

EXPERIMENT STATION  
OF THE  
KANSAS STATE AGRICULTURAL COLLEGE,  
MANHATTAN.

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**FARM DEPARTMENT.**

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***FATTENING HOGS WITH DROUGHT-RESISTING CROPS.***

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THIS bulletin gives the results of feeding experiments made with 326 hogs. Eight experiments were made; the first was begun November 15, 1897, and the last completed January 8, 1900. The object of the work was to develop the best methods of feeding hogs the Kansas crops that are good drought resisters and that do well on upland. We wanted to develop methods of handling these feeds that would produce the greatest daily gain for hogs at least cost, the greatest weight of pork per acre of feed, and pork of the best quality for the table.

Prof. F. C. Burtis, now of the Oklahoma Experiment Station, assisted in the experiments of 1897 and 1898.

In the first experiments ordinary methods were used. A careful study of the feeding indicated that certain changes would probably secure better results. These changes were made in the following experiment, and these in turn suggested further changes. In each of the latter experiments, the experience gained in those preceding it was used to improve the methods employed. This explains the lack of uniformity in the eight trials.

The different lots in each experiment were selected to make their average weights as nearly alike as possible and to have as nearly as we could judge the same feeding capacity. The same number of barrows were put in each of the lots of an experiment. If we had a "chunky" hog in one lot, a "chunky" hog was put in each of the other lots. If a long, rangy hog was in one lot, a hog of similar build was put in each of the other lots. The aim was to make the different lots in each trial so nearly uniform that all variations shown in the gains would be due to feed only.

In each experiment each hog was weighed separately at the same hour three consecutive days, at the beginning of the experiment, and the average of the three weights taken as the weight of the hog. Each hog was weighed weekly during the experiment, and at the close of the experiment each hog was weighed three consecutive days, at the same hour each day that he was weighed at the beginning, and the average of these three weights taken as his weight at the close of the experiment. These precautions were taken to avoid variations in weight caused by different amounts of feed or water consumed that might have been shown from single-day weighings.

In all experiments the hogs were fed twice a day. Each feed was weighed and the hogs were given what they would eat clean within an hour after feeding. Salt, wood ashes and charcoal made from corn-cobs were kept in boxes where the hogs could eat them at will.

In the second experiment the hogs were fed in closed sheds; in the

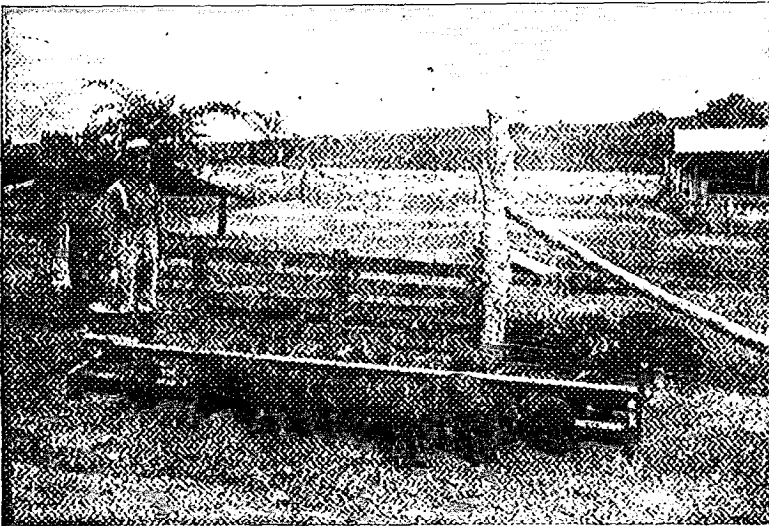


PLATE I. Summer and winter sheds and yards.

other experiments the hogs fed in winter were sheltered by sheds open to the south and the troughs were not under shelter. We wanted shelter that would not be better than that on the average farm. The hogs fed in summer had low sheds built without sides. The cut shows both winter and summer sheds and method of feeding.

FIRST EXPERIMENT.

Thirty hogs were used in this experiment. They were all bred by the College, born in the spring of 1897, about seven and one-half months old at the beginning of the experiment, and were pure-bred Berkshires and Poland-Chinas. The experiment began November 15, 1897, and continued forty-nine days. The table explains the feed used for each lot, the weight of hogs and feed, and the gains.

Lot No	I.  FEED.	Hogs in lot. . . .	Average weight per head, pounds.		Gain, pounds.		Grain fed, pounds.			
			Begin-ning	Close. . .	Average daily gain per head. . . . .	Average total gain per head. . . . .	Total pounds	Per day per head. . . . .	Pounds gain per bushel of grain. . . . .	Feed for 100 lbs. gain ..
2	Kafir-corn whole, dry. . . . .	5	188.0	256.0	1.39	68.0	1,846	7.53	10.33	<b>542</b>
3	Kafir-corn whole, soaked forty-eight hours. . . . .	5	188.0	254.0	1.35	66.0	2,090	8.53	8.86	<b>632</b>
4	Kafir-corn meal, wet. . . . .	5	187.6	278.2	1.85	90.6	2,136	8.72	11.89	<b>471</b>
5	Corn shelled, dry. . . . .	5	188.2	261.8	1.50	73.6	1,678	6.85	12.25	<b>457</b>
6	Kafir-corn meal one-half, corn-meal one-half, wet. . . . .	5	188.2	281.8	1.91	98.6	2,136	8.72	12.28	<b>456</b>
	Kafir-corn meal four-fifths, soy-bean meal one-fifth, wet. . . . .	5	188.2	292.0	2.12	103.8	2,122	8.66	13.89	<b>409</b>

Weight per bushel: Corn, 56 lbs., Kafir-corn, 56 lbs.; soy beans, 60 lbs.

In this trial 457 pounds of dry corn, or 542 pounds of dry Kafir-corn, were required for 100 pounds of gain, Kafir-corn showing a feeding value equal to eighty-four per cent, of that of corn.

Equal parts of corn and Kafir-corn meal gave as good results as shelled corn alone. If this proves to be generally true, a farmer can raise corn on his bottom land and Kafir-corn on his upland, and by feeding the two mixed secure as good returns from his upland as from the bottoms.

Wetting Kafir-corn meal at the time of feeding gave best results, this method giving the meal a feeding value of ninety-seven per cent. of that of dry corn. Taking dry whole Kafir-corn as a basis, we saved thirteen per cent. by grinding and feeding wet, and lost sixteen per cent. by soaking forty-eight hours. This is the only trial made that showed a gain from grinding.

The value of adding soy beans to Kafir-corn is shown in this trial

as well as in all our other trials. The hogs having one-fifth their grain soy beans made a greater daily gain and more gain from each bushel of feed eaten. By feeding one-fifth soy beans with the Kafir-corn, a saving was made in the amount of feed required to make 100 pounds of gain of thirteen per cent. when compared with Kafir-corn meal wet, of twenty-four per cent. when compared with whole Kafir-corn dry, and of ten per cent. when compared with dry shelled corn. The hogs having soy beans were better finished at the close of the experiment and had that smooth, slick appearance shown by animals fed oil-meal.

SECOND EXPERIMENT.

Eighteen hogs were used in this trial. They were bred by the College, born in the spring of 1897, were about six months old at the beginning of the experiment, and were pure-bred Berkshires and Poland-Chinas. The experiment began November 22, 1897, and continued eighty-four days.

