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Kansas Agricultural Experiment Station

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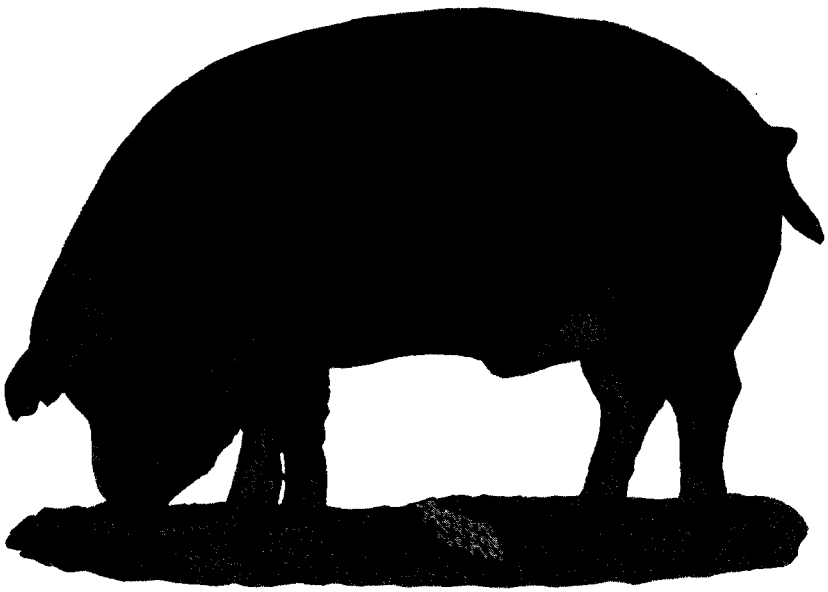
AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

DEPARTMENT OF ANIMAL HUSBANDRY



CHAMPION DUROC JERSEY BARROW
American Royal Live Stock Show
Bred and shown by K. S. A. C.

SWINE FEEDING INVESTIGATIONS, 1923 to 1926[1]

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Six swine feeding problems studied by the Kansas Agricultural Experiment Station from 1923 to 1926 are reported in this circular: (I) The relative value of alfalfa and sweet clover as pasture crops for hogs. (II) Tankage versus linseed oil meal for hogs. (III) Corn versus corn and tankage for hogs on alfalfa pasture. (IV) Corn and tankage versus corn, tankage, and alfalfa hay for hogs. (V) Corn versus kafir for hogs. (VI) Corn, tankage, and alfalfa pasture versus kafir, tankage, and Sudan grass pasture for hogs.

1. Contribution No. 89 from the Department of Animal Husbandry.

Historical Document
Kansas Agricultural Experiment Station

In each test 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 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, quality, age, and breeding.

I. THE RELATIVE VALUE OF ALFALFA AND SWEET CLOVER AS PASTURE CROPS FOR HOGS

Alfalfa is generally recognized as a splendid pasture crop for hogs. However, many farmers for different reasons have desired to utilize sweet clover and have inquired as to its value as a substitute for alfalfa for hog pasture purposes. Hence the reason for the tests reported in this circular.

The first test was conducted during the summer of 1924. Two lots of 19 pigs each were used. Both lots were fed corn and tankage. In each lot the corn was self-fed and the tankage hand-fed. First-year white sweet clover pasture was used. The results secured are given in detail in Table I.

TABLE I.—ALFALFA PASTURE VERSUS SWEET CLOVER PASTURE FOR FATTENING PIGS.

RATION.	Corn (self-fed). Tankage (hand-fed).	
	Alfalfa pasture.	Sweet-clover pasture.
Lot No.	1	2
Number of pigs in lot	19	19
Number of days on test	105	90
Dates of test	June 15 to Sept. 28, '24	June 17 to Sept. 15, '24
	Pounds.	*Pounds.*
Average initial weight per pig	60.00	61.95
Average final weight per pig	218.32	163.47
Average total gain per pig	158.32	101.57
Average daily gain per pig	1.51	1.13
Average daily ration per pig:		
Corn	4.96	3.70
Tankage	.20	.19
Feed required for 100 pounds gain:		
Corn	328.71	327.83
Tankage	13.13	16.60

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Kansas Agricultural Experiment Station

OBSERVATIONS

1. The pigs on alfalfa pasture gained considerably more and showed a higher finish at the end of the test than did the pigs on sweet clover pasture,

2. The concentrate required to produce 100 pounds of gain was practically the same in each lot.

3. The sweet clover this year made a very rank growth and the pigs probably filled up more on sweet clover than alfalfa. This probably explains why the pigs on sweet clover ate less corn than the pigs on alfalfa pasture.

