80 days.	Peanuts 80 days. Milo chops alone ½ ration.	Peanuts 80 days. Milo chops 6 lb., cottonseed meal 1 lb., ½ ration.	Peanuts 40 days. Milo chops 6 lbs. cottonseed meal 1 lb. 30 days.
Date hogs were placed on experiment.....	Oct. 31, 1916	Oct. 31, 1916	Oct. 31, 1916	Oct. 31, 1916	Oct. 31, 1916	Nov. 10, 1916
Date hogs were taken off experiment.....	Jan. 19, 1917	Jan. 19, 1917	Jan. 19, 1917	Jan. 19, 1917	Jan. 19, 1917	Jan. 19, 1917
Number of days hogs were on experiment....	80	80	80	80	80	70
Number of hogs in each lot.....	10	10	10	10	10	10
Initial weight of hogs on peanuts, pounds.....			1048	1056	1048	1151
Final weight of hogs off peanuts, pounds.....			1849		1888	1730
Gain in weight of hogs on peanuts, pounds.....			801		840	579
Average daily gain per hog on peanuts, lbs.....			1.335	1.53	1.55	1.45
Initial weight in dry lot.....	1061	1046	1849		1888	1730
Final weight at College Station.....	1917	2214	2203	2280	2405	2303
Total gain in dry lot, pounds.....	856	1168	354		517	575
Total gain for whole period.....	856	1168	1155	1224	1357	1152
Average daily gain in dry lot, per hog, lbs.....	1.07	1.46	1.44	1.53	2.068	1.91
Amount of feed consumed per lot, pounds.....	4377	4974	1125	2607	2623	3239
Amount of feed consumed per 100 lbs. gain in dry lot.....	511	426	318		193	565

INFLUENCE OF PEANUTS AND RICE BRAN ON PORK.

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Table 1.—Result of experiment—Continued.

Lot	7	8	9	10	11	12
Rations and number of days fed.	Peanuts 40 days. Milo chops 6 lbs., cottonseed meal 1 lb., 45 days.	Peanuts 40 days. Milo chops 6 lbs., cottonseed meal 1 lb., 60 days.	Peanuts 40 days. Milo chops alone 45 days.	Peanuts 40 days. Milo chops 10 lbs., Meat meal 1 lb., 45 days.	Rice bran 10 lbs., cottonseed meal 1 lb., 80 days.	Rice bran 4 lbs., milo chops 4 lbs., cottonseed meal 1 lb., 80 days
Date hogs were placed on experiment.....	Oct. 26, 1916	Oct. 12, 1916	Oct. 26, 1916	Oct. 26, 1916	Oct. 31, 1916	Oct. 31, 1916
Date hogs were taken off experiment.....	Jan. 19, 1917	Jan. 20, 1917	Jan. 19, 1917	Jan. 19, 1917	Jan. 19, 1917	Jan. 19, 1917
Number of days hogs were on experiment...	85	100	85	85	80	80
Number of hogs in each lot.....	10	10	10	10	10	10
Initial weight of hogs on peanuts, pounds...	1156	968	1101	1160
Final weight of hogs off peanuts, pounds...	1697	1667	1627	1691
Gain in weight of hogs on peanuts, pounds...	541	699	526	531
Average daily gain per hog on peanuts, lbs...	1.31	1.748	1.315	1.327
Initial weight in dry lot.....	1697	1667	1627	1691	1016	1064
Final weight at College Station.....	2487	2651	2353	2475	1693	2135
Total gain in dry lot, pounds.....	790	984	726	784	677	1071
Total gain for whole period.....	1331	1683	1252	1315	677	1071
Average daily gain in dry lot, per hog, lbs...	1.755	1.64	1.61	1.74	.846	1.339
Amount of feed consumed, per lot, pounds...	3654	4174	3654	3654	3945	4981
Amount of feed consumed per 100 lbs. gain in dry lot.....	463	424	503	466	583	465

Table 2.—Shrinkage by lots and per cent., and dressing per cent. of hogs by lots.