Job No....	II.  FEED.	Hogs in lot.	Average weight per head, pounds.		Gain, pounds.		Grain fed, pounds.			
			Begin-ning	Close	Average daily gain per head....	Average total gain per head.	Total pounds.	Per day per head.	Pounds gain per bushel of grain ..	Feed for 100 lbs. gain.
7	Kafir-corn whole, dry.....	3	124.0	256.0	1.18	132.0	2,030	8.05	10.93	<b>512</b>
8	Kafir-corn whole, soaked forty-eight hours .....	3	123.3	241.0	1.05	117.66	1,939	5.77	10.18	<b>550</b>
9	Kafir-corn meal, wet.....	3	124.0	226.0	1.21	102.0	1,704	6.76	10.01	<b>539</b>
10	Corn shelled, dry.....	3	123.3	225.3	1.21	102.0	1,462	5.80	11.69	<b>479</b>
11	Kafir-corn meal one-half, corn-meal one-half, wet...	3	121.66	245.66	1.48	124.0	1,780	7.06	11.74	<b>477</b>
12	Kafir-corn meal four-fifths, soy-bean meal one-fifth, wet.....	3	120.0	265.66	1.73	145.66	1,780	7.06	13.92	<b>408</b>

In this experiment the same methods of feeding were used as in the first trial, but the hogs were lighter and the fattening period was longer. In this trial whole Kafir-corn fed dry showed a feeding value equal to 93½ per cent. of that shown by shelled corn fed dry. A loss was shown both from grinding and from soaking Kafir-corn. Corn and Kafir-corn meals mixed in equal parts gave as good gains as shelled corn, and the hogs fed one-fifth soy-bean meal made the best daily gains and the most gains per bushel of feed eaten. The saving made in the amount of feed required to make 100 pounds of gain by feeding one-fifth soy beans with Kafir-corn meal was nearly fifteen per cent. when compared with dry shelled corn, and twenty-seven per cent. when compared with Kafir-corn fed wet.

THIRD EXPERIMENT.

*Young Pigs.*— Twenty pigs were used in this experiment. They were pure-bred Berkshires and Poland-Chinas, bred by the College. At the beginning of the experiment the oldest was eleven weeks and the youngest seven weeks of age. The pigs were weaned two weeks before the beginning of the experiment. The trial began November 22, 1897, and continued 112 days. The four lots ran together during the day on alfalfa pasture and were divided and shut in separate pens at night. The alfalfa had a fine young growth and furnished good pasture for nearly two weeks. December 2 a snow covered the ground, and thereafter the pigs could get but little picking from the alfalfa, but were turned into the field on nice warm days during the winter for exercise. The table shows feeds and gains, disregarding the pasture.

Lot No	III.  FEED.	Hogs in lot . . .	Average weight per head, pounds.		Gain, pounds.		Grain fed, pounds.			
			Begin-ning	Close	Average daily gain per head . . . . .	Average total gain per head . . . . .	Total pounds	Per day per head	Pounds gain per bushel of grain. . .	Feed for 100 lbs. gain .
13	Kafir-corn meal soaked forty-eight hours . . . . .	5	35.8	110.0	.66	74.2	2,003	3.53	10.33	<b>542</b>
14	Kafir-corn meal two-thirds, soy-bean meal one-third, soaked forty-eight hours, . . . . .	5	35.0	164.2	1.15	129.2	2,406	4.30	15.33	<b>371</b>
15	Corn-meal soaked forty-eight hours . . . . .	5	35.6	118.2	.74	82.6	2,003	3.53	11.57	<b>484</b>
16	Corn-meal two-thirds, soy-bean meal one-third, soaked forty-eight hours, . . . . .	5	34.4	154.8	1.08	120.4	2,229	3.98	15.54	<b>369</b>

The pigs were six months old at the close of the experiment and were sold for light pork. Neither Kafir-corn meal alone nor corn-meal alone gave satisfactory gains. In this respect the experiment simply confirms the judgment of our best feeders. Corn and Kafir-corn are good feeds for fattening mature hogs, but young pigs fattened while growing must have material in their food that will develop muscle, bone, and blood. Soy beans supply this material in abundance, while corn and Kafir-corn are deficient in it.

This experiment brings out strongly the value of soy beans for feeding young pigs. Nearly the same gains per hundred pounds of feed were made with Kafir-corn and soy beans as with corn and soy beans, while the pigs fed Kafir-corn and soy beans ate the most feed and made the greatest total gains. Making the grain ration of these young pigs one-third soy-bean meal saved nearly twenty-four per cent. with corn-meal, and thirty-one per cent. with Kafir-corn meal

in the amount of feed required for 100 pounds of gain over that needed with corn and Kafir-corn alone.

Experiments made after this trial was completed indicate that we probably lost by soaking the feed.

FOURTH EXPERIMENT.

Sixty hogs were used in this experiment; they were bought of farmers, and were good, thrifty hogs of mixed breeding, most of them cross-bred Berkshire and Poland-China, fairly representing the average hogs on Kansas farms.

Many farmers in the alfalfa sections of northwestern Kansas winter their stock hogs on alfalfa hay and a small grain ration, and a few feed alfalfa hay alone. This shows that alfalfa hay is a valuable feed for stock hogs, and we determined to test its value in fattening.

The alfalfa hay used in this experiment was of the best quality—fourth cutting, and well cured with all the leaves on. The whole alfalfa hay was fed dry in forkfuls, in shallow, flat boxes. The pigs were given more than they would eat, and they ate the leaves and finer stems, rejecting the coarser stems. The weight, of hay given in the table is the weight fed, as the waste was not weighed. The alfalfa meal was made by grinding the hay in a Bowsher No. 8 iron feed-mill. This ground the leaves as fine as flour, but left some of the coarser stems only broken, the whole mass resembling bran in coarseness.

This experiment began November 24, 1898, and continued sixty-three days.

Lot No...	IV FEED.	Hogs in lot	Average weight per head, pounds.		Gain, pounds.		Grain fed, pounds.			Pounds feed for 100 pounds gain.	
			Begin-ning	Close	Average daily gain per head	Average total gain per head.	Total pounds.	Per day per head.	Pounds of grain per bushel of grain	Grain	Hay
17	Kafir-corn meal dry and whole alfalfa hay.	10	126.6	217.5	1.44	90.9	4,679	7.43	10.88	515	72.4
18	Kafir-corn meal dry and ground alfalfa hay	10	126.6	209.9	1.32	83.3	4,479	7.11	10.42	538	78.7
19	Kafir-corn meal four-fifths, soy-bean meal one-fifth	10	126.8	224.6	1.55	97.8	4,578	7.27	12.12	468	.....
20	Kafir-corn whole, dry.	10	125.9	185.2	.94	59.3	3,885	6.17	8.55	655	.....
21	Kafir-corn meal dry	10	125.5	177.9	.83	52.4	3,925	6.23	7.48	749	.....
22	Kafir-corn meal wet	10	125.0	188.3	1.00	63.3	4,375	6.94	8.10	691	.....

We were surprised at the results obtained in this experiment. We expected an increased gain from the hogs fed alfalfa hay, but not the

great increase shown. We expected that the ground alfalfa would produce greater gains than alfalfa fed whole; it gave less returns.

The hogs fed Kafir-corn meal and whole alfalfa hay gained an average of 90.9 pounds each in nine weeks, while those having Kafir-corn meal alone gained an average of 52.4 pounds each, an increase of over seventy-three per cent. from feeding the hay. The hogs fed hay ate more grain and gained more for each bushel eaten. The gains per bushel of feed were:

Kafir-corn meal dry and 7.83 pounds alfalfa hay . . . . .	10.88 lbs.
Kafir-corn meal dry alone . . . . .	7.48 "

This shows a gain from the hogs of 868 pounds per ton of alfalfa hay fed. With hogs at three cents per pound live weight, the hay fed the hogs made a return of \$26.04 per ton; and with hogs at four cents per pound live weight, the hay returned \$34.72 per ton. These results are not due to the feeding value of the alfalfa alone, but also to its influence in aiding the hogs to better digest the Kafir-corn. The alfalfa also gave variety to the ration, making it more appetizing and inducing the hogs to eat more grain.

Wetting the Kafir-corn meal made a saving of nearly eight per cent. over feeding it dry, while grinding the Kafir-corn caused a loss of over fourteen per cent.

Soy-bean meal produced even better results than the alfalfa hay. The hogs fed Kafir-corn meal four-fifths, soy-bean meal one-fifth, gained 97.8 pounds, while those fed on Kafir-corn meal alone gained 52.4 pounds, an increase of over 86½ per cent. from feeding the beans. The hogs fed the soy-bean meal required 468 pounds of grain for 100 pounds of gain, while those having Kafir-corn meal alone required 749 pounds of grain, a saving of over thirty-seven per cent. in amount of feed needed.

After nine weeks' feeding, it was evident that it would not pay to continue the experiment longer; the hogs ready for market were sold, while those not in marketable condition were kept to be fed in the fifth experiment. The hogs in the different lots showed great differences in finish, as follows :

*Lot 17.*— Kafir-corn meal dry and whole alfalfa hay. All in marketable condition.