The second test was conducted in the summer of 1926. The pigs in this test were self-fed both corn and tankage. The results of this test are given in detail in Table II.

TABLE II.—ALFALFA PASTURE VERSUS SWEET CLOVER PASTURE FOR FATTENING PIGS SELF-FED CORN AND TANKAGE.

(June 15 to October 8, 1926—115 days.)

RATION.	Corn (self-fed). Tankage (self-fed).	
	Alfalfa pasture.	Sweet-clover pasture.
Lot No.	1	2
Number of pigs in lot	10	10
	Pounds.	*Pounds.*
Average initial weight per pig	90.47	90.13
Average final weight per pig	244.00	253.47
Average total gain per pig	153.53	163.34
Average daily gain per pig	1.34	1.42
Average daily ration per pig:		
Corn	4.80	5.02
Tankage	.23	.29
Feed required for 100 pounds gain:		
Corn	359.86	353.56
Tankage	17.59	20.50

OBSERVATIONS

1. The pigs on sweet clover pasture gained more and showed slightly more finish than the pigs on alfalfa pasture.

2. The concentrate required to produce 100 pounds of gain was practically the same in each lot.

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Kansas Agricultural Experiment Station

3. The sweet clover this year made a much finer growth than it did in 1924, due to the unusually dry season. It remained more succulent during the months of July and August than did the alfalfa.

CONCLUSIONS

Sweet clover, in these tests, proved to be a highly satisfactory hog pasture. The results of the second test emphasize its value in a dry season. Even in a most favorable season it proved to be quite satisfactory.

II. TANKAGE VERSUS LINSEED OIL MEAL FOR HOGS

Many inquiries have been received regarding the possibility of substituting linseed oil meal partly or wholly for tankage as a protein supplement for hogs. Three tests are reported in this circular. Two of these tests were conducted in dry lots during the winter months and one on alfalfa pasture during the summer months.

First Test.—The first of these tests was conducted during the winter of 1924-'25. It is reported in detail in Table III.

TABLE III.—TANKAGE VERSUS LINSEED OIL MEAL FOR FATTENING PIGS SELF-FED CORN AND ALFALFA HAY IN A DRY LOT.

(January 1 to April 11, 1925—100 days.)

RATION.	Corn (self-fed). Alfalfa hay (self-fed).		
	Tankage (hand-fed).	Tankage ½ and linseed oil meal ½ (hand-fed).	Linseed oil meal (hand-fed).
Lot No.	1	2	3
Number of pigs in lot	10	10	10
	Pounds.	*Pounds.*	*Pounds.*
Average initial weight per pig	70.77	70.27	70.43
Average final weight per pig	233.93	221.83	166.30
Average total gain per pig	163.16	151.56	95.87
Average daily gain per pig	1.63	1.52	.96
Average daily ration per pig:			
Corn	5.75	5.40	4.18
Tankage	.40	.20	.....
Linseed oil meal	.....	.20	.40
Alfalfa hay	.35	.35	.35
Feed required for 100 pounds gain:			
Corn	352.41	356.29	436.01
Tankage	24.33	13.10	.....
Linseed oil meal	.....	13.10	41.41
Alfalfa hay	21.45	23.09	36.51

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OBSERVATIONS

1. The daily gains in lot 3 where linseed oil meal was fed as a protein supplement were only approximately 60 per cent as great as those in the lot where tankage was fed, and it required approximately 25 per cent more corn to produce 100 pounds of gain where linseed oil meal was substituted for tankage.

2. In lot 2 where the protein consisted of tankage 50 parts and linseed oil ,meal 50 parts, daily gains were almost as satisfactory as those in lot 1 where the protein supplement consisted of tankage alone, and the feed required to produce 100 pounds of gain in lot 2 was about the same as in lot 1.

Second Test.—The second test comparing tankage and linseed oil meal was conducted during the summer of 1925. The pigs in this test had free access to alfalfa pasture whereas the pigs in the first test were fed in a dry lot with free access to alfalfa hay, otherwise the rations were the same in both tests. Lot 1 received corn and tankage; lot 2, corn, and tankage and linseed oil meal half and half; and lot 3, corn and linseed oil meal. Results in detail are given in Table IV.

TABLE IV.—TANKAGE VERSUS LINSEED OIL MEAL FOR FATTENING PIGS SELF-FED CORN ON ALFALFA PASTURE.

