

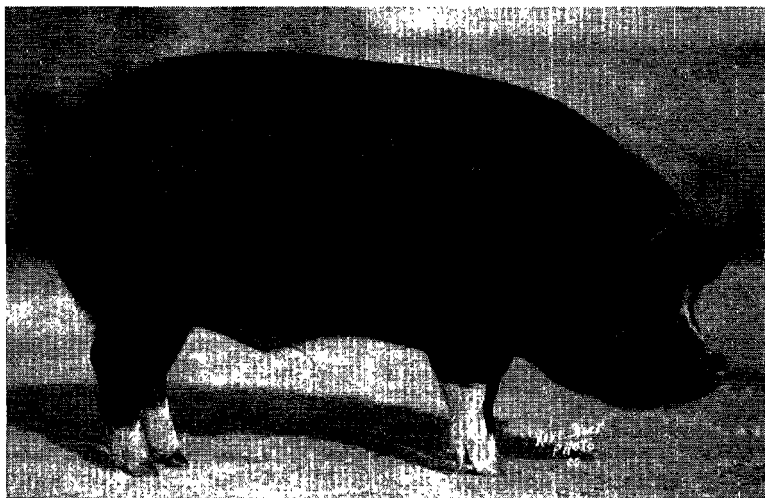
# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE COLLEGE OF AGRICULTURE  
AND APPLIED SCIENCE

MANHATTAN, KANSAS

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DEPARTMENT OF ANIMAL HUSBANDRY



BERKSHIRE BARROW, K. S. C. STANDARD

*Grand Champion Over All Breeds, International Livestock Show, 1929.  
Fitted and Shown by Kansas State College.*

## SWINE FEEDING INVESTIGATIONS, 1926 TO 1930<sup>1</sup>

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Three swine-feeding problems studied by the Kansas Agricultural Experiment Station from 1926 to 1930 are reported in this circular: (I) The relative value of various protein supplements and protein supplementary mixtures for fattening swine. (II) Corn versus atlas sorgo for hogs. (III) Alfalfa pasture feeding versus dry-lot feeding for fattening spring pigs.

In each of the tests securing information on these problems the pigs used were weighed individually at the same hour on three successive days at the beginning and end of the test. The average of the three weights at the beginning was used as the initial weight in

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1. Contribution No. 127 from the Department of Animal Husbandry.

each case, and the average of the three weights at the end as the final weight. The pigs used were sorted carefully in order that each lot in a given test should be as uniform as possible in type, weight, sex, quality, age, and breeding.

## I. THE RELATIVE VALUE OF VARIOUS PROTEIN SUPPLEMENTS AND PROTEIN SUPPLEMENTARY MIXTURES FOR FATTENING SWINE

Protein supplements are essential to profitable pork production, whether it be the maintenance of the breeding herd, growing the pigs, or fattening pigs for market. Previous tests at this station have shown the advantage and profitableness of feeding tankage as a protein supplement with corn or other grains when pigs are fed in the dfry lot or on pasture. Since the price of tankage is usually much higher than other protein supplementary feeds, there is a tendency on the part of many to believe that tankage is too expensive to feed or that other protein supplemental feeds may be substituted because they are cheaper in price.

The prevalence of this opinion prompted a series of experiments designed to answer questions pertaining to the substitution for tankage of various other feeds, and mixtures of feeds, high in protein.

Five swine-feeding problems comprised this series of experiments which were studied at this station from 1926 to 1930: 1. Tankage versus cottonseed meal and linseed meal. 2. Tankage versus tankage and shorts fed as a slop. 3. Tankage versus corn gluten meal. 4. Tankage and alfalfa hay versus various supplementary protein feed mixtures. 5. High protein content tankage versus low protein content tankage.

### 1. TANKAGE VERSUS COTTONSEED MEAL AND LINSEED MEAL

Many inquiries have been received regarding the possibility of substituting cottonseed meal and linseed meal partly or wholly for tankage as a protein supplement for hogs when self-fed corn. Studies pertaining to two problems in connection with these meals are reported in this circular. One problem concerns the substitution wholly or partly of these feeds for tankage when mixed or fed singly, and the other problem is concerned with the value of supplementing the cottonseed meal with minerals.

Two tests pertain to the first problem, that is, the relative value of tankage and linseed meal and cottonseed meal when they are fed singly or mixed with each other.