*Lot 18.*— Kafir-corn meal dry and ground alfalfa hay. All in fair condition. Three retained because they could be fed longer profitably.

*Lot 19.*— Kafir-corn meal four-fifths, soy-bean meal one-fifth. All in good condition, and having the best finish of any lot. Two were kept for longer feeding.

Lot 20.— Kafir-corn whole, dry. Four in good flesh, and sold; six lank and not filled out, but thrifty in appearance.

Lot 21.— Kafir-corn meal dry. Four in good condition, and sold; six retained; two of these looked rough, and had made little gain. They did not relish the feed.

Lot 22.— Kafir-corn meal wet. Five in good condition, and sold; five were thrifty-looking, but too thin to market.

FIFTH EXPERIMENT.

Eighteen of the hogs retained from the previous experiment were selected for this trial, the selection being made to get three lots even in condition and feeding ability.

The Kafir-corn meal for lot, 23 was wet with water at the time of feeding, and the alfalfa hay was fed whole in a shallow, flat trough. The cottonseed-meal was mixed with the Kafir-corn for lot 24, and the mixture wet with water at the time of feeding. The skim-milk fed lot 25 was poured over the Kafir-corn meal at feeding.

This experiment began February 2, 1899, and continued twenty-two days, when all the hogs were in marketable condition.

Lot No..	V. FEED.	Hogs in lot ...	Average weight per head, pounds.		Gain, pounds.		Grain fed, pounds.			Pounds feed for 100 lbs. gain.	
			Begin-ning.	Close ..	Average daily gain per head.....	Average total gain per head .....	Total pounds	Pou day per head.....	Pounds gain per bushel of grain....	Kafir-corn grain .	
23	Kafir-corn meal wet and alfalfa hay whole ....	6	164.3	183.8	.88	19.5	629	4.76	10.4	538	} Hay 214.0
24	Kafir-corn meal and cottonseed-meal wet .....	6	160.5	181.5	.95	21.0	681*	5.16	10.4	466	
25	Kafir-corn meal and skim-milk.	6	171.0	224.5	2.43	52.5	861	6.52	20.9	268	

\*Kafir-corn meal, 588 lbs., cottonseed-meal, 93 lbs., or 1 lb. Kafir-corn to .16 lb. cottonseed-meal.

The experiment was conducted during the coldest days of the year, the thermometer registering 32 degrees below zero February 12. Notwithstanding the intense cold, the hogs fed alfalfa hay and those fed cottonseed-meal fattened into good condition and the hogs fed skim-milk made large gains. The hogs fed skim-milk were fatter then the average hogs marketed.

This experiment particularly shows the value of skim-milk in reducing the cost of producing pork. At the time of the trial, the prices of feed at Manhattan were: Kafir-corn meal, 55 cents per 100 pounds;



alfalfa hay, \$6 per ton; cottonseed-meal, \$20 per ton, and skim-milk, 15 cents per 100 pounds. At these prices for feed, the cost of 100 pounds of gain was, for the hogs fed alfalfa hay, \$3.60; for the hogs fed cottonseed-meal, \$3.30; and for the hogs fed skim-milk, \$2.26.

SIXTH EXPERIMENT.

Fifty hogs were used in this experiment, and the plan was to show more fully the value of the best methods used in previous trials. The hogs were bought of farmers, were below the average Kansas hog in quality, and not equal to those used in previous experiments. All grain in this experiment was wet with water at the time of feeding, as this method had given best returns in previous trials. The Kafir-corn and soy-bean meals were ground medium fine in a Bowsher No. 8 iron feed-mill. The alfalfa had been cut too late, was rather woody, and many of the leaves were gone. It was the best we could get at the time of trial.

This experiment began February 28, 1899, and continued for fifty days.

Lot No ..	VI. FEED.	Hogs in lot .....	Average weight per head, pounds.		Gain, pounds.		Grain fed, pounds.			Lbs. feed for 100 lbs. gain.	
			Begin-ning .	Close ...	Average daily gain per head . . . . .	Average total gain per head . . . . .	Total pounds.	Per day per head .....	Pounds gain per bushel of grain . . . . .	Grain ...	Hay .....
26	Kafir-corn whole and alfalfa hay .....	10	141.6	210.1	1.37	68.5	3,434	6.87	11.18	501	131
27	Kafir-corn meal and alfalfa hay .....	10	139.9	208.5	1.37	68.6	3,535	7.07	10.85	516	123
28	Kafir-corn meal four-fifths, soy-bean meal one-fifth .....	10	142.6	229.2	1.73	86.6	3,766	7.53	13.04	435	.....
29	Kafir-corn whole .....	10	133.2	183.8	.91	45.6	2,910	5.82	8.75	640	.....
30	Kafir-corn meal .....	10	138.8	182.9	.68	44.1	2,872	5.73	8.59	653	.....

The gains per hog in fifty days from the different methods of feeding were as follows:

Kafir-corn whole and alfalfa hay .....	68.5 lbs.
Kafir-corn meal and alfalfa hay .....	68.6 "
Kafir-corn whole, alone .....	45.6 "
Kafir-corn meal alone .....	44.1 "
Kafir-corn meal four-fifths, soy-bean meal one-fifth .....	86.6 "

The gains per bushel of grain fed were as follows:

Kafir-corn whole and 14.58 pounds alfalfa hay .....	11.18 lbs.
Kafir-corn meal and 13.4 pounds alfalfa hay .....	10.85 "
Kafir-corn whole, alone .....	8.75 "
Kafir-corn meal alone .....	8.59 "
Kafir-corn meal four-fifths, soy-bean meal one-fifth .....	13.04 "

This experiment shows a slight loss from grinding the Kafir-corn, a great gain from feeding alfalfa hay with the Kafir-corn, and a greater gain from the use of soy-bean meal. The alfalfa hay, poor in quality, increased the gains 333 pounds per ton fed.

The following notes were made at the close of the experiment:

*Lots 26 and 27.*— Kafir-corn and alfalfa hay. Fattened evenly. Swift & Co.'s buyer reported them as showing good finish.

*Lot 28.*— Kafir-corn meal four-fifths, soy-bean meal one-fifth. Fattened uniformly; were very fat at the close of the trial. Swift & Co.'s buyer reported this to be the best fattened bunch having good finish.

*Lot 29.*— Kafir-corn whole. Four hogs well fattened and six poorly finished. Swift & Co.'s buyer reported this lot third grade, not showing good finish.

*Lot 30.*— Kafir-corn meal. Six hogs well fattened and four poorly finished. Swift & Co.'s buyer reported this lot fourth grade; poor quality both in fat and bacon finish.

The fifty head were shipped to the packers, Swift & Co., St. Joseph, Mo., who valued the different lots at the following prices per hundred pounds live weight: Kafir-corn and alfalfa hay lots, \$3.67; Kafir-corn and soy-bean meal lots, \$3.70; Kafir-corn alone lot, \$3.65; and Kafir-corn meal alone lot, \$3.60. Swift & Co. slaughtered each lot separately and made the following report:

*Lot 26.*— Ten hogs fed on alfalfa hay and whole Kafir-corn; live weight, 2060 pounds. This lot dressed 79½ per cent. from live weight, and when cut out, forty-eight hours after being killed, showed that they were good, firm-fleshed hogs, suitable for light-weight products. There was a good distribution of lean and fat in the bellies, though for firmness the meat was not equal to either lot 27 or lot 30.

*Lot 27.*— Ten hogs fed on alfalfa hay and Kafir-corn meal; live weight, 2060 pounds. This lot dressed 79 per cent. from live weight and the class of products from this lot is practically the same as from lot 26, distribution of lean and fat being good. The firmness of the fat in this lot was far above any of the others, and the fat had a good white color that is not customary in corn-fed hogs.

*Lot 28.*— Ten hogs fed on four-fifths Kafir-corn meal, one-fifth soy-bean meal; live weight, 2260 pounds. This lot dressed 80 per cent. from live weight, and the firmness of the fat in this lot is fair, but the cuts contained rather too great a proportion of fat for this weight hog, and for leanness would not compare with either lot 26 or lot 27.