Lot	1	2	3	4	5	6
Final weight at College.....	1917	2214	2203	2280	2405	2303
Weights at Fort Worth.....	1860	2120	2200	2260	2350	2240
Shrinkage.....	57	54	3	20	55	63
Per cent. shrinkage.....	.03	.024	.001	.0089	.023	.027
Dressing per cent.....	80.64	75.47	78.18	79.20	78.29	78.12

Lot	7	8	9	10	11	12
Final weight at College.....	2487	2651	2353	2475	1693	2135
Weights at Fort Worth.....	2370	2520	2280	2430	1540	2050
Shrinkage.....	117	131	73	45	153	85
Per cent. shrinkage.....	.047	.049	.03	.018	.09	.04
Dressing per cent.....	75.52	80.15	79.82	77.36	77.92	76.58

The shrinkage on these hogs was very light, except for Lot 11, receiving rice bran and cottonseed meal.

The shrinkage on this lot was 9 per cent. and is very heavy.

Lot 3, receiving peanuts alone, shrunk so little that the amount is negligible.

The dressing per cent. was very uniform for every lot.

Table 3.—Financial statement.

Lot	1	2	3	4	5	6
Total cost of feed.....	\$ 105.05	\$ 118.31	\$ 85.26	\$ 94.33	\$ 129.19	\$ 133.65
Cost of hogs at beginning, at \$7.50 per cwt.	79.58	78.45	78.60	79.20	78.60	86.33
Cost of freight at 20.97c per cwt.....	4.02	4.64	4.62	4.78	5.04	4.83
Cost of corn at stock yards.....	1.25	1.25	1.25	1.25	1.25	1.25
Cost of yardage.....	.79	.79	.79	.79	.79	.79
Cost of insurance and inspection.....	.05	.05	.05	.05	.05	.05
Commission.....	1.34	1.34	1.34	1.34	1.34	1.34
Cost of labor.....	11.26	11.26	2.82	11.26	11.26	7.04
Total cost.....	\$ 203.34	\$ 216.09	\$ 174.74	\$ 193.00	\$ 227.52	\$ 235.23
Selling price at Fort Worth at \$10.90 per cwt.	202.74	231.08	210.10	229.39	238.52	246.34
Profit per lot.....	**\$.60	\$ 14.99	\$ 35.36	\$ 36.39	\$ 11.00	\$ 11.06

Lot	7	8	9	10	*11	12
Total cost of feed.....	\$ 129.46	\$ 132.52	\$ 130.25	\$ 132.24	\$ 52.89	\$ 93.255
Cost of hogs at beginning, at \$7.50 per cwt.	86.70	72.60	82.59	87.00	72.20	79.80
Cost of freight at 20.97c per cwt.....	5.22	5.57	4.93	5.19	3.55	4.48
Cost of corn at stock yards.....	1.25	1.25	1.25	1.25	1.25	1.25
Cost of yardage.....	.79	.79	.79	.79	.79	.79
Cost of insurance and inspection.....	.05	.05	.05	.05	.05	.05
Commission.....	1.34	1.34	1.34	1.34	1.34	1.34
Cost of labor.....	6.33	8.45	6.33	6.33	11.26	11.26
Total cost.....	\$ 231.14	\$ 222.57	\$ 227.52	\$ 234.19	\$ 147.25	\$ 193.02
Selling price at Fort Worth at \$10.90 per cwt.	258.33	274.68	248.52	264.87	164.20	223.45
Profit per lot.....	\$ 27.19	\$ 52.11	\$ 21.00	\$ 29.68	\$ 16.95	\$ 30.43

Total profit..... \$284.22

*An 81-pound pig taken out of Lot 11 on account of continuously losing in weight instead of gaining. Estimated value 8 cents per pound.

**Loss.

These results show that in every case the average daily gains were greater when the hogs were in dry lots after grazing peanuts than when they were on peanuts alone. It also shows that unusually good gains were made. The amount of feed required to produce 100 pounds of gain was practically equal to those lots not receiving any peanuts. The lots allowed to graze on peanuts 40 days previous to grain in dry lot also made better daily gains than Lots 2, 11, and 12, receiving a balanced grain ration during the entire 80 days. Hence, according to this test, a grain ration may be profitably fed to hogs that have previously been grazing on peanuts.

COTTONSEED MEAL PROVES SUCCESSFUL.

Cottonseed meal was fed to Lot 2 in the proportion of 1 pound of cottonseed meal to 6 pounds of milo chops for 80 days without sickness or death. This result compares favorably with the results of four other experiments at this Station, where the same proportions were fed for similar lengths of time. Three of these experiments were completed without deaths, and in the fourth one hog died at the end of 72 days with symptoms of cottonseed meal poisoning. Cottonseed meal and milo in this proportion is one of the best rations for producing gains that we have, because 100 pounds of gain has been produced with

417 pounds, 419 pounds and 426 pounds, respectively, in different experiments.

