CHEMICAL ANALYSIS OF FEEDS USED IN THE 1948-1949 BEEF CATTLE FEEDING TRIALS

	Moisture %	Protein %	Fat %	Fiber %	N-free extract %	Mineral matter %	Calcium %	Phosphorus %
Soybean oil meal	9.51	43.69	5.38	6.09	29.31	5.79	.41	.59
Soybean pellets	9.14	43.81	5.60	6.14	29.31	5.88	.40	.59
Cottonseed meal	9.01	41.13	4.94	10.46	28.60	5.84	.32	1.13
Linseed oil meal	8.83	36.38	4.05	8.10	36.88	5.66	.55	.86
Dehydrated alfalfa pellets	8.57	15.38	2.70	28.25	37.15	7.74	1.77	.13
Dehydrated brome grass pellets	8.76	16.38	3.40	26.67	36.35	8.07	.73	.22
Corn	11.92	9.50	4.52	2.27	70.44	1.54	.009	.26
Atlas sorgo silage	71.4	1.84	.80	8.30	15.6	1.85	.11	.049
Prairie hay	7.07	5.00	2.06	33.04	45.30	7.25	.46	.12
Bluestem pasture grasses, 1949 (computed to a no-moisture basis)								
May 20	0	10.78						
June 1	0	8.29						
June 10	0	8.36						
June 21	0	7.3						
July 1	0	8.94						
July 11	0	9.29						
July 20	0	7.44						
August 1	0	7.04						
August 10	0	5.97						
August 20	0	5.24						
September 1	0	6.28						
September 10	0	6.00						
September 20	0	6.80						
October 1	0	3.48						
October 10	0	4.03						
November 1	0	4.93						
December 1	0	3.90						
Bluestem pasture grasses, 1950 (Air dry basis)								
January 1	11.58	2.44	1.81	30.92	45.07	8.24	.39	
February 1	15.38	2.63	1.63	29.27	43.26	7.83	.39	.067
March 1	7.40	2.81	1.50	33.20	46.11	8.98	.41	.03

Project 110: Swine Feeding Investigations

The comparative value of corn and sorghum grains as swine fattening feeds.

C. E. Aubel

In many parts of Kansas, sorghum grains are used extensively for hog feeding. In previous feeding tests with hogs at this station, ground kafir grain was shown to have about 90 percent of the value of corn. In a more recent test, ground Atlas sorgo grain was shown to have 93.5 percent of the value of corn. Since in recent years a number of new varieties of sorghum have been developed and grown throughout the state, hog feeders have a desire to know about the feeding merits of these varieties, especially in times of high priced corn when it might be desirable to substitute sorghum grain for corn. They also wish to know whether the grain should be fed whole or ground.

In order to obtain this information Kansas State College conducted two experiments, one during the winter of 1949 and one during the winter of 1950, to determine the value of several sorghum grains for fattening swine.

EXPERIMENT I—Winter, 1949

The sorghum grains used in this test were some of the varieties recently developed. They were Colby, Westland, Midland and Martin milos.

The following figures show the nutrient content on a percentage basis of the grains used in this experiment.

Feed	Protein	Ether Extract	Crude Fiber	Moisture	Ash	N-free Extract	Carbohydrates
Martin Milo	9.88	3.24	1.64	11.24	1.31	72.69	74.33
Westland Milo	9.06	2.93	1.97	10.87	1.74	63.43	65.40
Midland Milo	10.63	3.18	1.45	9.95	1.59	73.20	74.65
Colby Milo	14.25	2.90	2.44	10.97	1.92	67.52	69.92
Corn	9.88	4.24	1.95	11.16	1.50	71.27	73.22

The following table gives a summary of the record of this experiment.

EXPERIMENT I—Winter, 1949

The comparative value of shelled corn, Colby, Martin, Westland, and Midland milos for fattening pigs in the dry lot.

(January 8, 1949 to April 19, 1949—101 Days)

Ration Fed	Shelled Corn Tankage (Self-Fed)	Alfalfa Hay (Self-fed) Ground Martin Milo Tankage (Self-Fed)	Ground Westland Milo Tankage (Self-Fed)	Ground Midland Milo Tankage (Self-Fed)	Ground Colby Milo Tankage (Self-Fed)
Lot Number	1	2	3	4	5
No. pigs per lot	10	10	10	10	10
Av. Initial Weight per Pig	77.55 Pounds	76.80 Pounds	77.75 Pounds	78.30 Pounds	78.05 Pounds
Av. Final Weight per Pig	242.87	230.97	255.07	232.50	224.83