*First Test.*—The first of these tests was conducted during the summer of 1926. The pigs had free access to alfalfa pasture and were self-fed corn and a protein supplement. The results are reported in detail in Table I.

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TABLE I.—TANKAGE VERSUS COTTONSEED MEAL AND LINSEED MEAL FOR FATTENING PIGS SELF-FED CORN ON ALFALFA PASTURE.

(June 16 to October 8, 1928—110 days)

RATION.	Corn (self-fed), alfalfa pasture.			
	Tankage (self-fed).	Cottonseed meal (self-fed).	Tankage $\frac{1}{2}$ , cottonseed meal $\frac{1}{2}$ (self-fed).	Linseed meal $\frac{1}{2}$ , cottonseed meal $\frac{1}{2}$ (self-fed).
Lot No. ....	1	2	3	4
Number of pigs per lot. ....	10	10	10	10
Av. initial weight per pig. ....	<i>Pounds.</i> 61.90	<i>Pounds.</i> 61.40	<i>Pounds.</i> 61.43	<i>Pounds.</i> 61.67
Av. final weight per pig. ....	221.73	160.97	219.53	187.53
Av. total gain per pig. ....	159.83	99.57	158.10	125.86
Av. daily gain per pig. ....	1.45	.91	1.44	1.14
Av. daily ration per pig:				
Corn. ....	4.59	3.45	4.39	3.95
Tankage. ....	.40		.25	
Cottonseed meal. ....		.40	.25	.23
Linseed meal. ....				.23
Feed required for 100 pounds gain:				
Corn. ....	315.96	381.64	305.19	345.62
Tankage. ....	27.84		17.71	
Cottonseed meal. ....		43.74	17.71	19.82
Linseed meal. ....				19.82

Observations

1. The daily gains in lot 2 where cottonseed meal was fed as a protein supplement were only approximately 60 percent as great as those in the lot where tankage was fed. Furthermore, it required 65 pounds more corn and 15.5 pounds more cottonseed meal to produce 100 pounds of gain than it did tankage in the lot where tankage was fed.

2. The daily gains in lot 3, receiving tankage and cottonseed meal half and half, were about as satisfactory as those in lot 1, where the protein supplement consisted of tankage alone. The feed requirements to produce 100 pounds of gain in lot 3 were quite satisfactory when compared with the requirements in lot 1.

3. Linseed meal and cottonseed meal half and half in lot 4 proved to be less satisfactory as a protein supplement than either tankage alone or tankage and cottonseed meal half and half.

4. No ill effects were observed from feeding the cottonseed meal in this experiment.

*Second Test.*—The second test comparing the relative value of tankage, cottonseed meal, and linseed meal as protein supplements for pigs self-fed corn was conducted during the summer of 1930. These pigs also had free access to alfalfa pasture and were self-fed their protein supplement. The results in detail are given in Table II.

TABLE II.—TANKAGE VERSUS COTTONSEED MEAL AND LINSEED MEAL FOR FATTENING PIGS SELF-FED CORN ON ALFALFA PASTURE.

(June 18 to October 16, 1930—120 days)

RATION	Corn (self-fed), alfalfa pasture.			
	Tankage (self-fed).	Tankage $\frac{2}{3}$ and linseed meal $\frac{1}{3}$ (self-fed).	Tankage $\frac{1}{2}$ and linseed meal $\frac{1}{2}$ (self-fed).	Tankage $\frac{1}{4}$ and cottonseed meal $\frac{3}{4}$ (self-fed).
Lot No. ....	1	2	3	4
Number of pigs per lot. ....	10	10	9	10
Av. initial weight per pig. ....	<i>Pounds.</i> 56.50	<i>Pounds.</i> 56.67	<i>Pounds.</i> 57.87	<i>Pounds.</i> 56.87
Av. final weight per pig. ....	237.83	237.98	226.48	249.50
Av. total gain per pig. ....	181.33	181.26	168.81	192.63
Av. daily gain per pig. ....	1.51	1.51	1.41	1.61
Av. daily ration per pig:				
Corn. ....	4.66	4.41	4.16	4.60
Tankage. ....	.25	.20	.09	.19
Linseed meal. ....		.10	.09	
Cottonseed meal. ....				.19
Feed required for 100 pounds gain:				
Corn. ....	308.55	292.23	295.89	286.25
Tankage. ....	16.71	13.21	6.52	11.48
Linseed meal. ....		6.60	6.52	
Cottonseed meal. ....				11.48

Observations

1. A protein mixture of one part linseed meal and two parts tankage fed to pigs on alfalfa pasture failed to produce more rapid daily gains. The amount of concentrates consumed per unit of gain was slightly less than in lot 1, where tankage alone was the supplement.

