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DIVISION OF ANIMAL INDUSTRY

RICE BRAN FOR FATTENING HOGS



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†As of January 1, 1922.

*In cooperation with School of Veterinary Medicine, A. and M. College of Texas.

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RICE BRAN FOR FATTENING HOGS.

PART I

Feeding Value of Rice Bran When Fed in Various Combinations with Corn Chops and Tankage.

PART II

The Effect of Rice Bran, When Fed in Various Combinations with Corn Chops and Tankage, on the Condition of the Fat in the Carcass.

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RICE BRAN FOR FATTENING HOGS.

BY

D. W. WILLIAMS¹ AND O. E. McCONNELL.²

PART I

A REPORT OF THE FEEDING VALUE OF RICE BRAN, WHEN FED IN VARIOUS COMBINATIONS WITH CORN CHOPS AND TANKAGE, FOR FINISHING HOGS

This experiment was begun November 29, 1919, and continued for a period of seventy-five days, closing February 11, 1920.

HOGS USED

Ninety-four purebred Duroc-Jersey hogs were used in this experiment. Of this number, forty-four had been grazed on peanuts for a period of twenty-five days, their average weight being about 155 pounds. The others averaged about 125 pounds. Other than the grazing on peanuts, the feed and management of all the hogs had been as near the same as possible.

FEEDS USED

All the feeds used were dry, sound, and of good quality. Corn was ground in such quantities as would be fed in a short time. The percentage composition of feeds is shown in the following table:

Table 1. Percentage composition of feeds used.

Feeds	Protein	Fat	Crude fiber	Nitrogen free extract	Water	Ash
Rice bran.....	13.18	13.08	10.69	41.38	10.29	11.38
Corn chops.....	9.90	4.06	2.21	68.37	14.10	1.36
Meat meal tankage...	63.68	6.20	2.73	2.02	7.18	18.19
Tankage.....	59.25	6.43	2.78	4.00	8.40	19.14

(Analyses by Dr. G. S. Fraps, Station Chemist.)

METHODS OF PROCEDURE

All hogs were divided into two groups as follows:

Group 1

Those that had been grazed on peanuts for a period of twenty-five days. This group was divided into six lots, numbered 1 to 6, inclusive.

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² Animal Husbandman in charge of swine investigations, Division of Animal Industry; resigned October 1, 1920.

Group 2

Those that had not been grazed on peanuts. This group was divided into six lots, numbered 7 to 12, inclusive.

The two groups were fed the following rations:

- Lots 1 and 7. Corn chops 90 per cent, tankage 10 per cent.
- Lots 2 and 8. Rice bran 90 per cent, tankage 10 per cent.
- Lots 3 and 9. Corn chops 45 per cent, rice bran 45 per cent, tankage 10 per cent.
- Lots 4 and 10. Corn chops, rice bran, tankage, free choice self-feeder.
- Lots 5 and 11. Rice bran 60 per cent, corn chops 30 per cent, tankage 10 per cent.
- Lots 6 and 12. Rice bran 30 per cent, corn chops 60 per cent, tankage 10 per cent.

Each lot was fed in the hog barn, but allowed a small dry-lot run. The hogs were fed twice daily. The feeds for all lots were thoroughly mixed and fed as a thick slop, with the exception of Lots 4 and 10, which were fed with free choice self-feeders.

WEIGHINGS

Weighings were made on three successive days at the beginning of the experiment, and on three successive days at the end of the experiment. The average of each of these weighings was considered the initial and final weights, respectively. Weighings were also made on each tenth day during the experiment.

It was necessary to remove one hog from Lot 5 on December 12 on account of prolapsed rectum, and one from Lot 11 on December 8 on account of hernia. Corrections were made so that each of these lots was considered as having one hog less than the others from the beginning of the experiment.

The following table is a summary of the test:

Table 2. Summary of test.