*Lot 29.*— Ten hogs fed on whole Kafir-corn; live weight, 1800 pounds. This lot dressed 80.4 per cent. from live weight, and, while

the variations in weight were greater in this lot than in any of the others, it was the most suitable lot for bacon hogs of the five. There were a few hogs out of the ten that would have been suitable for English cuts, on account of the evenness of the fat and the good distribution of lean through the bellies.

*Lot 30.*— Ten hogs fed on Kafir-corn meal; live weight, 1790 pounds. This lot dressed 80 per cent. from live weight, and while the same average weight as lot 29, the hogs were fatter and not so adaptable for fancy bacon as lot 29. Firmness of the fat in this lot was good, but not as good as lot 27, but better than any of the others.

In our estimation, lots 26, 28, and 29, for firmness of the flesh, were no better than the regular corn-fed hogs, though it seems to us that corn-fed hogs of this weight would have been fatter. This excepts lot 28. which, as near as we could judge, were about as fat as corn-fed hogs of that weight would run.

Lots 27 and 30 had firmer flesh than would be found in a regular run of corn-fed hogs.

The yield of these lots from live weight was good, and on the last two lots was a little better than we would expect from the average hog.

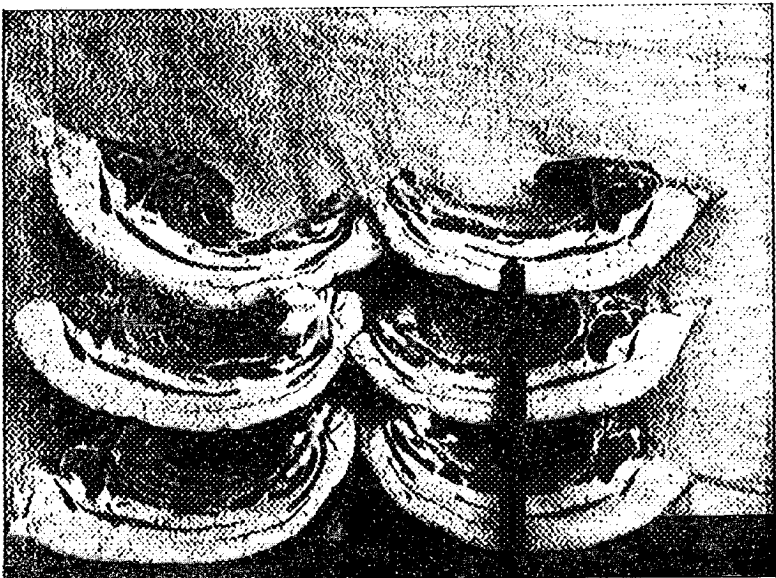


PLATE II. Kafir-corn whole and alfalfa hay.

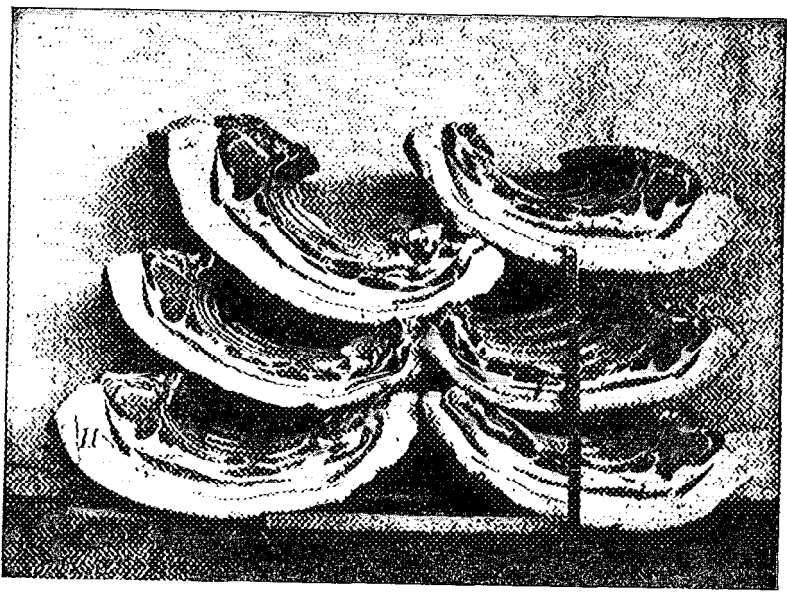


PLATE III. Kafir-corn meal and alfalfa hay.

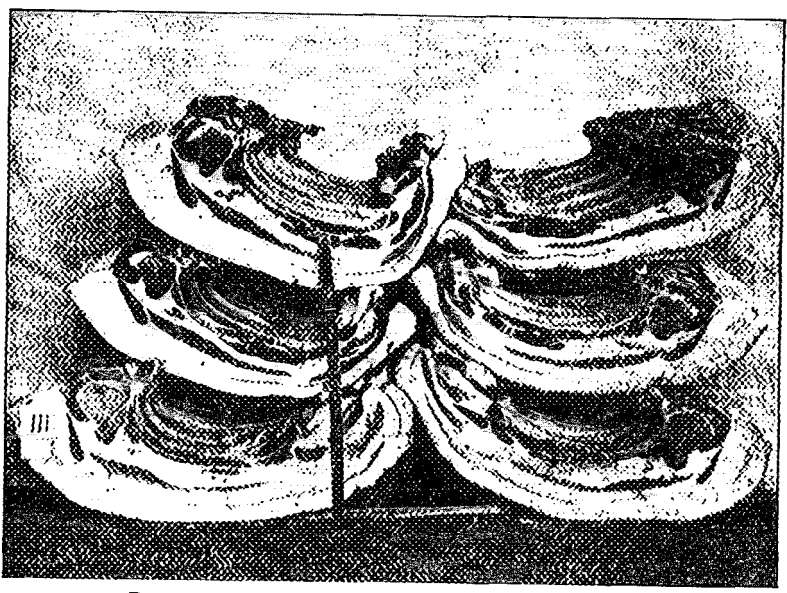


PLATE IV. Kafir-corn four-fifths, soy-bean meal one-fifth.

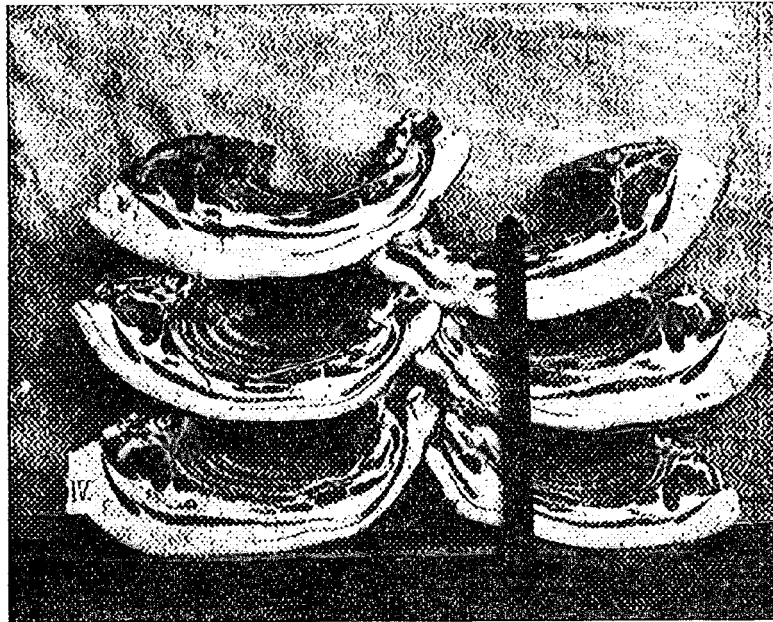


PLATE V. Kafir-corn whole, alone.

