

EXPERIMENT STATION  
OF THE  
KANSAS STATE AGRICULTURAL COLLEGE,  
MANHATTAN.

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**FARM DEPARTMENT.**

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**KAFIR-CORN.**

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KAFIR-CORN is grown in every county in the state, Sec. F. D. Coburn, of the State Board of Agriculture, reporting 582,895 acres grown in Kansas in 1899. Notwithstanding this general distribution and large acreage, we are constantly receiving letters asking for information in regard to the raising and feeding of this crop.

Kafir-corn is comparatively a new crop, Secretary Coburn first listing it in 1893 and showing 46,911 acres for the state.

DESCRIPTION.

Kafir-corn belongs to the group of sorghums that contain but little sugar. The plants grow erect, with thick, short-jointed stalks, bearing broad, deep-green leaves. The plants average 4½ to 6½ feet in height. The heads are compact, stand erect, and average from ten to fifteen inches in length.

Kafir-corn is raised both as a grain crop and as a hay crop. Its greatest value is for grain and this bulletin will treat of it chiefly as a grain crop.

VARIETIES.

Kafir-corn has been raised on the Kansas Agricultural College farm for eleven years. We recommend two varieties—the red and

the black-hulled white. For the first seven years we raised the red. The black-hulled white was then tested, and from 1896 to 1898 the two varieties were grown side by side, the red giving an average yearly yield of thirty-seven bushels per acre and the black-hulled white forty-three bushels per acre. The yield of grain per acre by years is as follows :

	Red.	Black-hulled White.
1896.....	41 bus. ....	48 bus.
1897.....	41 " .....	48 "
1898.....	28 " .....	33 "
Totals .....	110 bus. ....	129 bus.
Averages.....	37 " .....	43 "

We now raise the black-hulled white only. In western Kansas many farmers raise the red, thinking it a little hardier and earlier. In central Kansas some of our feeders raise both the red and the black-hulled white and feed alternately, the stock seeming to relish the change.

Our records show the red to be from a week to ten days earlier than the black-hulled white, but this difference is of but little importance in central Kansas. Kafir-corn planted on the College farm the middle of May is ripe the middle of September.

THE SEED.

Kafir-corn heads vary considerably in form and compactness. We prefer seed from long, closely compacted heads. It is best to save Kafir-corn intended for seed in the heads until planted, and the heads should either be hung up separately or else be loosely piled and kept dry and well aired. When thrashed and stored in large quantities, Kafir-corn will heat sufficiently in damp weather to destroy the germinating power of the seed. Poor stands are common every year all over the state from this cause.

PLANTING.

Kafir-corn is a warm-weather plant, makes a slow early growth, and should not be planted until the ground becomes warm. We usually plant immediately after corn planting is completed. Nothing is gained by earlier planting. Planted too early, the stand of Kafir-corn is frequently so poor that a late replanting is necessary, and if a good stand is secured the growth of the young plants is so slow that the weeds forge ahead and extra cultivation is necessary.

On cold soils and on soils that wash surface-planting is best. Plow the ground—in the fall, if practicable—thoroughly pulverize it just before planting, and plant in rows three to three and one-half feet apart, dropping single seeds an inch apart in the row. Plant about the same depth as wheat.

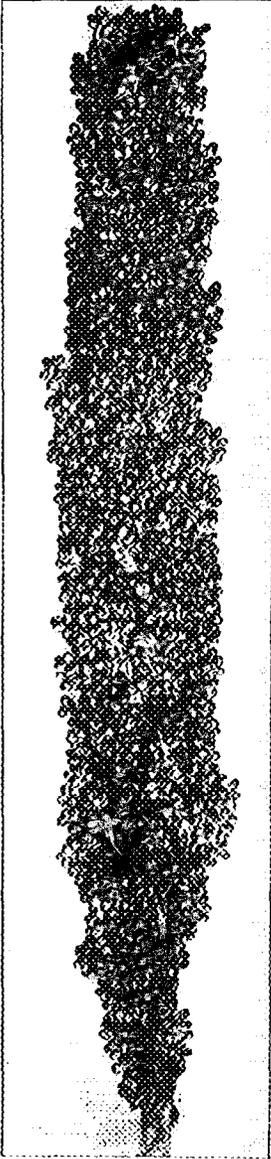


FIG. 1.  
Red Kafir-corn.