2. When the linseed meal was increased in the mixture to an equal amount with tankage (lot 3) the average daily gain was reduced, but the cost for 100 pounds of gain was only slightly less than when two parts, of tankage and one part of linseed meal were fed.

3. As more linseed meal was added to the mixture less feed was consumed daily. It would seem, therefore, that with more linseed meal in the mixture it was less palatable and the appetite was less keen.

4. The cottonseed meal and tankage mixture was eaten in larger amounts than the other supplements. Also, the amount of corn consumed was nearly as great. It would seem, therefore, that this mixture was the most palatable of all the supplements fed.

Conclusions

It appears from a study of these tests that—

1. Cottonseed meal alone is decidedly inferior to tankage as a protein supplement for fattening pigs self-fed corn on alfalfa pasture.

2. Hogs receiving a protein supplement of tankage and cottonseed meal half and half make as satisfactory daily gains and as efficient utilization of feed for 100 pounds gain as hogs that receive tankage alone.

3. Hogs receiving a protein supplement consisting of tankage and linseed meal half and half will not make as rapid gains or as high a degree of finish as hogs receiving a protein supplement consisting of tankage alone. However, if the linseed meal in a mixture with tankage is decreased to 1/3 linseed meal and 2/3 tankage the daily gains and feed for 100 pounds gain are as satisfactory as when the protein supplement is tankage alone.

The second problem concerning the relative efficiency of tankage and cottonseed meal when fed with minerals was studied in two tests.

*First Test.*—This test was conducted during the winter of 1927, when the pigs were self-fed corn in the dry lot. The pigs were self-fed their protein supplement and minerals. The test is reported in detail in Table III.

TABLE III.—TANKAGE VERSUS COTTONSEED MEAL SUPPLEMENTED WITH MINERALS FOR FATTENING PIGS SELF-FED CORN AND ALFALFA HAY IN A DRY LOT.  
 (January 7 to May 7, 1927—120 days)

RATION.	Corn (self-fed), alfalfa hay (self-fed).				
	Tankage (self-fed).	Cottonseed meal (self-fed).	Cottonseed meal, bone meal (self-fed).	Cottonseed meal, ground limestone (self-fed).	Cottonseed meal, ground limestone, bone meal (self-fed).
Lot No.....	1	2	3	4	5
Number of pigs per lot.....	8	8	8	8	8
Av. initial weight per pig.....	Pounds. 72.25	Pounds. 72.29	Pounds. 72.71	Pounds. 72.08	Pounds. 71.46
Av. final weight per pig.....	262.70	227.38	253.71	224.83	234.67
Av. total gain per pig.....	190.45	155.09	181.00	152.75	163.21
Av. daily gain per pig.....	1.59	1.25	1.51	1.27	1.36
Av. daily ration per pig:					
Corn.....	6.13	5.17	5.77	5.27	5.22
Tankage.....	.82				
Cottonseed meal.....		.49	.49	.49	.49
Alfalfa hay.....	.47	.82	.71	.57	.54
Bone meal (ounces).....			.25		.13
Ground limestone (ounces).....				.25	.13
Feed required for 100 pounds gain:					
Corn.....	385.93	400.17	382.32	413.91	383.86
Tankage.....	19.93				
Cottonseed meal.....		37.56	32.18	38.13	35.69
Alfalfa hay.....	29.37	63.07	47.17	44.84	39.52
Bone meal (ounces).....			16.57		9.19
Ground limestone (ounces).....				19.64	9.19

Observations

1. From the standpoint of both rapidity and economy of gains, cottonseed meal proved unsatisfactory as a protein substitute for tankage when fed with corn to hogs having free access to alfalfa hay. (Lots 1 and 2.)
2. From the standpoint of both rapidity and economy of gains, cottonseed meal plus bone meal, which is rich in lime and phosphorus, proved satisfactory as a protein substitute for tankage when each was fed with corn to hogs having free access to alfalfa hay. (Lots 1 and 3.)
3. Finely ground limestone proved unsatisfactory as a substitute for bone meal for the purpose of making cottonseed meal as good a protein supplement as tankage when each was fed with corn to hogs having free access to alfalfa hay. (Lots 3, 4, and 5.)
4. Since tankage contains approximately 50 percent more protein than cottonseed meal, a proportionately larger amount of the latter was utilized as a protein supplement.