Lot No.	No. Fed	Ration fed	Average initial weight	Average final weight	Average gain per head	Average daily gain	Feed per 100 lbs. gain	
							Kinds, pounds	Total Lbs.
1	7	Corn chops 90%	158	298	140	1.86	Corn chops... 401.4 Tankage... 44.6	446
7	8	Tankage 10%	127.5	256	128.5	1.70	Corn chops... 375.3 Tankage... 41.7	417
2	7	Rice bran 90%	155	253	98	1.28	Rice bran... 449.1 Tankage... 49.9	499
8	8	Tankage 10%	126	217	91	1.21	Rice bran... 456.3 Tankage... 50.7	507
3	7	Corn chops 45% Rice bran 45%	158	270	112	1.49	Corn chops... 247 Rice bran... 247 Tankage... 55	549
9	8	Tankage 10%	126	252	126	1.68	Corn chops... 195.3 Rice bran... 195.3 Tankage... 43.4	434
4	7	Corn chops Rice bran Tankage	159	311	152	2.02	Corn chops... 506 Rice bran... 47 Tankage... 6	559
10	8	Free choice self-feeder	128	268	140	1.86	Corn chops... 491 Rice bran... 29.8 Tankage... 9.2	530
5	6	Corn chops 30% Rice bran 60%	160	281	121	1.60	Corn chops... 148.5 Rice bran... 297.0 Tankage... 49.5	495
11	7	Tankage 10%	131	240	109	1.44	Corn chops... 147.6 Rice bran... 295.2 Tankage... 49.2	492
6	7	Corn chops 60% Rice bran 30%	162	299	137	1.83	Corn chops... 282.6 Rice bran... 141.3 Tankage... 47.1	471
12	8	Tankage 10%	126	254	128	1.70	Corn chops... 253.8 Rice bran... 126.9 Tankage... 42.3	423

DISCUSSION OF RESULTS

Rice bran, when fed alone with tankage, was not a satisfactory ration as shown by the rates of gain of Lots 2 and 8. The ration seemed to be unpalatable, was too bulky, and the pigs were often off feed. The cost of gains in these lots, however, was low because of the relatively high prices of the other feeds. It was also necessary to make a deduction of two cents per pound on all of the hogs from these two lots that were sold to Swift & Co., because the carcasses were graded as "soft."

In Lots 4 and 10, the fact that rice bran is unpalatable was also shown, since the hogs, when fed by the "free choice" method, consumed only five hundred pounds of rice bran in Lot 4 and 333.6 pounds in Lot 10, during the entire seventy-five-day period. Another point interesting to note is that Lot 10, averaging 128 pounds at the beginning of the test, consumed 102.8 pounds of tankage, whereas Lot 4, averaging 155 pounds at the beginning of the test, consumed only 65.2 pounds of tankage. This was expected, as the smaller hogs require more of protein feed. There was a considerable amount of feed wasted in Lots 4 and 10, which partly accounted for the greater cost of these gains. These two lots also used an excessive amount of corn so that they were decidedly "over

done" and should have been sold two or three weeks earlier. Gains, after hogs reach this condition, are usually expensive as shown by other tests.

Averaging the results of all the hogs fed the same ration, they ranked as follows, with reference to the amount of feed required per hundred pounds gain:

Lots 1 and 7.	Corn chops 90 per cent, tankage 10 per cent.	430.5 lbs.
Lots 6 and 12.	Corn chops 60 per cent, tankage 10 per cent, rice bran 30 per cent.	445.4 lbs.
Lots 3 and 9.	Corn chops 45 per cent, tankage 10 per cent, rice bran 45 per cent.	487.6 lbs.
Lots 5 and 11.	Corn chops 30 per cent, tankage 10 per cent, rice bran 60 per cent.	493.4 lbs.
Lots 2 and 8.	Rice bran 90 per cent, tankage 10 per cent.	504.0 lbs.
Lots 4 and 10.	Free choice feeding from self-feeders.	543.5 lbs.