Av. Total Gain per Pig	165.32	154.17	177.32	154.20	146.78
Av. Daily Gain per Pig	1.64	1.53	1.76	1.53	1.45
Av. Daily Ration per Pig:					
Shelled Corn	5.13				
Ground Martin Milo		6.06			
Ground Westland Milo			5.62		
Ground Midland Milo				5.91	
Ground Colby Milo					5.80
Alfalfa Hay	.39	.38	.39	.35	.39
Tankage	.30	.40	.40	.40	.30
Feed Consumed per 100 lbs. Gain:					
Shelled Corn	313.63				
Gr. Martin Milo		397.29			
Gr. Westland Milo			320.04		
Gr. Midland Milo				387.16	
Gr. Colby Milo					398.90
Alfalfa Hay	23.95	24.78	22.05	23.22	26.77
Tankage	18.15	25.95	22.56	25.94	20.44
Feed Cost per 100 lbs. Gain	$ 10.40	$ 13.24	$ 10.79	$ 12.93	$ 13.02

Feed Prices Charged: Shelled corn $1.65 per bu., Tankage $110.00 per ton, Alfalfa Hay $25.00 per ton, The Milos $2.90 per 100 pounds.

Methods of Feeding: The shelled corn, ground milos, alfalfa hay and Tankage were self-fed free choice. The milo was ground through a 3/32 inch screen in a hammer mill. The Martin Milo was of excellent weight, the Colby Milo was light in weight.

OBSERVATIONS AND CONCLUSIONS

1. Corn produced approximately 7% less gain per day but proved to be slightly more efficient and economical in producing 100 pounds of gain than Westland milo.

2. Westland milo produced greater daily gain and proved to be significantly more efficient and economical in producing 100 pounds of gains than Martin, Midland, or Colby milo.

3. There was no significant difference in the daily gain, efficiency in producing 100 pounds of gain or economy of gain of the Martin milo, Midland milo and Colby milo fed lots.

4. The average daily consumption of each of the milos was greater than the average daily consumption of corn which indicates that they were not lacking in palatability.

EXPERIMENT II—Winter, 1950

The comparative value of corn and two sorghum grains as swine fattening feeds in the dry lot.

In this experiment three lots of pigs were self-fed in the dry lot, one each on Westland and Midland milo and one on shelled corn.

A summary of the results follows:

EXPERIMENT II—Winter, 1950

(December 12, 1949 to March 17, 1950—95 Days)

Ration Fed	Alfalfa Hay (Self-Fed): Shelled Corn Tankage (Self-Fed)	Ground Midland Milo Tankage (Self-Fed)	Ground Westland Milo Tankage (Self-Fed)
Lot Number	1	2	3
No. of pigs in lot	10	10	10
	Pounds	Pounds	Pounds
Av. Initial Weight per Pig	70.20	67.95	69.10
Av. Final Weight per Pig	222.70	239.80	244.80
Av. Total Gain per Pig	152.50	171.85	175.70
Av. Daily Gain per Pig	1.60	1.80	1.84
Av. Daily Ration per Pig:			
Shelled Corn	5.80		
Gr. Westland Milo			5.71
Gr. Midland Milo		5.80	
Tankage	.46	.52	.42
Alfalfa Hay	.15	.16	.19
Feed Consumed per 100 lbs. Gain:			
Shelled Corn	361.31		
Gr. Westland Milo			309.04
Gr. Midland Milo		320.91	
Tankage	28.85	29.09	22.76
Alfalfa Hay	9.70	8.90	10.41
Feed Cost per 100 lbs. Gain	$ 10.73	$ 10.69	$ 10.03

Feed Prices Charged: Shelled corn, $1.40 per bu.; The milos, $2.80 per cwt.; Tankage, $110.00 per ton; Alfalfa hay, $25 per ton.

Methods of Feeding: The shelled corn, ground milos, alfalfa hay and tankage were self-fed free choice. The milo was ground through a 3/32 inch screen in a hammer mill. Both milos were of good quality and weight.

OBSERVATIONS AND CONCLUSIONS

1. There was very little difference in the daily gain produced by Westland milo and Midland milo, and the daily gain produced by each was approximately 12% greater than that produced by corn.

2. There was not much difference in the efficiency of Westland milo and Midland milo in producing 100 pounds of gain and each proved to be somewhat more efficient than corn.

3. Westland milo produced gain at a cost of approximately 5% less than Midland milo. There was very little difference in the cost of gain produced by Midland milo and corn.

EXPERIMENT III - Summers 1948 and 1949

The value of hog wallows for pigs that are full fed in the summer.

Two lots of pigs were fed each of the summers of 1948 and 1949. One lot had a well developed wallow or mud hole. The other lot was run in a pasture in which a mud hole was not allowed to develop. The pigs were fed from June until September.