*Second Test.*—The second test comparing tankage and cottonseed meal supplemented with minerals was conducted during the summer of 1927. The pigs in this test had free access to alfalfa pasture, whereas the pigs in the first test were fed in the dry lot with free access to alfalfa hay. Otherwise the rations were the same in both tests. The results in detail are given in Table IV.

TABLE IV.—TANKAGE VERSUS COTTONSEED MEAL SUPPLEMENTED WITH MINERALS FOR FATTENING PIGS SELF-FED CORN ON ALFALFA PASTURE.

(June 28 to October 26, 1927—120 days)

RATION.	Corn (self-fed), alfalfa pasture.				
	Tankage (self-fed).	Cottonseed meal, (self-fed).	Cottonseed meal, bone meal (self-fed).	Cottonseed meal, ground limestone (self-fed).	Cottonseed meal, ground limestone, bone meal (self-fed).
Lot No. ....	1	2	3	4	5
Number of pigs per lot. ....	8	8	8	8	8
Av. initial weight per pig. ....	<i>Pounds.</i> 44.90	<i>Pounds.</i> 44.70	<i>Pounds.</i> 46.30	<i>Pounds.</i> 45.80	<i>Pounds.</i> 45.30
Av. final weight per pig. ....	214.80	192.40	202.10	190.50	215.50
Av. total gain per pig. ....	169.90	147.70	155.80	144.70	170.20
Av. daily gain per pig. ....	1.42	1.23	1.30	1.21	1.42
Av. daily ration per pig:					
Corn. ....	4.78	3.99	4.57	4.01	4.42
Tankage. ....	.24				
Cottonseed meal. ....		.36	.36	.36	.36
Bone meal (ounces). ....			.25		.13
Ground limestone (ounces). ....				.25	.13
Feed required for 100 pounds gain:					
Corn. ....	337.91	324.12	351.99	332.65	311.77
Tankage. ....	16.81				
Cottonseed meal. ....		29.49	27.96	30.10	25.59
Bone meal (ounces). ....			19.26		8.81
Ground limestone (ounces). ....				20.73	8.81

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Observations

1. Cottonseed meal proved to be less satisfactory from the standpoint of daily gains and finish than tankage when fed as a protein supplement with corn. (Lots 1 and 2.)

2. Feeding either bone meal or ground limestone with cottonseed meal did not increase the value of the meal materially from the standpoint of cost of gains when fed to hogs on alfalfa pasture. (Lots 2, 3, and 4)

3. The addition of a combination of bone meal and ground limestone to cottonseed meal increased its value from the standpoint of both rapidity and economy of gains when fed to hogs on alfalfa pasture. (Lots 2 and 5.)

Conclusions

These experiments seem to indicate that cottonseed meal is a more valuable protein supplement for corn as a hog feed when hogs have access to alfalfa pasture than when they have access to alfalfa hay.

There were no ill effects observed from the use of cottonseed meal in these experiments.

2. TANKAGE VERSUS TANKAGE AND SHORTS FED AS A SLOP

A ration of corn, tankage, and alfalfa hay has proved in previous tests at this station to be well-balanced for fattening pigs in the dry lot. However, much comment has been made concerning the advisability of feeding a shorts slop to pigs that are being fattened for market. Consequently, a test was conducted during the winter

TABLE V.—TANKAGE SELF-FED VERSUS TANKAGE AND SHORTS FED AS A SLOP FOR FATTENING PIGS SELF-FED CORN AND ALFALFA HAY IN A DRY LOT.