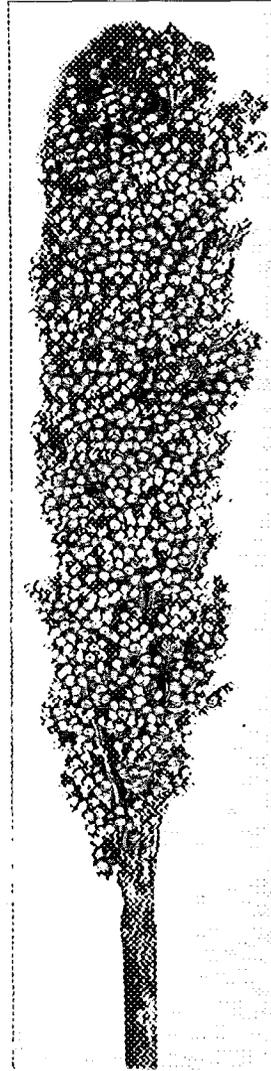


FIG. 2.  
Black-hulled White Kafir-corn.

We plant Kafir-corn with a grain-drill, stopping all but two holes, using a bushel of seed to each five acres. The seed weighs fifty-six pounds per bushel.

Kafir-corn may also be planted with either a one-horse corn-drill or a two-horse corn-planter with drill attachment. With either of these machines dropping plates must be used that are drilled to drop Kafir-corn at the proper distance.

On warm soils and in late planting listed Kafir-corn does well, the only difficulty being that a heavy rain before the plants come up or while they are small may fill the furrows with soil and ruin the stand.

Whatever method of planting is used, the weeds should be killed just before the Kafir-corn is planted and a mellow seed-bed provided. The ground should be compacted around the seed to insure quick starting.

In 1898 heavy late floods destroyed hundreds of acres of wheat and corn on bottom lands in eastern Kansas. These floods came too late for replanting of the lands with corn. We advised using red Kafir-corn and many farmers who accepted our advice secured good crops.

#### CULTIVATION.

Cultivate Kafir-corn the same as you would corn for a good yield. We give level culture and prefer the two-horse cultivator with four small shovels attached to each beam. Most farmers use the cultivator with two broad shovels to each beam.

After the Kafir-corn has reached a foot in height the shovels should be run shallow, as the roots soon extend from row to row.

#### HARVESTING.

When grain and fodder are both wanted, Kafir-corn should be cut when the seeds are ripe and put in large shocks. The most convenient machine for cutting is the corn-binder which cuts the stalks and ties them with twine into bundles. Next to this method, for speed and convenience, is cutting with the common sled cutter. For stock cattle and horses the shocks may be hauled directly to the feed lot.

When steers and hogs are to be fattened the grain is wanted without the fodder. Kafir-corn raisers are still looking for a cheap and satisfactory means of harvesting the grain alone. Some feeders run the entire stalks—including the heads—through a thrashing-machine. This takes power, is expensive, and the cut and torn stalks lose flavor, like bread after it is sliced. Others take bundles of Kafir-corn and hold the heads in the thrasher until the grain is knocked off, and then throw the stalks back without letting them pass through the machine. This takes less power than the other method but the fodder has to be handled too much.

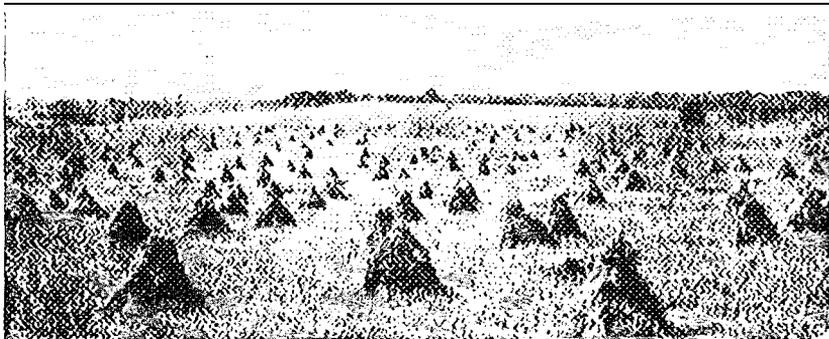


FIG. 3. Kafir-corn in the shock.

The cheapest method we have found is to place the bundles on a block and cut the heads off into a wagon with a broad ax.