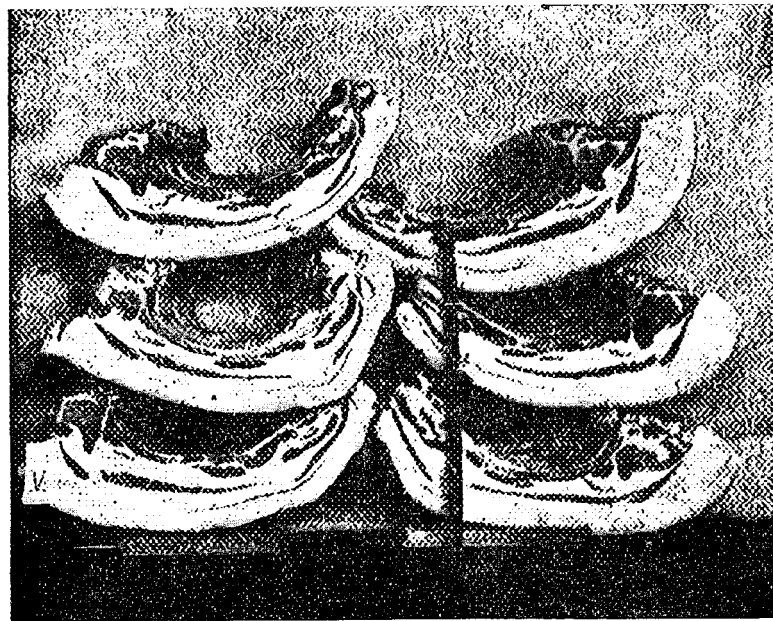


PLATE VI. Kafir-corn meal alone.

PLATE VII.



I. Kafir-corn whole and alfalfa hay.  
II. Kafir-corn meal and alfalfa hay.

III. Kafir-corn four-fifths, soy-bean meal one-fifth.  
IV. Kafir-corn whole, alone.  
V. Kafir-corn meal alone.

SEVENTH EXPERIMENT.

Eighty hogs were used in this experiment, and the plan was to show the value of our drought-resisting feeds for summer fattening. The hogs were mixed-bred hogs purchased of farmers, and were of average quality.

The alfalfa pasture was four years old and a poor stand. Each lot of hogs having pasture had the run of 1.87 acres of alfalfa. The first crop was mowed for hay before the hogs were turned on. At the end of the fourth week of the experiment the pastures were cut for hay a second time, as the hogs did not keep the growth eaten down. The pastures proved to be too large for the number of fattening hogs put on them, allowing the hogs to run too much.

The skim-milk used was sterilized skim-milk purchased of the Manhattan creamery. One day each week skim-milk could not be obtained and buttermilk was used in its place, experiments at other stations showing that skim-milk and buttermilk have the same feeding value.

The grain of the hogs fed milk was put in the feed-trough dry and the milk poured over it. The grain for the other lots was wet with water at the time of feeding.

This experiment began March 30 and continued forty-two days.

Lot No	VII.  FEED.	Hogs in lot. ....	Average weight per head, lbs.		Gain, lbs.		Grain fed, pounds.			Lbs. feed for 100 lbs. gain.	
			Begin-ning..	Close.	Av daily gain per head.	Av total gain per head	Total pounds.	Per day per head..	Pounds gain per bushel of grain ...	Grain....	Skim-milk..
31	Kafir-corn whole, skim-milk, and alfalfa pasture .....	20	124.40	194.95	1.68	70.55	6,736	8.02	11.78	477	*298
32	Kafir-corn whole and skim-milk.....	20	124.35	190.30	1.57	65.95	6,601	7.86	11.19	500	318
33	Kafir-corn whole. ....	20	124.20	165.90	.99	41.70	5,321	6.33	8.78	638	.....
34	Kafir-corn whole and alfalfa pasture. ....	20	124.55	169.00	1.08	45.23	4,931	5.97	10.11	554*	.....

\*Pasture to be added.

The gains per head for the forty-two days from the different methods of feeding were as follows:

- Whole Kafir-corn \_ . . . . . 41.7 lbs.
- Whole Kafir-corn and alfalfa pasture. . . . . 45.2 "
- Whole Kafir-corn and skim-milk. . . . . 66.0 "
- Whole Kafir-corn, alfalfa pasture, and skim-milk .. . . . 70.6 "

This shows poor returns from the alfalfa pasture. The hogs were fed all the grain they would eat, and fed but little on the pasture, while the pasture allowed them too much exercise. To get the most out of

pasture, hogs should be given a light grain ration. Prof. E. M. Shelton, at this College, showed a gain of 776 pounds of pork per acre of alfalfa pasture, with hogs fed little grain. The hogs having both pasture and skim-milk with the Kafir-corn made the best gains.

It required 638 pounds of whole Kafir-corn to make 100 pounds of gain, and 500 pounds whole Kafir-corn and 318 pounds of skim-milk to make 100 pounds of gain—318 pounds of milk in this trial producing as much gain as 138 pounds of Kafir-corn. This shows 129 pounds of creamery skim-milk fed with Kafir-corn to have the same feeding value as one bushel of whole Kafir-corn fed alone. With hogs at three cents per pound live weight, the skim-milk fed with Kafir-corn brought twenty cents per hundred pounds. The hogs were fed five pounds of milk each per day.

By the end of the seventh week the hogs seemed to have passed the most profitable feeding period. The weather was hot and the hogs began to eat less. The hogs having pasture, those fed skim-milk and those having skim-milk and the pasture were in good condition. The hogs fed the Kafir-corn alone were not finished.

The hogs were shipped to Armour & Co., Kansas City, for slaughter test, who made the following report:

*Lot 31.*— Twenty hogs fed on Kafir-corn, skim-milk, and alfalfa pasture; live weight, 3770 pounds; yielded 80.53 per cent. When cut out, the flesh showed a good, firm condition; nice white fat and better proportion of fat to weight of hogs than in any of the other lots. The distribution of lean and fat in bellies not so good as in lots 32 and 34.

*Lot 32.*— Twenty hogs fed on Kafir-corn and skim-milk; live weight, 3700 pounds; yielded 81.17 per cent. When cut out, showed condition of flesh same as in lot 31. One hog in this lot showed fat very yellow, others good white color. Proportion of fat to weight of hogs not so good as either lot 31 or 34; distribution of lean and fat in bellies better than in lots 31 and 33.

*Lot 33.*— Twenty hogs fed on Kafir-corn alone; live weight, 3260 pounds; yielded 80.30 per cent. When cut out, showed flesh very irregular and rather soft. Color of fat about the same as in other lots but softer. Neither the proportion of fat to weight of hogs or distribution of lean and fat in bellies as good as any of the other lots.

*Lot 34.*— Twenty hogs fed Kafir-corn and alfalfa pasture; live weight, 3340 pounds; yielded 81.05 per cent. When cut out, showed condition of flesh firm, not quite up to lots 31 and 32; color of fat good; proportion of fat to weight of hogs not so good as lot 31, bet-



ter than lots 32 and 33; distribution of lean and fat in bellies better than lots 31 and 33, about the same as lot 32.

EIGHTH EXPERIMENT.

*Feeding Cholera Hogs.*— Sixty-six hogs were used in this experiment. In June, 1899, 115 weaned pigs were purchased; and 320 pigs, averaging sixty pounds each, were purchased in August, 1899, with the object of continuing our work with drought-resisting feeds for fattening hogs. Each lot was inoculated at time of purchase with virus for the prevention of hog-cholera. The pigs were attacked with the cholera, and all but sixty-six head died. These appeared well, but were in thin flesh, as a result of the disease. Our plans for experiments had to be dropped, and it was desirable to fatten the hogs that were alive as soon as possible. Thirty head were divided into three lots of ten each. The remaining thirty-six head were used as a check on lot 37. The feeds selected were those that we judged from previous experiments would produce the most rapid gains.

The table shows the methods of feeding, the amount of feed, and the gains.

The experiment began October 3, 1899, and continued ninety-seven days.

Lot No.	VIII. FEED.	Hogs in lots.....	Average weight per head, lbs.		Gain, lbs.		Total pounds feed.			Pounds feed for 100 pounds gain.		
			Begin-ning ..	Close . .	Average daily gain per head.....	Average total gain per head.....	Kafir-corn.	Alfalfa hay.	Skim-milk..	Kafir-corn.	Alfalfa hay.	Skim-milk..
35	Kafir-corn whole, soy bean meal, and alfalfa hay.....	10	109.7	188.5	.81	78.8	4,960	1,148	.....	629	145+	.....
36	Kafir-corn whole, soy beans whole, and alfalfa hay.....	10	109.7	205.0	.98	95.3	5,393	1,148	.....	566	120.4	.....
37	Kafir-corn whole, soy beans whole, alfalfa hay, and skim-milk ..	10	82.0	196.5	1.18	114.5	4,622	1,148	4,239	403.6	100+	370.2
38	Kafir-corn whole, soy beans whole, alfalfa hay, and skim-milk ..	36	90.6	211.1	1.31	120.5	20,380	2,192	7,447	469	50.5	171.6

The gains are poor considering the character of the feed given. The hogs in all lots would eat a light feed with relish, but would not stand heavy feeding. The cholera seemed to have lessened their ability to consume feed.