(October 15, 1928, to January 3, 1929—80 days)

RATION.	Corn (self-fed), alfalfa hay (self-fed).	
	Tankage and shorts (fed as slop).	Tankage (self-fed).
Lot No. ....	1	2
Number of pigs per lot. ....	10	10
Av. initial weight per pig. ....	<i>Pounds.</i> 114.73	<i>Pounds.</i> 114.93
Av. final weight per pig. ....	269.63	286.30
Av. total gain per pig. ....	154.90	171.37
Av. daily gain per pig. ....	1.94	2.14
Av. daily ration per pig.		
Corn. ....	6.75	8.00
Tankage (self-fed in Lot 2). ....	.40	.75
Shorts. ....	1.00	.....
Alfalfa hay. ....	.14	.14
Feed required for 100 pounds gain:		
Corn. ....	348.84	373.37
Tankage (self-fed in Lot 2). ....	20.66	35.23
Shorts. ....	51.65	.....
Alfalfa hay. ....	7.07	6.33

of 1928-'29 to get information on this. The pigs of lot 1 each received daily four tenths of a pound of tankage with one pound of shorts mixed into a slop hand-fed once each day. In addition, they had free access to corn and alfalfa hay. The pigs in lot 2 were self-fed free choice corn, tankage, and alfalfa hay. The results are given in detail in Table V.

**Observations**

1. A ration of corn, tankage, and alfalfa hay, all self-fed, produced a greater daily gain than a ration of corn and alfalfa hay, both self-fed, and tankage and shorts, hand-fed, as a slop.
2. At no time during the feeding period did the slop-fed pigs gain more than the tankage-fed pigs.
3. Slop feeding required more labor and would make the cost of gains greater. The cost of labor was not included in this experiment.

**3. TANKAGE VERSUS CORN GLUTEN MEAL**

Many inquiries have been received regarding the relative value of tankage and corn gluten meal. This meal has become increasingly available the last few years to hog feeders. It is a protein feed which contains about 43 percent protein. One of the two tests reported in this circular was conducted in the dry lot during the winter months, and the other on alfalfa pasture during the summer. The protein supplements were self-fed.

**TABLE VI.—TANKAGE VERSUS CORN GLUTEN MEAL FOR FATTENING PIGS SELF-FED CORN AND ALFALFA HAY IN A DRY LOT.**

(January 19 to April 19, 1929—90 days)

RATION.	Corn (self-fed), alfalfa hay (self-fed).		
	Tankage (self-fed).	Corn gluten meal, (self-fed).	Corn gluten meal, bone meal (self-fed).
Lot No.....	1	2	3
Number of pigs per lot.....	23	22	21
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Av. initial weight per pig.....	72.19	71.76	72.20
Av. final weight per pig.....	176.98	116.74	117.78
Av. total gain per pig.....	104.79	44.98	45.58
Av. daily gain per pig.....	1.16	.50	.51
Av. daily ration per pig:			
Corn.....	4.47	3.05	3.03
Tankage.....	.33		
Corn gluten meal.....		.30	.29
Bone meal (ounces).....			.16
Alfalfa hay.....	.46	.50	.45
Feed required for 100 pounds gain:			
Corn.....	383.55	609.56	598.66
Tankage.....	27.91		
Corn gluten meal.....		60.76	57.04
Bone meal (ounces).....			31.20
Alfalfa hay.....	39.62	99.73	89.27



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*First Test.*—The first of these tests was conducted during the winter of 1929. These pigs had free access to corn and alfalfa hay. The results are reported in detail in Table VI.

Observations

1. In this experiment corn gluten meal proved to be unsatisfactory as a supplement to corn for fattening pigs in a dry lot from the standpoint of daily gain, finish, and cost of gain.
2. The lot fed tankage produced over twice the daily gain of either the lots fed corn gluten.
3. The addition of bone meal to corn gluten meal did not increase the daily gain materially, but decreased slightly the amount of feed required for 100 pounds gain.

*Second Test.*—The second test studying the value of corn gluten meal when compared with tankage was conducted during the summer of 1929. The pigs in this experiment were self-fed corn on alfalfa pasture and the protein supplements were self-fed. The results in detail are given in Table VII.

TABLE VII.—TANKAGE VERSUS CORN GLUTEN MEAL FOR FATTENING PIGS SELF-FED CORN ON ALFALFA PASTURE.