Headers have been recently put on the market that harvest the heads, leaving the stalks standing where they grew. The work of these headers has not been such as to bring them into general use, but it is probable that they will soon be perfected and that heading will be the best method of harvesting Kafir-corn where grain only is wanted.

Thrashed Kafir-corn grain stored in bins is liable to heat badly in damp weather. No way of avoiding this has been found. In the spring of 1899 we bought a car-load of Kafir-corn that had been thrashed several months and was apparently thoroughly dry when received. The car-load was put in one bin, and when wet weather came began to heat and we had to shovel it over several times.

In western Kansas it is a common practice to head Kafir-corn and pile the heads in stacks until the grain is wanted. This is done to avoid heating of the thrashed grain. Stacked heads are liable to mold in eastern and central Kansas.

#### YIELD.

The College farm is upland. In the eleven years that we have grown Kafir-corn there has been but one failure to produce grain. In 1894 Kafir-corn yielded no grain, but gave two tons of fodder per acre. Corn the same year yielded us no grain and one ton of fodder per acre. The average yield of grain per acre on the College farm for the past eleven years has been, per year: Kafir-corn, 46 bushels; corn, 34½ bushels. Our highest yield per acre in one year has been: Kafir-corn, 98 bushels; corn, 74 bushels. In the western half of the state the difference in favor of Kafir-corn is greater, as there, in dry years, when corn yields one to five bushels per acre, the yield of Kafir-corn is twenty-five bushels or more.

Yield of Kafir-corn and corn per acre on the College farm:

Year.	Kafir-corn.	Corn.
1889 . . . . .	71 bus . . . . .	56 bus.
1890 . . . . .	19 " . . . . .	22 "
1891 . . . . .	98 " . . . . .	74 "
1892 . . . . .	50 " . . . . .	30 "
1893 . . . . .	49 " . . . . .	30 "
1894 (failure).		
1895 . . . . .	43 " . . . . .	28 "
1896 . . . . .	48 " . . . . .	39 "
1897 . . . . .	48 " . . . . .	34 "
1898 . . . . .	33 " . . . . .	26 "
1899 . . . . .	50 " . . . . .	40 "
Totals. . . . .	509 bus . . . . .	379 bus.
Yearly averages. . . . .	46 " . . . . .	34.5 "

We are often asked how the yield of Kafir-corn compares with that of rice-corn, Jerusalem corn, and milo maize. Three years' tests at this station indicated that Kafir-corn was the superior variety for grain and the other varieties were dropped. The yield in bushels per acre for these three years was as follows:

	1889.	1890.	1891.
Red Kafir-corn . . . . .	71.0 bus . . . . .	19.0 bus. . . . .	98.0 bus.
Rice-corn . . . . .	0.0 " . . . . .	16.5 " . . . . .	61.0 "
Jerusalem corn (destroyed by birds all years).			
Milo maize . . . . .	57.0 bus . . . . .	2.2 bus. . . . .	0.0 bus.

The English sparrow destroys the heads of rice-corn and Jerusalem corn on the College farm before the seeds become ripe. In the treeless sections of the western part of the state the sparrows do not bother these varieties and they are good grain yielders, but yield little fodder. Milo maize does well on the College farm in a long season, but in two years out of the three was cut off by frost.

DROUGHT AND CHINCH-BUGS.

Kafir-corn stands the drought better than corn. It will continue to extract moisture from the ground and to grow after the ground has become so dry that corn has become permanently checked. When finally the ground becomes so dry that the Kafir-corn can no longer grow it remains stationary and if the late rains come starts to growing again as though nothing had happened. Corn, under the same conditions, dies. Frequently in Kansas the corn crop is small because, although the rainfall is sufficient and the stalks are vigorous through the season, a few days of hot winds at tasseling time kills the pollen and the kernels of corn do not form. Kafir-corn is not affected in this way.

The thick, short-jointed stalk of Kafir-corn enables it to withstand strong winds much better than either corn or the sweet sorghums.

Kafir-corn has strong feeding powers and heavy root development, especially adapting it to poor soils. It will produce a good yield of

grain on poor land and on uplands where corn will fail except in favorable years.

Kafir-corn is not proof against chinch-bugs and chinch-bugs when very thick will kill it, but an ordinary attack such as will seriously injure corn does not seem to hurt Kafir-corn much. When only a few inches high Kafir-corn is readily destroyed by this pest.

COMPOSITION.