The hogs fed skim-milk made the most rapid gains, and required the least amount of grain for 100 pounds of gain. Lot 38, which had milk, was finished in ninety-two days and sold. The other lots required ninety-seven days in which to fatten.

The only point of value brought out by this experiment is the loss from grinding soy beans. The hogs having ground soy beans requiring over eleven per cent. more meal to make 100 pounds of gain than those fed the beans whole.

VALUE OF BREED AND TYPE.

The hogs fed in the first three experiments were pure-bred hogs raised by the College, and were good types of Berkshires and Poland-Chinas. In the remaining five experiments the hogs were purchased of farmers and were of mixed breeding, mostly Berkshire and Poland-China crossed, of average quality. In the third experiment pigs were fed, and in the first and second trials hogs. Taking the average gains of the pure-bred hogs in the first and second experiments, and the average gains of the mixed-bred hogs fed by the same methods, the amount of feed required to make 100 pounds of gain is, dropping fractions, as follows:

	Pure-bred hogs.	Mixed-bred hogs.	Increase in feed needed by mixed-bred hogs.
Kafir-corn whole, dry . . . . .	527	647	23 per cent.
Kafir-corn meal wet . . . . .	515	672	30 " "
Kafir-corn meal four-fifths, soy-bean meal one-fifth . . . . .	409	452	10 " "

This showing that average mixed-bred hogs required from ten to thirty per cent. more feed for 100 pounds gain than good pure-bred hogs is a strong argument for better breeding. The scrub hog should go.

In these experiments we found many well-built hogs among those we purchased—hogs that would stand heavy feeding and make good returns for the feed. We found two mistakes common in the mixed-bred hogs. One class had good hind quarters, but were low in front and weak through the heart. Such hogs get off feed easily, often will not stand heavy feeding, and take disease readily. The other unprofitable class is the "chunk," the fine-boned, short, blocky hog with heavy jowls. This is the form of hog the feeder often breeds for, after he has found the weakness of the first class described. The "chunk" is fat or can be quickly fattened, but will not eat enough feed to make profitable gains.

The hogs that made the best gains in these experiments were well boned, with both fore and hind quarters well developed, rather rangy, well developed through the heart, with heavy-boned legs of fair length.

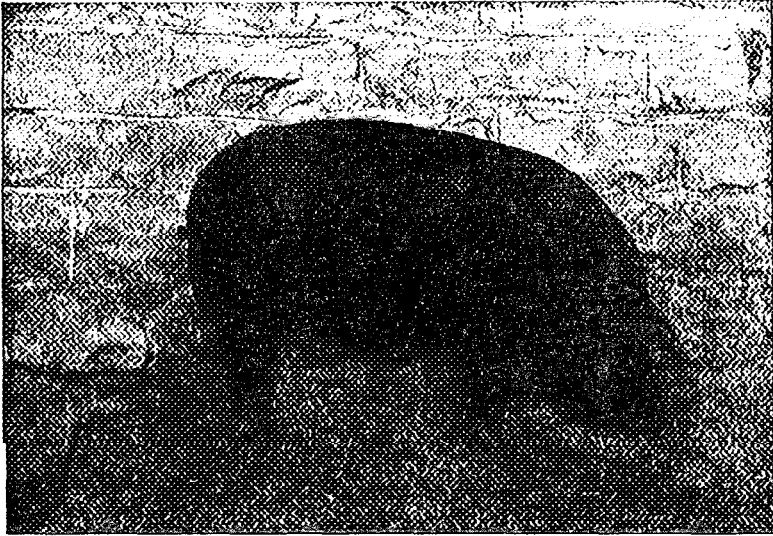


PLATE VIII. The "chunk."

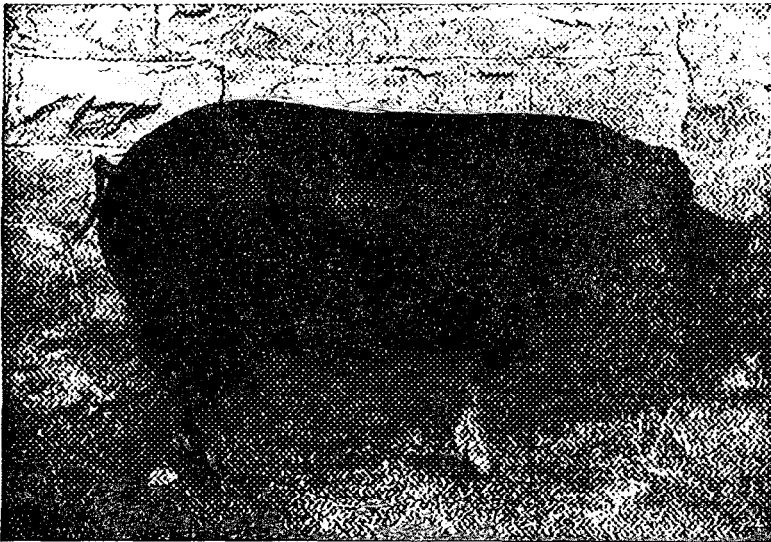


PLATE IX. The hog that makes profitable gains.

FEED REQUIRED FOR ONE HUNDRED POUNDS OF GAIN.

Twenty-five different lots of hogs have been fattened on grain alone. The different lots show wide variations in the amount of feed required to make 100 pounds gain.

Lot No.	FEED.	Feed required for 100 lbs. gain.
16	Corn-meal two-thirds, soy-bean meal one-third	369 lbs.
14	Kafir-corn meal two-thirds, soy-bean meal one-third	374 "
12	Kafir-corn meal four-fifths, soy-bean meal one-fifth	408 "
6	Kafir-corn meal four-fifths, soy-bean meal one-fifth	409 "
23	Kafir-corn meal four-fifths, soy-bean meal one-fifth	435 "
5	Kafir-corn meal one-half, corn-meal one-half	456 "
4	Shelled corn, dry	457 "
19	Kafir-corn meal four-fifths, soy-bean meal one-fifth	468 "
3	Kafir-corn meal, wet	471 "
11	Kafir-corn meal one-half, corn-meal one-half, wet	477 "
10	Shelled corn, dry	479 "
15	Corn-meal, soaked forty-eight hours	484 "
7	Kafir-corn whole, dry	512 "
24	Kafir-corn meal and cottonseed-meal	540 "
1	Kafir-corn whole, dry	542 "
13	Kafir-corn meal, soaked forty-eight hours	542 "
8	Kafir-corn whole, soaked forty-eight hours	550 "
9	Kafir-corn meal, wet	559 "
2	Kafir-corn whole, soaked forty-eight hours	632 "
33	Kafir-corn whole, wet	638 "
29	Kafir-corn whole, wet	640 "
30	Kafir-corn meal, wet	653 "
20	Kafir-corn whole, dry	655 "
22	Kafir-corn meal, wet	691 "
21	Kafir-corn meal, dry	749 "
	Average	528 lbs.

This table shows the average amount of feed required to produce 100 pounds of gain was 528 pounds of grain, with variations in feed ranging from 369 pounds to 749 pounds of grain. It is noticeable that the hogs requiring the least amount of feed for 100 pounds gain had soy-bean meal in their rations. The six lots of hogs having soy beans as part of their ration required an average of 411 pounds of grain for 100 pounds of gain, while the nineteen lots not fed soy beans required an average of 564 pounds of feed for 100 pounds of gain, an increase in food required of over thirty-seven per cent. The moral of this is, raise and feed soy beans. Skim-milk and alfalfa hay also greatly reduced the amount of grain required for 100 pounds gain.

PREPARATION OF FEED.