(June 15 to September 28, 1925—105 days.)

RATION.	Corn (self-fed). Alfalfa pasture.		
	Tankage (hand-fed).	Tankage ½ and linseed oil meal ½ (hand-fed).	Linseed oil meal (hand-fed).
Lot No	1	2	3
Number of pigs in lot	15	15	14
	Pounds.	*Pounds.*	*Pounds.*
Average initial weight per pig	66.38	65.29	66.10
Average final weight per pig	220.93	212.62	198.00
Average total gain per pig	154.55	147.33	131.90
Average daily gain per pig	1.47	1.40	1.26
Average daily ration per pig:			
Corn	5.03	4.76	4.16
Tankage	.20	.11	.....
Linseed oil meal	.....	.11	.19
Feed required for 100 pounds gain:			
Corn	341.42	338.24	330.79
Tankage	13.80	7.98	.....
Linseed oil meal	.....	7.98	14.75

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OBSERVATIONS

1. The daily gains in lot 3 where linseed oil meal was fed as a protein supplement were only 85 per cent as great as in lot 1, but the feed required to make 100 pounds of gain was slightly less than in the case of lot 1 fed tankage. However, the pigs fed linseed oil meal had not attained a market finish at the end of the test. They finished the test large and growthy but not fat. They made very slow gains until they reached a weight of 135 pounds.

2. The pigs in lot 2, fed a protein supplement consisting of tankage 50 parts and linseed oil meal 50 parts, made decidedly better gains and finish than did the pigs receiving linseed oil meal as a protein supplement and almost as good gains and finish as the pigs receiving tankage as a protein supplement. The feed required to produce 100 pounds of gain was practically the same as in lot 1.

Third Test.—The third test was made on six lots of pigs each fed in a dry lot, Linseed oil meal alone was discontinued as a pro-

TABLE V.—TANKAGE VERSUS LINSEED OIL MEAL AND TANKAGE FOR FATTENING PIGS IN A DRY LOT.

(January 1 to April 15, 1926—104 days.)

RATION.	Corn (self-fed).					
	Salt (hand-fed).		Alfalfa hay (self-fed).		Alfalfa hay (self-fed). Salt (hand-fed).	
	Tankage (hand-fed).	Tankage ½ and linseed oil meal ½ (hand-fed).	Tankage (hand-fed).	Tankage ½ and linseed oil meal ½ (hand-fed).	Tankage (hand-fed).	Tankage ½ and linseed oil meal ½ (hand-fed).
Lot No.	1	2	3	4	5	6
Number of pigs in lot	8	8	8	8	8	7
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Av. initial weight per pig	71.96	70.38	71.17	71.46	72.13	72.08
Av. final weight per pig	211.00	192.00	215.08	197.33	206.21	182.75
Av. total gain per pig	139.04	121.62	143.91	125.87	134.08	110.67
Av. daily gain per pig	1.34	1.17	1.38	1.21	1.29	1.06
Av. daily ration per pig:						
Shelled corn	5.38	4.92	5.38	4.65	5.13	4.35
Tankage	.36	.19	.37	.18	.36	.18
Linseed oil meal	.....	.19	.....	.18	.....	.18
Alfalfa hay	.....	.....	.33	.33	.33	.33
Salt	.008	.008	.....	.....	.008	.008
Feed required for 100 lbs. gain:						
Shelled corn	402.02	420.65	388.44	384.52	398.27	409.10
Tankage	26.97	15.95	26.64	15.23	27.97	16.94
Linseed oil meal	.....	15.95	.....	15.23	.....	16.94
Alfalfa hay	.....	.....	23.63	27.51	25.83	31.20
Salt	.60	.72	.....	.....	.63	.76

Historical Document
Kansas Agricultural Experiment Station

tein supplement because of the unsatisfactory results in the two previous tests. In this test tankage and tankage and linseed oil meal half and half were compared under three sets of conditions: First, both lots receiving salt; second, both lots receiving alfalfa hay; third, both lots receiving salt and alfalfa hay. Detailed results are given in Table V.

OBSERVATIONS

1. The daily gains in lot 2 receiving linseed oil meal and tankage half and half and having free access to both corn and salt but no alfalfa hay as a protein supplement, were approximately 90 per cent as great as the daily gains of the pigs in lot 1 receiving tankage, corn, and salt but no alfalfa hay. The pigs in lot 2 required slightly more corn to produce 100 pounds of gain and were not so highly finished at the end of the test as the pigs in lot 1.