The following table shows the digestible nutrients in Kafir-corn grain and fodder compared with other common feeds:

GRAIN.	DIGESTIBLE NUTRIENTS. Pounds per 100 lbs. feed.			Heat units in one pound.	Nutri- tive ratio 1 to—
	Protein.	Carbo- hydrates.	Fat.		
<i>Kafir-corn grain.</i> .....	<b>7.3</b>	<b>65.2</b>	<b>0</b>	<b>1349</b>	<b>8.9</b>
Corn .....	7.8	66.7	4.3	1567	9.7
Barley. ....	8.9	64.8	1.6	1438	7.7
Oats ....	9.3	48.3	4.2	1249	6.2
<i>Kafir-corn fodder.</i> .....	<b>3.5</b>	<b>52.8</b>	<b>1.3</b>	<b>1092</b>	<b>15.9</b>
Corn-fodder . ....	2.0	33.2	0.6	680	17.3
Sorghum hay . . . . .	2.4	40.6	1.2	850	18.0
Prairie hay .....	3.5	41.8	1.4	902	12.8
Millet hay. ....	4.5	51.7	1.4	1104	12.2
Alfalfa .....	10.6	37.3	1.4	948	3.8

KAFIR-CORN FOR FATTENING HOGS.

We have tested the value for fattening hogs of Kafir-corn alone and Kafir-corn combined with other feeds in experiments including 324 hogs.

Two experiments were made to compare Kafir-corn with corn. The hogs in the first trial were fed seven weeks; in the second, twelve weeks. The hogs used in both experiments were pure-bred Poland-Chinas and Berkshires.

FEEED.	Ave. weight at beginning.	Gain per hog.	Gain per bus. of feed.	Feed for 100 lbs. gain.	
First trial, {	Kafir-corn. . . . .	188 lbs.	68 lbs.	10.33 lbs.	542 lbs.
	Corn. . . . .	188 "	73.6 "	12.25 "	457 "
Second trial, {	Kafir-corn. . . . .	124 "	132 "	10.93 "	512 "
	Corn. . . . .	123 "	102 "	11.69 "	479 "

Averaging the results of these two trials, we have 10.6 pounds pork from a bushel of Kafir-corn and 11.9 pounds of pork from a bushel of corn. A bushel of corn is worth more than a bushel of Kafir-corn, but, on the College farm, an acre of Kafir-corn is worth more than an acre of corn. The average yield of grain per acre on the College farm for the past eleven years has been, per year: Kafir-corn, 46 bushels;

corn, 34½ bushels. This shows for the College upland farm an average yield of grain per year to produce 487 pounds of pork from Kafir-corn and 410 pounds of pork from corn.

To secure the best results in fattening hogs with Kafir-corn it should be fed with some feed that is rich in protein. We have had good results in feeding alfalfa hay, skim-milk and soy beans with Kafir-corn for this purpose. The hogs used in these experiments were ordinary mixed-bred hogs purchased of farmers, and did not make the gains per bushel of feed that were made by the College pure-bred hogs.

Hogs fattened in nine weeks gained an average of 52.4 pounds each fed on Kafir-corn meal alone, and 90.9 pounds each fed Kafir-corn meal and alfalfa hay. The hay was fed twice daily, whole, in shallow boxes separate from the grain. The hogs ate 7.83 pounds of hay per bushel of grain. The hogs having the meal alone ate 393 pounds each, while those having hay ate 468 pounds of meal each. The gains per bushel of Kafir-corn meal were: Kafir-corn meal and 7.83 pounds alfalfa hay 10.88 pounds; Kafir-corn meal alone, 7.48 pounds. The hogs fed the alfalfa hay ate more Kafir-corn and made more gain from each bushel eaten. The gain in weight made by hogs fed the hay is over 73 per cent. more than the gain made by the hogs fed grain alone. The feeding also shows a gain of 868 pounds of pork per ton of alfalfa hay fed.

These results are not due to feeding value of alfalfa hay alone, but also to its influence in aiding the hogs to better digest the Kafir-corn. The alfalfa hay also gave a variety to the ration, making it more appetizing and inducing the hogs to eat more grain. Valuing the hay at \$3 per ton and fat hogs at 3 cents per pound live weight, the Kafir-corn fed alone brought 22.4 cents per bushel; the Kafir-corn fed with alfalfa hay brought 31.4 cents. The hay fed was of the best quality, carefully cured, with all the leaves on.