(June 6 to October 14, 1929—180 days)

RATION.	Corn (self-fed), alfalfa pasture.			
	Tankage (self-fed).	Corn gluten meal (self-fed).	Corn gluten meal, bone meal (self-fed).	Corn gluten meal 60%, tankage 40% (self-fed).
Lot No. ....	1	2	3	4
Number of pigs per lot. ....	8	9	10	9
Av. initial weight per pig. ....	<i>Pounds.</i> 63.92	<i>Pounds.</i> 62.70	<i>Pounds.</i> 63.93	<i>Pounds.</i> 62.52
Av. final weight per pig. ....	270.04	236.22	260.03	258.19
Av. total gain per pig. ....	206.12	173.52	196.10	195.67
Av. daily gain per pig. ....	1.59	1.33	1.51	1.51
Av. daily ration per pig:				
Corn. ....	5.88	4.96	5.17	5.22
Tankage. ....	.24			.12
Corn gluten meal. ....		.35	.36	.19
Bone meal. ....			.02	
Feed required for 100 pounds gain:				
Corn. ....	370.69	371.77	342.43	347.13
Tankage. ....	14.96			7.97
Corn gluten meal. ....		25.93	24.12	12.76
Bone meal. ....			1.27	

**Observations**

1. Corn gluten meal proved to be less satisfactory from the standpoint of daily gains and finish than tankage when each was fed alone as a protein supplement with corn on alfalfa pasture. (Lots 1 and 2.)
2. Feeding bone meal with the corn gluten meal increased its value materially from the standpoint of daily gains and finish when fed to hogs on alfalfa pasture. (Lots 2 and 3.)
3. The addition of tankage to the corn gluten meal (40 percent tankage, 60 percent corn gluten meal) proved to be no more satisfactory than the addition of bone meal from the standpoint of daily gains and finish. (Lots 3 and 4.)

**Conclusions**

1. These experiments seem to indicate that corn gluten meal is a more valuable protein supplement for corn as a hog feed when hogs have access to alfalfa pasture than when they have access to alfalfa hay. In fact, the pigs receiving corn gluten meal and alfalfa hay became so unthrifty that the experiment was discontinued at the end of 90 days. (Table VI.)
2. Compared with the gains made with corn and tankage, corn and corn gluten meal proved to be a fairly satisfactory supplement for hogs on alfalfa pasture.

**4. TANKAGE AND ALFALFA HAY VERSUS VARIOUS SUPPLEMENTARY PROTEIN FEED MIXTURES**

Many experiments at this and other stations have shown the worth of feeding protein to swine. Tankage as a supplement fed with corn or other grains was an early recommendation in swine feeding. Later experiments demonstrated that the addition of alfalfa hay, free choice, improved the corn and tankage ration when pigs were self-fed in the dry lot. As a result, the Kansas Experiment Station referred to such a ration as the Kansas Standard fattening ration. The recognition of an improvement in the tankage alone ration by adding alfalfa hay paved the way to the use of more complex mixtures, for many believed that a protein supplement should be a mixture of several high-protein-content feeds.

In the last few years much has been said of such complex protein mixtures as substitutes for a tankage alone supplement. Consequently this station instituted an experiment to demonstrate the effectiveness of more complex protein supplements when compared with the standard protein supplement of tankage and alfalfa hay, free choice. The mixtures were made up of different proportions of tankage, cottonseed meal, linseed meal, and alfalfa meal.

This experiment was conducted in the winter of 1930 with pigs self-fed corn in the dry lot. All protein supplements were self-fed. The detailed results follow in Table VIII.

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TABLE VIII.—TANKAGE AND ALFALFA HAY VERSUS VARIOUS SUPPLEMENTARY PROTEIN MIXTURES FOR FATTENING PIGS SELF-FED CORN IN DRY LOT.

(January 19 to May 19, 1930—120 days)

RATION.	Corn (self-fed).				
	Tankage alfalfa hay (self-fed).	Tankage 50%, linseed meal 25%, alfalfa meal 25% (self-fed).	Tankage 50%, cottonseed meal 25%, alfalfa meal 25% (self-fed).	Tankage 75%, alfalfa meal 25% (self-fed).	Tankage 90%, alfalfa meal 10% (self-fed).
Lot No.....	1	2	3	4	5
Number of pigs per lot.....	9	9	10	10	10
Av. initial weight per pig.....	<i>Pounds.</i> 72.11	<i>Pounds.</i> 71.45	<i>Pounds.</i> 70.73	<i>Pounds.</i> 70.37	<i>Pounds.</i> 70.40
Av. final weight per pig.....	277.63	285.07	282.33	274.50	267.20
Av. total gain per pig.....	205.52	213.59	211.60	204.13	196.80
Av. daily gain per pig.....	1.71	1.78	1.76	1.70	1.64
Av. daily ration per pig:					
Corn.....	6.26	6.67	6.59	6.60	6.18
Tankage.....	.48	.32	.31	.29	.47
Linseed meal.....		.16			
Cottonseed meal.....			.15		
Alfalfa meal.....		.16	.15	.10	.05
Alfalfa hay.....	.91				
Feed required for 100 pounds gain:					
Corn.....	365.42	375.01	373.77	388.14	376.63
Tankage.....	28.00	17.83	17.18	16.56	28.53
Linseed meal.....		8.92			
Cottonseed meal.....			8.59		
Alfalfa meal.....		8.92	8.59	5.52	3.17
Alfalfa hay.....	53.90				