Although Lot 1, receiving milo chops alone, required a less amount of feed to produce 100 pounds gain than usual, it, nevertheless, was fed at a loss of 60 cents, while all the other lots were fed at a profit.

THE KILLING TEST.

At the beginning of the experiment, two average sized hogs were slaughtered, placed in the coolers at College Station at a temperature of 32 degrees Fahrenheit, and after 24 hours examined by the author and an expert meat cutter, and found to be firm. At the end of 40 days, four hogs that had grazed with Lot 8 on peanuts were also slaughtered, placed in the cooler at freezing temperature for 24 hours, and all four hogs remained soft. They were allowed to remain in the cooler at the same temperature for 48 hours, and still they did not get firm and white, but at the end of this time were flabby, and presented an oily appearance.

Since these hogs received nothing except peanuts and water, it may be inferred that the softness was due to the peanuts.

At the close of the experiment the hogs in each lot were double marked, with different hair brand and ear mark, so that errors would be avoided. The ration each lot received was not made known to the buyer or commission man, so that there was no chance for prejudice against any particular lot. In fact, both the hog salesman, Tom Frazier, and the hog buyer failed to pick out the lot that had been fed on peanuts alone.

These hogs were sold to Swift & Company, Fort Worth, Texas, subject to killing test. The author, with the able assistance of J. K. G. Fisher, of Swift & Company, followed the hogs through the packing plant to the coolers. After they had been in the coolers for 24 hours, at a temperature of 32 degrees to 38 degrees Fahrenheit, each carcass was examined and each lot checked by an expert cooler man and myself..

All of the hogs in Lots 1, 2, 6, 7, 8, 9, 10 and 12 were pronounced to be firm by the expert.

In Lot 3, receiving a ration of peanuts alone, 9 were oily or soft, and 1 firm.

In Lot 4, receiving 2 pounds of milo chops per 100 pounds live weight daily while grazing on peanuts, 5 were oily and 5 firm.

In Lot 5, receiving 2 pounds of cottonseed meal and milo chops (in the proportion of 1 to 6) per 100 pounds live weight daily while grazing on peanuts, 5 were oily and 5 firm.

In Lot 11, receiving a full ration of rice bran, 10 pounds, and cottonseed meal, 1 pound, 4 were oily and 5 firm. (One hog in this lot was taken out before the end of the experiment, on account of sickness.)

This indicates that peanuts will make soft or oily hogs, and that a half grain ration of milo and cottonseed meal will not prevent it from getting soft or oily. It also indicates that a ration of rice bran and cottonseed meal will produce soft or oily hogs.