The lots ranked as follows with reference to the average daily gains:

Lots 4 and 10.	1.934 lbs.
Lots 1 and 7.	1.774 lbs.
Lots 6 and 12.	1.760 lbs.
Lots 3 and 9.	1.591 lbs.
Lots 5 and 11.	1.507 lbs.
Lots 2 and 8.	1.240 lbs.

SUMMARY OF KILLING TEST

Three hogs from each lot were shipped to the United States Experiment Station at Beltsville, Maryland, while the others were sold to Swift & Co., Fort Worth, Texas. Details of the killing test are given in Part 2. The following is a summary:

Lots 1 and 7. Corn chops 90 per cent., tankage 10 per cent.: Swift, 9 hard; U. S., 6 hard.

Lots 2 and 8. Rice bran 90 per cent., tankage 10 per cent.: Swift, 9 soft; U. S., 4 hard, 2 slightly soft.

Lots 3 and 9. Corn chops 45 per cent., rice bran 45 per cent., tankage 10 per cent.: Swift, 8 hard, 1 soft; U. S., 6 hard.

Lots 4 and 10. Self-fed, corn chops, rice bran, and tankage: Swift, 9 hard; U. S., 6 hard.

Lots 5 and 11. Corn chops 30 per cent., rice bran 60 per cent., and tankage 10 per cent.: Swift, 4 hard, 2 soft; U. S., 6 hard.

Lots 6 and 12. Corn chops 60 per cent., rice bran 30 per cent., and tankage 10 per cent.: Swift, 7 hard, 1 soft; U. S., 6 hard.

It was noted by the Swift & Co. graders that the carcasses classed as "soft" were only slightly so, excepting Lots 2 and 8. The writers also inspected the carcasses of the hogs killed by Swift & Co. and could see but little difference in the carcasses, excepting those in Lots 2 and 8, which were appreciably softer than the others.

No difference could be detected between the lots, so far as the previous grazing period on peanuts was concerned. This indicates that peanuts could be used in the early stages of the fattening period without having a noticeably bad effect on the carcasses.

FINANCIAL STATEMENT

(a) *Debit.*

90 hogs, weight, 12,770 pounds, at \$12.50 per cwt.....	\$1,596.25
18,140.5 pounds rice bran, at \$1.80 per cwt.....	326.69
30,905.2 pounds corn chops, at \$2.86 per cwt.....	860.72
4,227.3 pounds tankage, at \$5.50 per cwt.....	232.50
One man's labor for two and one-half months at \$75 per month	187.50
Freight charges from College Station to Fort Worth, Texas...	48.15
Stock Yards Company charges.....	5.20
Feed at Fort Worth.....	5.00
Insurance .....	.35
Inspection .....	.15
Commission for selling.....	12.00
Deduction for fourteen soft hogs.....	71.72
Allowed freight charges from College Station to Washington, D. C.	40.00
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	\$3,416.98

(b) *Credit.*

52 hogs, Swift & Co., weight 13,249 pounds, at \$14.65 per cwt..	\$1,939.66
36 hogs, U. S. Experiment Station, weight 10,382 pounds, at \$14.65 per cwt.....	1,520.96
2 hogs, weight 250 pounds, at \$12.50 per cwt.....	31.25
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Total credit	\$3,491.87
Total debit	3,416.98
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Profit	\$ 74.89

PART II

A REPORT OF THE EFFECT OF RICE BRAN, WHEN FED IN VARIOUS COMBINATIONS WITH CORN CHOPS AND TANKAGE, ON THE CONDITION OF THE FAT IN THE CARCASS

(This test was carried on in connection with Part 1.)

METHOD OF PROCEDURE

The ninety-four hogs were divided into two groups. One group of forty-four, which had been grazed on peanuts for a period of twenty-five days, was divided into six lots, numbered 1 to 6, inclusive. The second group of fifty hogs, which had not been grazed on peanuts, was divided into six lots, numbered 7 to 12, inclusive. Two hogs from each group were killed at the beginning of the test. The carcasses were chilled for forty-eight hours and leaf and back fat samples were taken.