Observations

1. The differences in gains were small and scarcely significant.
2. The lots (2 and 3) receiving the greater variety of protein supplements made a slightly greater daily gain.
3. In this experiment the lot (3) fed cottonseed meal required slightly less feed to produce a unit of gain than the lot (2) fed linseed meal, and the gains of the two lots were practically equal.
4. A protein mixture of tankage 75 percent and alfalfa meal 25 percent (lot 4), self-fed, produced the same daily gain as tankage and alfalfa hay self-fed separately (lot 1), although more corn was consumed per unit of gain. A saving resulted, however, through the consumption of less tankage and alfalfa hay.
5. A protein mixture of tankage 90 percent and alfalfa meal 10 percent (lot 5) produced less gain than tankage and alfalfa hay (lot 1).
6. In this experiment, when a protein mixture of tankage 75 percent and alfalfa meal 25 percent (lot 4) was changed to a mixture of tankage 90 percent and alfalfa meal 10 percent (lot 5), the daily gain was decreased and the corn required per unit of gain was decreased as compared with tankage and alfalfa hay self-fed (lot 1).

**5. HIGH PROTEIN CONTENT TANKAGE VERSUS LOW PROTEIN CONTENT TANKAGE**

The tankage most generally recommended for swine feeding has been the so-called digester tankage, which contains about 60 percent protein. In recent years tankages of lower protein content have been coming on the market, and because they sell for less money than the higher protein content tankages, hog feeders have been inclined to purchase them because they believe that they are as valuable pound for pound as the higher priced standard digester brands.

The prevalence of this opinion prompted a test for the purpose of securing definite information on this matter.

This test was conducted in the spring of 1930 and was carried on with fattening pigs self-fed corn and alfalfa hay in the dry lot. The pigs also had free access to good quality alfalfa hay. The results are given in detail in Table IX.

**TABLE IX.—SIXTY-ONE PERCENT PROTEIN TANKAGE VERSUS FORTY-EIGHT PERCENT PROTEIN TANKAGE FOR FATTENING PIGS SELF-FED CORN AND ALFALFA HAY IN A DRY LOT.**

(February 18 to June 18, 1930—120 days)

RATION.	Corn (self-fed), alfalfa hay (self-fed).	
	61% tankage (hand-fed).	48% tankage (hand-fed).
Lot No.....	1	2
Number of pigs per lot.....	5	5
Av. initial weight per pig.....	<i>Pounds,</i> 74.40	<i>Pounds,</i> 74.60
Av. final weight per pig.....	287.18	270.93
Av. total gain per pig.....	212.73	196.33
Av. daily gain per pig.....	1.77	1.64
Av. daily ration per pig:		
Corn.....	6.85	6.77
Tankage.....	.40	.40
Alfalfa hay.....	.27	.34
Feed required for 100 pounds gain:		
Corn.....	386.22	413.69
Tankage.....	22.56	24.45
Alfalfa hay.....	15.32	20.48

**Observations**

1. The pigs receiving the 61 percent tankage gained more rapidly than those receiving the 48 percent tankage.
2. Those receiving the 48 percent tankage consumed more hay per day than those receiving the 61 percent tankage, but consumed less corn.

3. The pigs receiving 48 percent tankage required more corn per 100 pounds gain.

4. These results would indicate that 61 percent tankage is more efficient in producing gains to fattening pigs than 48 percent tankage.