The following table gives a summary of the results of this experiment:

EXPERIMENT III—Summers of 1948 and 1949

The value of hog wallows for full fed pigs on alfalfa pasture. Average of two experiments in the Summers 1948 and 1949 from June to September—98 days

Ration	Shelled Corn and Tankage (Self-fed) Alfalfa Pasture	
		Wallow
Lot Number	1	2
Number Pigs in Lot	10	10
Average Initial Weight per Pig	55.66	54.06
Average Final Weight per Pig	233.45	252.15
Average Total Gain per Pig	177.78	193.08
Average Daily Gain per Pig	1.79	1.90
Average Daily Feed per Pig:		
Shelled Corn	6.38	6.89
Tankage	.44	.43
Feed Consumed per 100 lbs. Gain:		
Shelled Corn	354.55	352.04
Tankage	24.94	21.88
Feed Cost per 100 lbs. Gain	$ 10.23	$ 9.99

Feed Prices Charged: Shelled Corn, $1.40 per bu.; Tankage, $110 per ton.

Methods of Feeding: The pigs of both groups were self-fed, free choice, shelled corn and tankage on alfalfa pasture. The wallows were mud holes part in shade and part in the sun. In both the pigs were sprinkled with water at least twice a day, sometimes more in the hottest weather. The summer of 1948 was wet and so all lots wallowed some. The summer of 1949 was wet in early part of the experiment but dry in last part.

OBSERVATIONS

1. The hogs with a wallow made the most rapid gains, and the greatest total gains.
2. The amount of feed used per 100 pounds gain was about the same in both lots, with a slight advantage with the wallow lot pigs.

EXPERIMENT IV - Winter, 1950

The value of sorghum distillers dried solubles* in protein feed mixtures when fed as a supplement to shelled corn for fattening fall pigs in the dry lot.

In recent years much attention has been given to the feeding of distillers by-products to livestock. One of these is distillers dried solubles derived from the malting of various grains. In addition to other nutrients it furnishes some of the B vitamins that have lately been shown to be so important in swine feeding.

A discussion of an experiment conducted at Kansas State College to determine the value of distillers dried solubles in protein supplements for swine follows:

EXPERIMENTAL PROCEDURE

In the experiment reported herein, five lots of pigs were self-fed shelled corn and alfalfa hay. In addition to the basal ration protein

* The sorghum distillers dried solubles used in this experiment were furnished through the courtesy of the Midwest Solvents Co., Inc., Atchison, Kan.

supplements were fed as follows: in Lot 1, the control lot, tankage; in Lot 2 a mixture of tankage 50%, soybean meal 50%; in Lot 3 a mixture of tankage 50%, dried solubles 50%; in Lot 4 a mixture of soybean meal 50%, dried solubles 50%; in Lot 5 a mixture of tankage, ⅓, soybean meal, ⅓, and dried solubles, ⅓.

The protein content of the tankage was 60%, soybean meal 43%, and the distilled solubles 25%.

The following table gives a summary of the record of this experiment:

EXPERIMENT IV—Winter, 1950

The Value of Sorghum Distillers Dried Solubles in Protein Feed Mixtures When Fed as a Supplement to Shelled Corn for Fattening Fall Pigs in a Dry Lot.

(December 12, 1949 to March 17, 1950—95 Days)

Ration Fed	Shelled Corn and Alfalfa Hay (self-fed)				
	Tankage (Self-fed)	Tankage 50% Soybean meal 50% (Self-fed)	Tankage 50% Distilled Sol. 50% (Self-fed)	Soybean meal 50% Distilled Sol. 50% (Self-fed)	Tankage ⅓, Soybean meal ⅓ Distilled Sol. ⅓ (Self-fed)
Lot Number	1	2	3	4	5
No. pigs per lot	10	10	10	10	10
	Pounds	Pounds	Pounds	Pounds	Pounds
Av. initial weight per pig	70.20	70.20	70.29	70.00	70.07
Av. final weight per pig	222.70	218.60	225.90	226.70	224.40
Av. total gain per pig	152.50	148.40	155.61	156.70	154.33
Av. daily gain per pig	1.60	1.57	1.63	1.64	1.62
Av. daily ration per pig:					
Shelled corn	5.80	5.53	5.53	5.36	5.90
Tankage	.46	.48	.47		.27
Alfalfa Hay	.15	.15	.14	.13	.12
Soybean Meal		.48		.66	.27
Distillers Solubles			.47	.66	.27
Feed Consumed per 100 lbs. gain:					
Shelled Corn	361.31	354.44	338.34	325.46	363.18
Tankage	28.85	30.82	28.59		16.63
Alfalfa Hay	9.70	9.63	8.67	8.29	7.90
Soybean meal		30.82		40.20	16.63
Distillers Solubles			28.59	40.20	16.63
Feed Cost per 100 lbs. gain	$ 10.73	$ 11.60	$ 11.27	$ 11.05	$ 11.25

Feed Prices Charged: Shelled corn, $1.40 per bu.; Tankage, $110.00 per ton; Alfalfa Hay, $25 per ton; Sorghum Distillers Dried Solubles, $80.00 per ton; Soybean meal, $60.00 per ton.