2. The daily gains in lot 4 receiving linseed oil meal and tankage half and half as a protein supplement and having free access to corn and alfalfa hay but no salt were 90 per cent as great as the daily gains of the pigs in lot 3 receiving tankage, corn, and alfalfa hay but no salt. The feed required to make 100 pounds of gain was about the same in lots 3 and 4, but the pigs in lot 3 receiving tankage showed more finish at the end of the test than those in lot 4 receiving tankage and linseed oil meal half and half.

3. The daily gains in lot 6 receiving linseed oil meal and tankage half and half as a protein supplement and having free access to corn, alfalfa hay, and salt were approximately 90 per cent as great as the gains of the pigs in lot 5 receiving tankage, corn, alfalfa hay, and salt. There was very little difference in the amount of feed required to make 100 pounds of gain, but the pigs in lot 5 receiving tankage showed somewhat more finish at the end of the test than the pigs in lot 6 receiving linseed oil meal and tankage half and half.

4. In each of the three pairs of comparisons the pigs receiving tankage as a protein supplement made greater gains and a higher degree of finish than the pigs receiving tankage and linseed oil meal half and half as a protein supplement. There was no significant difference in the feed required to make 100 pounds of gain.

5. The addition of salt to the ration seemed to retard slightly the gains of the pigs in both series.

CONCLUSIONS

It would seem from a study of these three tests that:

1. Linseed oil meal alone is decidedly inferior to tankage as a protein supplement in hog feeding rations.

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Kansas Agricultural Experiment Station

2. That hogs receiving a protein supplement consisting of tankage and linseed oil meal half and half will not make so rapid gains or so high a degree of finish in a given length of time as hogs receiving a protein supplement consisting of tankage alone.

III. CORN VERSUS CORN AND TANKAGE FOR HOGS ON ALFALFA PASTURE

Previous tests at the Agricultural Experiment Station have shown the advantage of adding tankage to a corn ration for hogs on alfalfa pasture. Since the price of tankage is so much higher than the price of corn there is a rather prevalent tendency to think tankage is too expensive to feed, especially when hogs have free access to alfalfa pasture. The prevalence of this opinion prompted another test to bring to the attention of hog raisers the advantage of adding tankage to corn even when hogs have free access to alfalfa pasture. This test was conducted during the summer of 1926. The results in detail are given in Table VI.

TABLE VI.—CORN VERSUS CORN AND TANKAGE FOR FATTENING PIGS ON ALFALFA PASTURE.

(June 15 to October 8, 1926—115 days.)

RATION.	Corn.	
	Alfalfa pasture.	Tankage and alfalfa pasture.
Lot No.	1	2
Number of pigs in lot	10	10
	Pounds.	*Pounds.*
Av. initial weight per pig	90.50	90.47
Av. final weight per pig	188.53	244.00
Av. total gain per pig	98.03	153.53
Av. daily gain per pig	.85	1.34
Av. daily ration per pig:		
Corn	3.76	4.80
Tankage	.....	.23
Feed required to produce 100 pounds gain:		
Corn	441.19	359.86
Tankage	.....	17.59

Historical Document
Kansas Agricultural Experiment Station

OBSERVATIONS

1. The daily gain of the pigs receiving one-fourth of a pound of tankage per head per day in addition to corn and alfalfa pasture was 60 per cent greater than the daily gains in the lot receiving no tankage in addition to corn and alfalfa pasture. The cost of gains was 9 per cent less in the tankage-fed lot.

2. The pigs in the lot receiving tankage in addition to corn and alfalfa pasture were finished and ready for market but the pigs in the lot receiving no tankage were not finished. Feeding for another 60 days was necessary to make them as fat as the other group.

3. Each pound of tankage fed replaced 4 2/3 pounds of corn in producing 100 pounds of gain. In other words, 3½ cents' worth of tankage fed at the rate of one-fourth of a pound per head per day replaced 7 cents' worth of corn, thereby reducing materially the cost of gains.

CONCLUSIONS

This and previous tests emphasize the fact that corn, tankage, and alfalfa pasture produce more rapid and cheaper gains and a higher degree of finish in a given time than corn and alfalfa pasture.

IV. CORN AND TANKAGE VERSUS CORN, TANKAGE, AND ALFALFA HAY FOR HOGS

Corn and tankage make a well-balanced ration from the standpoint of protein, carbohydrates, and fat, but other tests have indicated that a hog will make better use of these feeds if supplied certain vitamins which they contain only in limited quantities. Since alfalfa, either in the form of pasture or good green hay, contains these vitamins the addition of alfalfa hay to a corn and tankage ration should improve it materially.