Grinding Kafir-corn gave greatest returns in our first experiment, showing a saving of thirteen per cent. in amount of feed required for 100 pounds of gain. In all other trials Kafir-corn meal gave less gains than the whole grain, the loss from grinding being nine and fourteen per cent. in the different trials.

Soaking the Kafir-corn resulted in losses of seven and seventeen per cent.

Wetting the grain at the time of feeding gave best results, and this is the method we recommend. We put the whole grain dry into the trough and pour over it sufficient water or skim-milk to thoroughly wet the grain. When water is used we add enough to have a little left in the trough after the grain is eaten. Kafir-corn is dusty, and when fed dry makes hogs cough.

Grinding alfalfa hay resulted in a loss, and we recommend the hay to be fed whole, just as to cattle.

Grinding the soy beans caused a loss of eleven per cent. in the one experiment where both ground and whole beans were fed.

KAFIR-CORN.

In the first and second trials an average gain is shown of 100 pounds from 527 pounds of Kafir-corn or from 468 pounds of corn, a bushel of Kafir-corn producing 10.6 pounds gain, a bushel of corn 11.9 pounds. In these trials a bushel of Kafir-corn had eighty-nine per cent. of the feeding value of corn. For the past eleven years the average yearly yield per acre on the College farm—upland—has been: Kafir-corn, 46 bushels; corn, 34½ bushels. This shows an average yearly yield of grain to produce, per acre, from Kafir-corn 487 pounds of pork, from corn 410 pounds of pork. A bushel of corn will produce more pork than a bushel of Kafir-corn. On the College farm, an acre of Kafir-corn will produce more pork than an acre of corn. Kafir-corn is our most vigorous plant on upland soils, and is a strong drought resister.

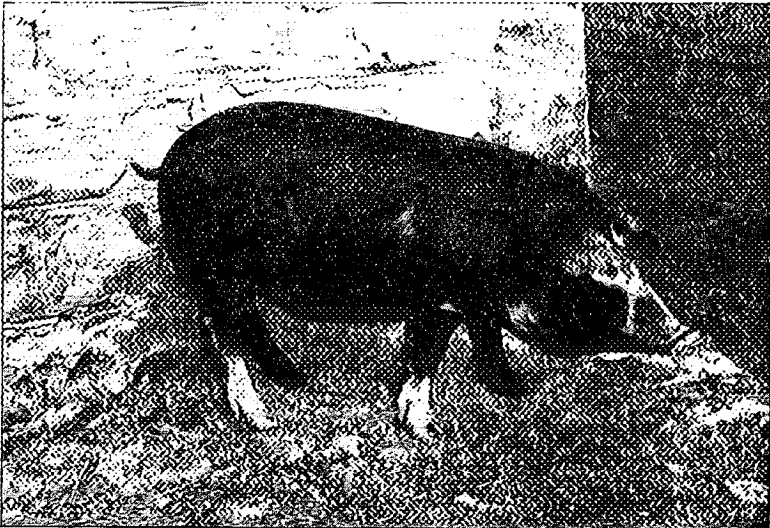


PLATE X. The Kafir-corn-fed hog.

Hogs tire of Kafir-corn alone much more quickly than they do of corn alone. Hogs like this grain at first, and when fed Kafir-corn alone eat it with relish for about four weeks, gaining as fast as if fed corn. Then they become tired of it and show intense longing for other feed. If no other feed is given they will eat their bedding in an effort to get variety, and show every sign of loathing the Kafir-corn. Their tails hang down, their heads droop, and the general appearance is dispirited. The cut gives a fair idea of the Kafir-corn pig at the end of six weeks' feeding.

Kafir-corn is our most constipating grain, and it is to this quality that we attribute its effect on the hog's appetite, as on this account hogs fed exclusively on Kafir-corn become feverish and unthrifty. When laxative feeds are given with Kafir-corn the hog's appetite is vigorous through a long feeding period.

Often a mature hog will continue to make good gains from Kafir-corn alone until well fattened. After young hogs become tired of an exclusive diet of Kafir-corn it is difficult to get them to eat enough of this grain to thoroughly fatten. A bunch of hogs fed Kafir-corn alone fattens unevenly, some becoming well fattened, some moderately fat, and others remaining thin, although increasing in weight. This has been true of every lot we have fed on Kafir-corn alone, no matter how even the hogs seemed to be at the beginning of the trial.

Kafir-corn fed with alfalfa, soy beans or skim-milk is eaten with relish every meal until the hogs are thoroughly finished and the lot fattens evenly.

ALFALFA HAY.

In the fourth experiment alfalfa hay was fed to two lots being fattened on Kafir-corn. The hogs fed hay ate more grain and gained more for each bushel eaten, showing a gain of 868 pounds of pork per ton of alfalfa hay fed whole, and 716 pounds of pork per ton of alfalfa hay fed ground. The hogs having both grain and hay gained an average of 90.9 pounds each, while the hogs fed grain alone gained an average of 52.4 pounds each, showing 73 per cent. increase in gain from feeding the hay. The gains per bushel of feed were as follows:

Kafir-corn meal and 7.83 pounds alfalfa hay. ....	10.88 lbs.
Kafir-corn meal alone .....	7.48 "

Valuing the hay at three dollars per ton and fat hogs at three cents per pound live weight, the Kafir-corn fed alone brought 22.4 cents per bushel, and the Kafir-corn fed with alfalfa hay brought 31.4 cents per bushel.

The hay fed in the fourth trial was early cut and carefully cured with the leaves on. In our sixth trial alfalfa hay was used that was

cut late, and many of the leaves were lost in curing. The experiment showed a gain of 333 pounds per ton of the hay fed. The hogs having both grain and hay gained 68.5 pounds each, and the hogs having Kafir-corn alone gained 45.6 pounds each, showing 50 per cent. increase in gain from feeding from poor alfalfa hay. The gains per bushel of feed were as follows:

Kafir-corn whole and 14.58 pounds alfalfa hay.. . . .	11.17 lbs.
Kafir-corn whole.....	8.75 "

Valuing the hay at three dollars per ton, and fat hogs at three cents per pound live weight, the Kafir-corn fed alone brought 26.2 cents per bushel, and the Kafir-corn fed with alfalfa hay brought 33.2 cents per bushel.

These trials with alfalfa hay show two things: the great value of alfalfa hay to feed with Kafir-corn, and the need of cutting it early and carefully curing it. The hogs eat the leaves. Alfalfa hay for hogs should be cut before more than half the plants are in bloom and handled in curing to save every leaf possible.

SOY BEANS.

The soy bean stands drought as well as Kafir-corn or sorghum, is not touched by chinch-bugs, and does well on poor soils. Every experiment in which soy beans were tried shows that, when part of the ration was beans, the hogs having them ate the most grain, and made the most gain for feed eaten. The results are:

EXPERIMENTS.	Average gain per hog, lbs.....	Increased gain from soy beans, per cent.....	Pounds feed for 100 lbs. gain.....	Per cent feed saved by feeding soy beans.....
<b>FIRST EXPERIMENT:</b>				
Kafir-corn meal.....	90.6		471	
Kafir-corn meal four-fifths, soy-bean meal one-fifth.....	103.8	14.6	409	13.2
<b>SECOND EXPERIMENT:</b>				
Kafir-corn meal.....	102.0		559	
Kafir-corn meal four-fifths, soy-bean meal one-fifth.....	145.7	42.8	408	27.0
<b>THIRD EXPERIMENT:</b>				
Kafir-corn meal.....	74.2		542	
Kafir-corn meal two-thirds, soy-bean meal one-third.....	129.2	74.1	374	31.0
Corn-meal.....	82.6		484	
Corn-meal two-thirds, soy-bean meal one-third.....	120.4	45.5	389	23.7
<b>FOURTH EXPERIMENT:</b>				
Kafir-corn meal.....	52.4		749	
Kafir-corn meal four-fifths, soy-bean meal one-fifth.....	97.8	86.5	468	37.5
<b>SIXTH EXPERIMENT:</b>				
Kafir-corn meal.....	44.1		653	
Kafir-corn meal four-fifths, soy-bean meal one-fifth.....	86.6	96.4	435	33.2

This table shows an increase in gain of from 14.6 to 96.4 per cent. by making the ration one-fifth soy beans, and that the rations containing one-fifth soy beans show a saving in the amount of feed required to make 100 pounds of gain from 13.2 to 37.5 per cent. Can the Kansas farmer afford to fatten hogs without soy beans? Hogs fed soy beans fatten rapidly, look thrifty, have strong appetites, and the hair and skin are glossy, like those of animals fed oil-meal. The soy bean is a rich feed and we do not recommend more than one-fifth to one-third of the ration to be made of the beans. Soy beans may be fed whole, mixed with the other grain, or unthrashed beans, stalk and all, may be thrown to the hogs and they will quickly pick out the beans. We lost eleven per cent. from grinding the beans.