The lots were fed as follows:

- Lots 1 and 7. Corn chops 90 per cent., tankage 10 per cent.
- Lots 2 and 8. Rice bran 90 per cent., tankage 10 per cent.
- Lots 3 and 9. Corn chops 45 per cent., rice bran 45 per cent., tankage 10 per cent.
- Lots 4 and 10. Corn chops, rice bran, tankage, free choice self-feeder.
- Lots 5 and 11. Rice bran 60 per cent., corn chops 30 per cent., tankage 10 per cent.
- Lots 6 and 12. Rice bran 30 per cent., corn chops 60 per cent., tankage 10 per cent.

An analysis of the feeds and methods of feeding are shown in Part 1.

At the close of the test, three hogs from each lot were shipped to the United States Experiment Station at Beltsville, Maryland, where killing tests were conducted. The others were shipped to Fort Worth, Texas, and sold through the regular market channels to Swift & Co. After chilling for forty-four hours, leaf and back samples were taken from representatives carcasses of each lot; also notes were taken on the condition of the carcasses at the time. Samples from each carcass were taken from as near the same point as possible in the back and the leaf fat. The carcasses of the hogs killed by Swift & Co. were graded by two of their representatives. Those killed by the United States Experiment Station were graded by their inspectors.

The four hogs killed at the beginning of the experiment were all graded as hard. Those that had not been grazed on peanuts were slightly watery, however, owing to the fact that they were lighter in weight and were not in as high condition as those that were grazed on peanuts.

The following are the melting points of fat of the four hogs killed at the beginning of the experiment:

- No. 1, grazed on peanuts. leaf fat, 46.5° C., back fat, 41.9° C.
- No. 2, grazed on peanuts. leaf fat, 44.8° C., back fat, 43.8° C.
- No. 3, no peanuts. leaf fat, 44.9° C., back fat, 41.7° C.
- No. 4, no peanuts. leaf fat, 44.2° C., back fat, 38.3° C.

The following table shows for each lot the ration fed, the grading of the carcasses by Swift & Co. and by inspectors at the United States Experiment Station, and the melting points and iodine numbers of the back and leaf fat:

Table 3.