In this test one lot of pigs was given free access to corn and tankage in self-feeders. A second lot was given free access to corn and tankage in self-feeders and good-quality alfalfa hay in a rack. The pigs used were raised as feeder pigs on the United States Dry-land Field Station at Ardmore, S. Dak., and shipped to the Kansas Agricultural Experiment Station to be fattened for market. The results of this test are given in detail in Table VII.

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Kansas Agricultural Experiment Station

TABLE VII.—CORN AND TANKAGE VERSUS CORN, TANKAGE, AND ALFALFA HAY FOR FATTENING PIGS IN DRY LOT.

(October 4 to December 8, 1926—65 days.)

RATION.	Corn.	
	Tankage.	Tankage and alfalfa hay.
Lot No.	1	2
Number of pigs per lot	31	30
	Pounds.	*Pounds.*
Av. initial weight per pig	104.61	104.28
Av. final weight per pig	183.37	198.41
Av. total gain per pig	78.76	94.13
Av. daily gain per pig	1.21	1.45
Av. daily ration per pig:		
Shelled corn	4.41	4.74
Tankage	.35	.41
Alfalfa hay	.....	.14
Feed required for 100 pounds gain:		
Shelled corn	364.32	327.18
Tankage	29.22	28.48
Alfalfa hay	.....	9.56

OBSERVATIONS

1. The pigs in lot 2 having free access to corn, tankage, and alfalfa hay gained nearly one-fourth of a pound more per head per day and required 10 per cent less corn to make 100 pounds of gain than the pigs receiving corn and tankage but no alfalfa hay.

2. It is significant that 9.56 pounds of alfalfa hay replaced 37.14 pounds of corn in producing 100 pounds of gain. This emphasizes the value of giving hogs that are fed in a dry lot free access to alfalfa hay in addition to corn and tankage.

V. CORN VERSUS KAFIR FOR HOGS

The relative value of corn and kafir as a hog feed is a matter of considerable importance to many sections of Kansas and the Southwest. The form in which to feed kafir is also an important matter. In the summer of 1923 a test was conducted by the Agricultural Experiment Station for the purpose of securing additional information regarding these matters. All pigs were fed in a dry lot. No alfalfa hay was fed. Kafir was fed in the form of kafir heads, threshed kafir, and ground threshed kafir. Corn was fed in the

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Kansas Agricultural Experiment Station

shelled form. Each lot was fed the same amount of actual grain per head per day. Detailed results are given in Table VIII.

TABLE VIII.—CORN VERSUS KAFIR FOR FATTENING PIGS IN DRY LOT.

(January 19 to April 11, 1923—82 days.)

RATION.	Tankage.			
	Corn.	Kafir heads.	Threshed kafir.	Ground threshed kafir.
Lot No.	1	2	3	4
Number of pigs in lot.	9	9	9	9
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Av. initial weight per pig.	87.89	88.33	82.56	84.41
Av. final weight per pig.	158.59	141.04	133.93	147.19
Av. total gain per pig.	70.70	52.71	51.37	62.78
Av. daily gain per pig.	.86	.64	.63	.77
Av. daily ration per pig:				
Shelled corn.	3.37			
Whole kafir heads.		a5.05 b3.37		
Threshed kafir.			3.37	
Ground threshed kafir.				3.37
Tankage.	.25	.25	.25	.25
Feed required for 100 pounds gain:				
Shelled corn.	390.36			
Whole kafir heads.		a785.72 b523.81		
Threshed kafir.			537.28	
Ground threshed kafir.				439.65
Tankage.	29.18	39.14	40.16	32.86

a Weights including entire head.
b Weights of grain actually consumed.

OBSERVATIONS

1. All the kafir-fed lots gained more slowly than the corn-fed lot.

2. The gains of the lot fed ground threshed kafir were approximately 10 per cent less than those of the corn-fed lot.

3. The gains of the lot fed threshed kafir (unground) were approximately 27 per cent less than those of the corn-fed lot.

4. The gains of the lot fed kafir heads and the lot fed threshed kafir (unground) were practically the same.

5. It required approximately 12½ per cent more kafir in the ground form and 35 per cent more in the threshed or whole head form than corn to produce 100 pounds of gain.

6. It required approximately 8 bushels of ground kafir and approximately 10 bushels of threshed or whole head kafir to produce 100 pounds of gain.