11. CORN VERSUS ATLAS SORGO FOR HOGS

In many parts of the state sorghum grains are used extensively for hog feeding. In previous feeding tests with hogs at this station ground kafir was shown to have about 90 percent of the value of corn. Ground cane seed was shown to have about 75 percent of the value of corn. The grain of atlas sorgo, a new variety of sorghum developed at the Kansas Agricultural Experiment Station, was employed in a test in the winter of 1930 to secure information as to its value compared with corn as a feed for hogs. The pigs in this test were fed in a dry lot. Alfalfa hay and tankage were self-fed, free choice. The corn was self-fed in the shelled form, and the atlas sorgo grain was ground and self-fed.

The results in detail are given in Table X.

TABLE X.—CORN VERSUS GROUND ATLAS SORGO FOR FATTENING FALL PIGS IN THE DRY LOT.

(January 19 to May 9, 1930—110 days)

RATION.	Tankage and alfalfa hay (self-fed).	
	Ground atlas sorgo (self-fed).	Corn (self-fed).
Lot No. ....	1	2
Number of pigs per lot.....	10	9
Av. initial weight per pig.....	<i>Pounds.</i> 69.53	<i>Pounds.</i> 72.11
Av. final weight per pig.....	251.83	261.04
Av. total gain per pig.....	182.30	188.93
Av. daily gain per pig.....	1.66	1.72
Av. daily ration per pig:		
Corn.....		6.01
Ground atlas sorgo.....	6.19	
Tankage.....	.49	.51
Alfalfa hay.....	.96	.98
Feed required for 100 pounds gain:		
Corn.....		350.10
Ground atlas sorgo.....	373.73	
Tankage.....	29.51	29.93
Alfalfa hay.....	57.76	56.81

**Observations**

1. Shelled corn when compared with ground atlas sorgo for fattening hogs on a self-feeder, produced a slightly more rapid daily gain and slightly better finish.
2. Atlas sorgo proved to be worth 93.5 percent as much as corn.
3. The daily consumption of ground atlas sorgo was slightly more per pig, but the daily consumption of tankage and alfalfa hay, when compared with the hogs fed corn, was practically the same.
4. Other experiments have shown that grinding kafir and so-called "cane" grain for hogs is advisable, whereas the grinding of corn is not practical; consequently, in this experiment the atlas sorgo was fed ground and the corn fed shelled.
5. Apparently the ground atlas sorgo was palatable, for the daily consumption was greater than of corn.

III. ALFALFA PASTURE FEEDING VERSUS DRY-LOT FEEDING FOR FATTENING SPRING PIGS

Pasture crops are essential to profitable pork production, whether it be the maintenance of the breeding herd, growing the pigs, or fattening them for market. In order to secure definite information regarding the value of alfalfa pasture feeding versus alfalfa hay feeding in dry lot for fattening spring pigs for market, a test was conducted in the summer of 1930.

Two lots of pigs were used in this test; one lot was self-fed, free choice, shelled corn and tankage on good alfalfa pasture, another lot was self-fed, free-choice, shelled corn, tankage, and good quality alfalfa hay but confined to a dry lot. Detailed results are given in Table XI.

TABLE XI.—ALFALFA PASTURE FEEDING VERSUS DRY LOT FEEDING FOR FATTENING SPRING PIGS.

(June 18 to October 16, 1930—120 days)

RATION.	Corn (self-fed).	
	Tankage (self-fed), alfalfa pasture.	Tankage and alfalfa hay (self-fed).
Lot No. ....	1	2
Number of pigs per lot.....	10	10
Av. initial weight per pig.....	<i>Pounds.</i> 56.50	<i>Pounds.</i> 56.37
Av. final weight per pig.....	237.83	216.90
Av. total gain per pig.....	181.33	160.53
Av. daily gain per pig.....	1.51	1.34
Av. daily ration per pig:		
Corn.....	4.66	4.48
Tankage.....	.25	.48
Alfalfa hay.....		.34
Feed required for 100 pounds gain:		
Corn.....	308.55	334.77
Tankage.....	16.71	35.82
Alfalfa hay.....		25.51

Observations

1. Pigs self-fed corn and tankage on alfalfa pasture compared with those self-fed corn and tankage and alfalfa hay in the dry lot produced greater daily gains, consumed less feed per 100 pounds gain and made more economical gains.
2. The dry-lot-fed pigs consumed more than double the amount of tankage per 100 pounds gain than did the pasture-fed pigs.
3. The feeding value of alfalfa pasture as shown in this experiment indicates that it should be more generally used in the production of pork.