Methods of Feeding: All lots were self-fed shelled corn and alfalfa hay. The protein supplements were mixed in the proportions indicated and self-fed in a separate compartment.

DISCUSSION OF RESULTS

It will be seen from the foregoing figures that Lots 3, 4, and 5 which

received dried solubles made almost identical gains. The lowest gains were made in the Lots 1 and 2, which received no dried solubles. All the rations produced efficient and economical gains, though there is a slight difference in favor of the pigs fed the dried solubles, whether with tankage and alfalfa hay or soybean meal and alfalfa hay. Lot 1, receiving tankage alone as a protein supplement, made the cheapest gains.

EXPERIMENT V - Summer, 1949

The limited feeding of tankage in the ration of fattening pigs when self-fed corn on alfalfa pasture.

C. E. Aubel

To produce swine profitably, it is necessary to make use of forage crops. This practice not only saves grain, but contributes to the general health of the hogs. Since swine feeders are seeking new and cheaper methods of producing hogs on pasture, the limited feeding of tankage for fattening pigs on alfalfa pasture was studied in this feeding trial.

How the Hogs Were Fed and The Tankage Supplement Allowance

Six lots of spring pigs having an average initial weight of approximately 57 pounds were self-fed corn on good alfalfa pasture.

A protein supplement was also fed, or not fed, as follows:

Lot 1—Tankage self-fed throughout the test. Lot 2—No protein supplement fed. The remaining lots were self-fed tankage until they reached different weights—100 pounds in Lot 3, 125 pounds in Lot 4, 150 pounds in Lot 5, and 175 pounds in Lot 6.

The experiment started June 9, 1949, and each lot was continued on feed until it had attained a weight of approximately 216 pounds.

A summary of the results is on the following page.

OBSERVATIONS

(1) The maximum use of alfalfa pasture without other protein supplement produced low cost gain.

(2) Full feeding a protein supplement free choice with the fattening ration of corn and alfalfa pasture increased the rate of gain of the hogs. As the protein feeding period was lengthened, the rate of gain for the entire feeding period was increased.

(3) The protein supplement was used most effectively in the feeding period where it was omitted from the ration after the hogs had reached the weight of 100 pounds. With this plan of feeding the rate of gain was fairly high and the feed cost low. Feeding the protein for longer periods increased the total feed requirement and cost of gain, although the rate of gain was increased.

CONCLUSIONS

The results of this experiment show that the feed cost of gains can be kept at a comparatively low figure by omitting the protein supplement from the ration for the entire fattening period. The rate of gain, however, will be reduced with this plan of feeding.

The results of this experiment show further that hogs will gain efficiently on a full-feed of corn and good alfalfa pasture, without receiving a protein supplement after they have reached a weight of 100 to 150 pounds.

If maximum gains are desired despite the higher cost, the protein supplement should be full-fed throughout the fattening period. This speeding up in gains should insure an earlier market.

EXPERIMENT V—Summer, 1949

The Limited Feeding of Tankage in the Ration of Fattening Pigs When Self-Fed Corn on Alfalfa Pasture

C. E. Aubel

(June 9, 1949 to November 5, 1949)

	Corn: (Self-fed) Alfalfa Pasture					
	Tankage (self-fed) throughout entire period	Corn alone throughout entire period	Tankage (self-fed) up to wt. 100 lbs.	Tankage (self-fed) up to wt. 125 lbs.	Tankage (self-fed) up to wt. 150 lbs.	Tankage (self-fed) up to wt. 175 lbs.
Lot Number	1	2	3	4	5	6
No. of pigs per lot	10	10	10	10	10	10
No. of days supplement fed	91	0	24	36	58	78
Days required to reach 216 lbs.	91	149	119	114	99	94
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Av. initial weight per pig	56.93	58.03	58.40	58.53	58.00	56.40
Av. final weight per pig	216.70	214.10	216.10	216.60	215.90	218.10
Av. total gain per pig	159.77	156.07	157.70	158.07	159.90	161.70
Av. daily gain per pig	1.75	1.03	1.32	1.38	1.59	1.72
Feed required for 100 lbs. gain:						
Corn	362.08	334.14	324.41	329.91	321.84	352.19
Tankage	26.91		6.46	12.66	15.19	27.21
Feed cost per 100 lbs.	$ 10.53	$ 8.35	$ 8.46	$ 8.91	$ 8.87	$ 10.29

Feed Prices Charged: Shelled corn, $1.40 per bu.; Tankage, $110.00 per ton.

Methods of Feeding: All lots were self-fed shelled corn, on alfalfa pasture. The tankage was self-fed the number of days shown in the table. After that the pigs received only shelled corn until they reached a weight of 216 pounds.