Lot No.	Feed	Pronounced by Inspector	Melting points C°		Iodine numbers	
			Back	Leaf	Back	Leaf
1	Corn chops 90%, Tankage 10%	S—Hard.....	39.2	41.0	59.5	56.9
		S—Hard.....	35.4	43.3	60.1	56.0
		S—Hard.....	39.6	.....	.....	.....
		S—Hard.....	.....	.....	.....	.....
		U. S.—Hard.....	37.4	39.4	.....	.....
		U. S.—Hard.....	33.0	40.8	.....	.....
7	Corn chops 90%, Tankage 10%	S—Hard.....	38.9	41.2	58.3	54.9
		S—Hard.....	37.9	41.5	60.3	54.2
		S—Hard.....	39.3	41.6	60.2	57.4
		S—Hard.....	36.9	40.2	58.8	56.0
		S—Hard.....	38.1	40.9	58.7	55.2
		U. S.—Hard.....	34.6	39.0	.....	.....
2	Rice bran 90%, Tankage 10%	S—Soft.....	38.2	37.9	70.7	65.6
		S—Soft.....	34.2	39.7	70.2	69.8
		S—Soft.....	38.4	36.3	63.2	63.5
		S—Soft.....	34.5	38.8	73.2	72.5
		U. S.—Hard.....	29.0	38.0	.....	.....
		U. S.—Hard.....	32.0	36.4	.....	.....
8	Rice bran 90%, Tankage 10%	U. S.—Hard.....	35.0	37.0	.....	.....
		S—Soft.....	37.7	.....	74.2	.....
		S—Soft.....	34.8	.....	70.1	.....
		S—Soft.....	35.6	40.6	59.7	69.1
		S—Soft.....	37.1	41.5	64.6	68.6
		S—Soft.....	38.7	40.3	59.3	63.1
3	Rice bran 45%, Corn chops 45%, Tankage 10%	U. S.—Slightly soft.....	33.0	39.0	.....	.....
		U. S.—Slightly soft.....	31.6	39.2	.....	.....
		U. S.—Hard.....	32.0	36.4	.....	.....
		S—Hard.....	33.3	39.3	67.1	63.1
		S—Hard.....	36.8	40.2	65.0	59.2
		S—Hard.....	39.1	41.2	63.2	60.6
9	Rice bran 45%, Corn chops 45%, Tankage 10%	S—Hard.....	33.8	.....	52.0	.....
		S—Hard.....	34.0	38.2	.....	.....
		U. S.—Hard.....	39.4	39.2	.....	.....
		S—Hard.....	33.6	37.1	73.3	64.6
		S—Hard.....	37.7	41.7	63.7	62.0
		S—Hard.....	35.4	41.0	63.4	61.0
4	Free choice self-feeder, Rice bran, Corn chops, Tankage	S—Hard.....	36.5	40.2	57.2	62.0
		S—Soft.....	37.1	41.5	65.1	60.3
		U. S.—Hard.....	35.2	39.2	.....	.....
		U. S.—Hard.....	36.8	39.0	.....	.....
		U. S.—Hard.....	.....	.....	.....	.....
		U. S.—Hard.....	.....	.....	.....	.....
10	Free choice self-feeder, Rice bran, Corn chops, Tankage	S—Hard.....	37.8	42.1	63.9	58.0
		S—Hard.....	36.0	39.9	65.1	60.8
		S—Hard.....	39.7	42.4	62.8	56.1
		S—Hard.....	37.1	42.1	62.7	60.9
		U. S.—Hard.....	38.4	40.4	.....	.....
		U. S.—Hard.....	36.8	39.0	.....	.....
5	Corn chops 30%, Rice bran 60%, Tankage 10%	U. S.—Hard.....	39.6	39.6	.....	.....
		S—Hard.....	.....	41.3	.....	54.7
		S—Hard.....	41.2	42.1	59.6	55.2
		S—Hard.....	38.5	43.0	62.2	56.4
		S—Hard.....	39.4	43.1	58.8	55.9
		S—Hard.....	33.5	42.0	62.4	56.2
5	Corn chops 30%, Rice bran 60%, Tankage 10%	U. S.—Hard.....	32.6	42.0	.....	.....
		U. S.—Hard.....	35.0	39.0	.....	.....
		U. S.—Hard.....	35.0	39.0	.....	.....
		U. S.—Hard.....	36.4	41.2	.....	.....
		S—Hard.....	38.1	41.9	65.9	65.0
		S—Soft.....	35.6	42.6	68.1	64.0
5	Corn chops 30%, Rice bran 60%, Tankage 10%	S—Soft.....	30.2	39.5	68.6	66.0
		U. S.—Hard.....	33.6	38.0	.....	.....
		U. S.—Hard.....	33.4	37.0	.....	.....
		U. S.—Hard.....	33.4	37.0	.....	.....
		U. S.—Hard.....	34.2	40.2	.....	.....
		U. S.—Hard.....	.....	.....	.....	.....

Table 3.