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Kansas Agricultural Experiment Station

CONCILUSIONS

1. Ground kafir is a fairly satisfactory substitute for corn as the basis of a hog fattening ration.

2. If 8 bushels of kafir can be threshed and ground for less than the value of 2 bushels of threshed kafir in the head it should be threshed and ground for hogs.

3. Previous tests indicate that the gains in all lots would have been greater had each lot had free access to alfalfa hay in addition to the grain and tankage.

VI. CORN, TANKAGE, AND ALFALFA PASTURE VERSUS KAFIR, TANKAGE, AND SUDAN GRASS PASTURE FOR HOGS

Many farms of the state that do not produce either corn or alfalfa satisfactorily do produce both kafir grain and Sudan grass. Previous tests at this station have shown that ground kafir compares favorably with corn as the basis of a fattening ration for hogs. Sudan grass has also proved to be about equal to alfalfa as a pasture crop for hogs. This particular test was planned for the purpose of comparing directly the combination of corn and alfalfa pasture with the combination of ground kafir and Sudan grass pas-

TABLE IX.—CORN, TANKAGE, AND ALFALFA PASTURE VERSUS KAFIR, TANKAGE, AND SUDAN GRASS PASTURE FOR FATTENING PIGS.

(June 15 to September 28, 1925—105 days.)

RATION.	Tankage.	
	Corn and alfalfa pasture.	Kafir and Sudan grass pasture.
Lot No.	1	2
Number of pigs per lot	15	15
	Pounds.	*Pounds.*
Av. initial weight per pig	66.38	62.04
Av. final weight per pig	220.93	202.13
Av. total gain per pig	154.55	140.09
Av. daily gain per pig	1.47	1.33
Av. daily ration per pig:		
Corn	5.03	.....
Kafir	.....	4.73
Tankage	.20	.23
Feed required for 100 pounds gain:		
Corn	341.42	.....
Kafir	.....	354.44
Tankage	13.80	17.52

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Kansas Agricultural Experiment Station

ture. Since previous tests have shown the necessity of adding tankage to a ration of either corn or kafir fed on pasture, both lots received tankage. Details of the results of this test are given in Table IX.

OBSERVATIONS

1. The pigs fed ground kafir and tankage on Sudan grass pasture did not make quite so good gains as the pigs fed corn and tankage on alfalfa pasture but their gains were quite satisfactory and the pigs fed kafir and tankage were well finished at the end of the test.

2. The pigs fed kafir and tankage on Sudan grass pasture required only slightly more feed to make 100 pounds of gain than the pigs fed corn and tankage on alfalfa pasture.

3. Kafir must be ground to secure most satisfactory results as a hog feed.

CONCLUSIONS

1. Almost as satisfactory gains from the standpoint of rapidity and feed required to produce 100 pounds of gain can be made with ground kafir, tankage, and Sudan grass pasture as can be made with corn, tankage, and alfalfa pasture.

2. Hogs fattening on kafir, tankage, and Sudan grass pasture will be practically as well finished in a given length of time as hogs fattened on corn, tankage, and alfalfa pasture.

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Kansas Agricultural Experiment Station

PUBLICATIONS ON HOGS

For further information on the station's recent work on hogs, especially the results of feeding experiments, the reader is referred to the following publications:

Bul. No.

243. Equipment for Swine Production. By B. M. Anderson and V. R. Hillman. (46 pp., 32 illus.)

Circ. No.

76. Home Preparation of Pork. By A. M. Paterson. (13 pp., 8 illus.)
78. Swine Feeding Investigations, 1918-'19. By C. W. McCampbell, E. F. Ferrin, and H. B. Winchester. (7 pp., 1 illus.)
89. Swine Feeding Investigations, 1919-'20. By E. F. Ferrin and H. B. Winchester. (10 pp., 1 illus.)
98. Swine Feeding Investigations, 1921-'22. By F. W. Bell, H. B. Winchester, and H. W. Marston. (11 pp., 2 illus.)
112. Swine Feeding Investigations, 1922-'23. By B. M. Anderson and H. W. Marston. (8 pp., 4 illus.)
118. Swine Feeding Investigations, 1923-'24. By B. M. Anderson and H. W. Marston. (6 pp., 1 illus.)
137. Judging Price Risks in Marketing Hogs. By R. M. Green and E. A. Stokdyk. (29 pp., 12 illus.)

Copies of any of these publications in which the reader may be interested may be secured as long as available by addressing a request to: AGRICULTURAL EXPERIMENT STATION, MANHATTAN, KAN.

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