SKIM-MILK.

In our fifth experiment creamery skim-milk was fed, and shows the following results:

FEED.	Gain per hog, lbs.	Pounds feed for 100 pounds gain.		
		Kafir-corn.	Hay.	Skim-milk.
Kafir-corn meal and alfalfa hay.....	19.5	538	214	.....
Kafir-corn meal and skim-milk.....	52.5	288	.....	526

The hogs having the skim-milk made over 169 per cent. more gain than the hogs not fed milk, and 526 pounds of skim-milk instead of 214 pounds of alfalfa hay reduced by 50 per cent. the amount of feed required to make 100 pounds of gain. Valuing the Kafir-corn at 55 cents per hundred and hogs at three cents per pound live weight, we realized 29 cents per hundred from feeding the skim-milk.

In our seventh experiment whole Kafir-corn was fed to one lot of hogs and whole Kafir-corn and creamery skim-milk to another lot.

FEED.	Gain per hog, lbs.	Pounds feed for 100 lbs. gain.	
		Kafir-corn.	Skim-milk.
Kafir-corn.....	41.7	638	.....
Kafir-corn and skim-milk.....	65.9	500	318

The hogs having the skim-milk made 58 per cent. more gain than those not fed milk, and 230 pounds of milk took the place of 100 pounds of grain. Valuing whole Kafir-corn at 50 cents per hundred and live hogs at three cents per pound, the skim-milk brought 15.7 cents per 100 pounds.



COTTONSEED-MEAL.

We fed cottonseed-meal to one lot of hogs that had not done well in another experiment, and they were ready for market, well finished, in twenty two days. Cottonseed-meal fed in large quantities or for long periods is death to hogs. Fed for a short time, in small quantities, it is valuable to put hogs in good condition that are not doing well. We begin by feeding one-fourth pound of cottonseed a day per 1000 pounds live weight of hogs, and increase each day to ten days, when we feed per day three pounds per 1000 pounds live weight of hogs, mixing the meal with the other grain. This quantity of cottonseed can be profitably fed three to four weeks.

VALUE OF PROTEIN AND MINERAL MATTER.

These experiments bring out strongly the value of these materials in making increased gains from food consumed. In each trial where a feed rich in protein and mineral matter was added to Kafir-corn or corn the addition made variety and the ration was more appetizing. This helped to increase the gain, as is shown in the trials where corn was added to Kafir-corn. After allowing full value to the increased gain from the effect of variety, we still have a greater part of the increase to be accounted for by the influence of the protein and mineral matter in the feeds given with Kafir-corn.

The table gives the composition of the feeds given in the eight experiments.

FEEDS.	Mineral mat- ter, per cent.	Digestible nutrients, pounds per 100 lbs. feed.			Nutri- tive ratio, 1 to—
		Pro- tein.	Carbo- hy- drates.	Fat.	
Corn .....	1.5	7.8	66.7	4.3	9.7
Kafir-corn.....	2.5	7.3	65.2	.....	8.9
Soy beans.....	4.7	29.6	22.3	14.4	1.8
Cottonseed-meal.....	7.2	37.2	16.9	12.2	1.2
Skim-milk.....	0.7	3.9	4.5	0.1	1.2
Alfalfa hay.....	10.5	14.5	43.0	1.0	3.1

NOTE.—The analyses of the alfalfa hay and Kafir-corn were made by the chemical department of this Station during the progress of these experiments, and represent the composition of the feed given the hogs. The analyses of the other feeds represent the average composition, as given by our best authorities.

Taking the results obtained from lots where grain only was fed, we have the following showing in regard to the value of protein and mineral matter:

	Protein, pounds.	Mineral matter, pounds.	Pounds feed for 100 lbs. gain.
Corn 66% pounds, soy beans 33% pounds .....	15.1	2.6	369
Kafir-corn 66% pounds, soy beans 33% pounds.....	14.8	3.3	374
Kafir-corn 80 pounds, soy beans 20 pounds.....	11.8	2.9	408 to 468
Corn 100 pounds .....	7.8	1.5	457 to 479
Kafir-corn 100 pounds.....	7.3	2.5	471 to 749

This is a strong showing of the value of feeds rich in protein and mineral matter for fattening hogs, as it shows that as the protein and mineral matter were increased the amount of feed required for 100 pounds of gain decreased.

The mineral matter is needed in the growth of bone and flesh, and neither corn nor Kafir-corn furnishes a sufficient quantity to supply the needs of the hog. The need of mineral matter is much greater in hogs that are growing while being fattened than in mature animals. In other experiments we have kept pigs in a stone piggery, and those fattened on corn or Kafir-corn alone craved mineral matter so intensely that they ate the mortar from between the stones.

Protein is needed to form blood and flesh and is used to form fat in the body. Neither corn nor Kafir corn supplies it in sufficient quantities, as is seen in the much better results obtained where additional protein was furnished by the soy beans. Soy beans contain the most protein of any crop that can be raised on Kansas farms, and alfalfa comes next.

The profits made by adding more protein to a ration of Kafir-corn are easily shown from the results obtained in our sixth experiment. In this experiment one bushel of Kafir-corn and 7.83 pounds alfalfa hay gave 10.88 pounds gain, and one bushel of Kafir-corn alone gave 7.48 pounds gain. Fifty acres of Kafir-corn yielding forty-six bushels per acre, our average on upland, will produce 2300 bushels, which would produce, with the quality of hogs used in this experiment, 17,-204 pounds gain, worth \$516.12 with hogs at three cents per pound live weight. Hogs fed this amount of Kafir-corn would eat nine tons of the best quality of alfalfa hay. This Kafir-corn and alfalfa together would produce 25,024 pounds gain, worth, at three cents, \$750.72, a profit of \$234.60 by adding the protein in nine tons of hay to the Kafir-corn raised on fifty acres.

#### WHAT THESE EXPERIMENTS SHOW FOR KANSAS.

We have had but one failure of Kafir-corn in eleven years. It gives a good grain yield on upland, and is our surest crop in drought. Soy beans give a fair yield on upland, stand drought well, and are not touched by chinch-bugs. Alfalfa can usually be raised in the draws of the highest upland Kansas farms; yields at least one crop in the dryest year, and usually two to four crops a year on most farms.

These experiments show that Kafir-corn and either soy beans or alfalfa, properly combined, produce good results in fattening hogs. On an upland farm an acre of Kafir-corn will produce more pork than an acre of corn. Kafir-corn fed alone to hogs does not give nearly so large gains as when fed with soy beans or alfalfa hay. Kafir-corn combined with either soy beans or alfalfa hay will produce more

pounds of pork per acre from upland than are usually produced from adjoining bottom lands from corn. Kafir-corn, or its near relatives, rice-corn and Jerusalem corn, yield well in every part of the state. The experiments reported in this bulletin show that, by combining soy beans or alfalfa hay with Kafir-corn, hogs may be fattened profitably on every farm in the state. Corn should be raised where it will yield more than Kafir-corn, and Kafir-corn where its yield is the higher.

Skim-milk fed with Kafir-corn made our best gains, and the 30,000 patrons of Kansas creameries can increase their profits by feeding their skim-milk with Kafir-corn, using the methods of feeding which this bulletin shows to be the best.

Pure-bred hogs gave so much better gains per bushel of feed than average hogs that the value of breeding up cannot be questioned.

The yields we have obtained from Kafir-corn, soy beans, and alfalfa hay, the showing of only one crop failure in eleven years, and the good results obtained from fattening hogs with combinations of these feeds, show a greater certainty of crop and more pounds of pork per acre than are usually secured by ordinary feeds in other states.