Lot No.	Feed	Pronounced by Inspector	Melting points C°		Iodine numbers	
			Back	Leaf	Back	Leaf
11	Corn chops 30%, Rice bran 60%, Tankage 10%	S—Hard	34.8	.....	65.3	.....
		S—Hard	37.5	41.3	64.6	57.1
		S—Hard	38.9	41.2	63.0	58.4
		S—Soft	38.0	40.4	57.5	60.7
		U. S.—Hard	28.6	40.2	.....	.....
		U. S.—Hard	35.4	40.2	.....	.....
		U. S.—Hard	35.2	39.4	.....	.....
6	Corn chops 60%, Rice bran 30%, Tankage 10%	S—Soft	40.5	39.8	62.3	64.3
		S—Hard	37.9	39.7	64.0	62.9
		S—Hard	34.8	39.0	56.8	63.3
		U. S.—Hard	32.2	39.4	.....	.....
		U. S.—Hard	35.4	40.2	.....	.....
		U. S.—Hard	34.4	37.2	.....	.....
		U. S.—Hard	34.4	40.2	.....	.....
12	Corn chops 60%, Rice bran 30%, Tankage 10%	S—Hard	37.3	40.4	61.5	58.0
		S—Hard	37.0	40.9	64.5	59.0
		S—Hard	38.8	41.6	59.2	58.2
		S—Hard	36.0	40.1	59.3	59.5
		S—Hard	.....	41.5	.....	58.3
		U. S.—Hard	36.2	39.2	.....	.....
		U. S.—Hard	33.4	39.2	.....	.....
		U. S.—Hard	36.4	37.0	.....	.....
		U. S.—Hard	36.4	37.0	.....	.....

S—Swift & Company.

U. S.—United States Experiment Station.

The iodine numbers were not reported by the United States Experiment Station.

Table 4. Summary showing average melting points and iodine numbers.

Lot No.	Average melting points						Average iodine numbers	
	Back S	Back U. S.	Back Total	Leaf S	Leaf U. S.	Leaf Total	Back	Leaf
1.....	38.06	36.13	37.10	42.15	39.40	40.50	59.80	56.45
7.....	38.22	37.60	37.98	41.08	40.86	41.00	59.26	55.54
2.....	36.32	32.00	34.47	38.17	37.13	37.72	69.32	67.85
8.....	36.78	32.20	35.06	40.80	38.20	39.50	65.58	66.93
3.....	35.75	36.70	36.06	40.23	38.70	39.62	61.82	60.96
9.....	36.06	36.00	36.04	40.30	39.10	39.95	64.54	61.98
4.....	37.65	38.26	37.91	41.62	39.66	40.78	63.62	58.95
10.....	38.15	34.66	36.65	42.30	40.73	41.71	60.75	55.68
5.....	34.63	33.73	34.18	41.33	38.40	39.85	67.53	65.00
11.....	37.30	33.06	35.48	40.96	39.93	40.45	62.60	58.73
6.....	37.73	34.00	35.85	39.50	39.00	39.25	61.03	63.50
12.....	37.27	35.33	36.44	40.90	38.46	39.98	61.12	58.60

S—Hogs sold to Swift & Company.

U. S.—Hogs sold to U. S. Experiment Station.

Melting points and iodine numbers for hogs killed by Swift & Company, furnished by Dr. G. S. Fraps, State Chemist.

SUMMARY OBSERVATIONS.

1. It was reported by the inspector at the United States Experiment Station at Beltsville, Maryland, that all of the carcasses graded hard except two in Lot 8 (fed ninety parts rice bran and ten parts tankage). These graded slightly soft.

2. Of the fifty-two head graded by Swift & Co., thirty-eight were hard and fourteen were soft. The fourteen soft carcasses graded by Swift & Co. were from lots as follows:

Lots 2 and 8, nine head, all soft.

Lot 5, two soft, one hard.

Lot 11, fed the same as Lot 5, except that they had not been grazed on peanuts, one soft, three hard.

Lot 6, one soft, three hard.

Lot 9, four hard, one soft. The comment was made by the inspector that the soft carcasses were "very close."

All the other hogs in this test were graded as hard.

3. A deduction of two cents per pound was made on all carcasses that were graded soft, although none were graded lower than medium hard. There was no tendency toward running together or dripping fat in any carcasses, and the fat in each carcass was a clear white, so there could have been no discrimination for dark color as in peanut and mast-fed hogs.

4. From the test, it appears that rice bran can be fed safely with equal parts of corn chops and 10 per cent. tankage, and in all probability can be fed in as high a proportion as 60 per cent. without having the carcasses graded soft.

5. The fact that one group of these hogs was grazed on peanuts for a short period before they were put on feed apparently did not affect the carcasses.