This corroborates results obtained by Prof. J. C. Burns of the Texas

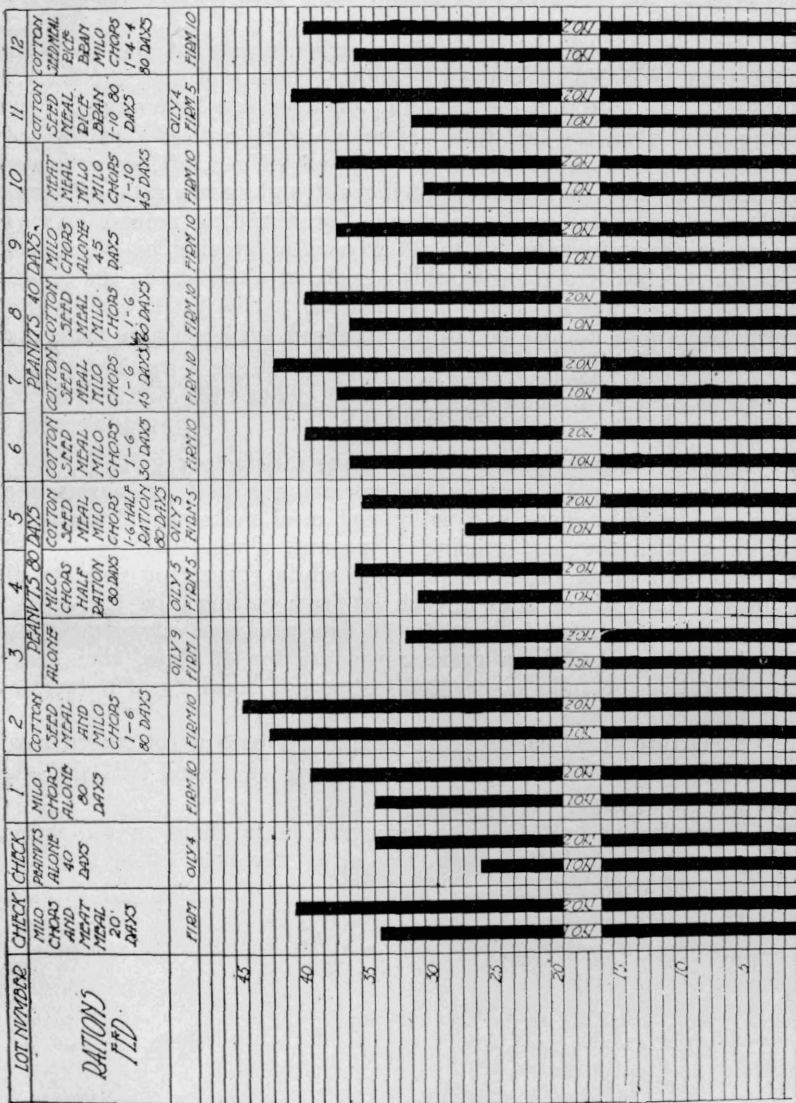
Experiment Station in 1909,* when rice bran alone and peanuts alone were used to fatten hogs, both feeds producing soft or oily hogs. It also shows that if half of the rice bran is replaced by corn or milo, that the hogs will kill firm. These results also show that, although the hogs were soft after grazing on peanuts 40 days they killed firm after being fed rations 30, 45 and 60 days, thus showing that the soft hogs can be made firm and satisfactory to the packer within 30 days on a grain ration.

MELTING POINT TESTS.

In addition to this slaughter test, a further check was made. Samples of fat were taken from the leaf, shoulder and along the back of three hogs out of each lot. Samples of fat were also taken from the same places in the carcasses, from the hogs slaughtered at the beginning of the experiment and when coming off peanuts.

These samples of fat were sent to the State Chemist, where the melting point determinations were made with the following results.

*Bulletin 131, Texas Experiment Station.



NO. 1 AVERAGE MELTING POINTS OF SHOULDER AND BACK FAT. NO. 2 AVERAGE MELTING POINTS OF LEAN FAT. 10-30

Showing melting point of shoulder, back and leaf fats taken from three hogs out of each lot.

EXPLANATION OF CHART.

The chart represents the average melting points of the fat taken from three hogs of each lot, with the exception of the check lots. In check lot A, only two hogs were tested, while with the check lot B four hogs were tested.

The No. 1 graph represents the melting points of the back and shoulder fat, and No. 2 shows the melting points of the leaf fat. It is interesting to note that the back and shoulder fats have a much lower melting point than the leaf fats. It may also be noticed that the hogs receiving peanuts throughout the period, and killing soft, show a much lower melting point than those receiving a straight grain ration throughout the feeding period, and also show a lower melting point than those hogs receiving grain from 30 to 60 days after grazing on peanuts 40 days. In practically every case, this corroborates the test in the coolers.

Although feed was extremely high and labor cost \$104, and the soft or oily hogs were docked \$1.50 per hundred, still a small profit was made on every lot except Lot 1.

SUMMARY.

1. Hogs grazing on peanuts alone make satisfactory gains.
2. Hogs grazing on peanuts and receiving a half grain ration of milo chops or milo chops and cottonseed meal make very little better gains than when they are grazing on peanuts alone.
3. The half grain ration fed to hogs while grazing on peanuts did not prevent some of the hogs in each lot from getting oily.
4. Peanuts when fed to hogs for 40 days produced oily pork.
5. After hogs had been grazing peanuts for 40 days, then fed a balanced ration of milo chops and cottonseed meal for 30 days, all killed firm.
6. A mixture of 10 parts of rice bran and 1 part of cottonseed meal, when fed to hogs for 80 days, produced lower gains and half the hogs in the lot killed oily.
7. By replacing half the rice bran with milo chops in the ration, the hogs made much better gains, and all of the hogs killed firm.