A second trial was made of feeding alfalfa hay with Kafir-corn to fattening hogs, using a hay of poor quality that had lost many of the leaves in curing. The hogs were fed 50 days and the gain per hog fed whole Kafir-corn alone were 45.6 pounds each, and those fed whole Kafir-corn and alfalfa hay were 68.5 pounds each. The hogs fed the hay ate 343 pounds of grain each, while those having grain alone ate 291 pounds each. The gains per bushel of feed were: Kafir-corn whole and 14.58 pounds of alfalfa hay, 11.17 pounds; Kafir-corn alone, 8.75 pounds. This experiment shows a gain in feeding poor alfalfa hay with Kafir-corn to fattening hogs of 333 pounds of pork per ton of alfalfa hay.

Hogs averaging 125 pounds each were fed 42 days and 20 head

were used for each method of feeding. Hogs fed whole Kafir-corn alone ate 266 pounds each and gained 41.7 pounds each. Hogs fed whole Kafir-corn and skim-milk ate, per hog, Kafir-corn 330 pounds, skim-milk 210 pounds, and made an average gain per hog of 66 pounds each. The hogs having the milk ate more grain and gained more for each bushel eaten. In the 42 days the hogs fed Kafir-corn and milk gained 58 per cent. more than the hogs fed Kafir-corn alone. The milk used was sterilized skim-milk from a creamery. In this experiment one bushel of Kafir-corn alone made 8.78 pounds gain, and one bushel of Kafir-corn and 35.6 pounds of skim-milk made 11.2 pounds gain.

We have made many trials to test the value of adding soy beans to Kafir-corn, in fattening hogs.

Hogs 7½ months old, averaging 188 pounds each, were fed seven weeks, when they were ready for market, with the following results:

	Average gain per hog.	Gain per bus. of feed.	Feed per 100 lbs. gain.
Kafir-corn meal. . . . .	90.6 lbs.	11.9 lbs.	472 lbs.
Kafir-corn meal $\frac{3}{4}$ , soy-bean meal $\frac{1}{4}$ .....	103.8 "	13.9 "	409 "

This experiment shows that by adding soy beans to Kafir-corn a saving of 13 per cent. was made in the amount of feed required to make 100 pounds of gain.

Pigs six months old, averaging 122 pounds each, were fed twelve weeks, with the following results:

	Average gain per hog.	Gain per bus. of feed.	Feed per 100 lbs. gain.
Kafir-corn meal. . . . .	102.0 lbs.	10 0 lbs.	559 lbs.
Kafir-corn meal $\frac{3}{4}$ , soy-bean meal $\frac{1}{4}$ .....	146.0 "	13.9 "	408 "

This experiment shows a saving of twenty-seven per cent, by adding the beans to the Kafir-corn.

Weaning pigs were put on experiment November 22. and fed sixteen weeks. In addition to the grain they were allowed to run on alfalfa pasture. Snow fell in December, and allowed slight picking thereafter. The results, not considering the pasture, were as follows:

	Average gain per hog.	Gain per bus. of feed.	Feed per 100 lbs. gain.
Kafir-corn meal. . . . .	74.2 lbs.	10.3 lbs.	542 lbs.
Kafir-corn meal $\frac{3}{8}$ , soy-bean meal $\frac{5}{8}$ . . . . .	129.2 "	15.3 "	37½ "

Showing a saving in amount of feed required to make a hundred pounds of gain of 31 per cent. by adding soy beans to the Kafir-corn.

Hogs were purchased that averaged 126 pounds each and were fed nine weeks, with the following results:

	Average gain per hog.	Gain per bus. of feed.	Feed per 100 lbs. gain.
Kafir-corn meal. . . . .	52.4 lbs.	7.5 lbs.	749 lbs.
Kafir-corn meal $\frac{3}{4}$ , soy-bean meal $\frac{1}{4}$ . . . . .	97.8 "	12.1 "	468 "

This experiment shows a saving, by adding soy beans to the Kafir-corn, of over 37 per cent.

Hogs were purchased that averaged 140 pounds each, and were fed fifty days, with returns as follows:

	Average gain per hog.	Gain per bus. of feed.	Feed per 100 lbs. gain.
Kafir-corn meal . . . . .	44.1 lbs.	8.6 lbs.	653 lbs.
Kafir-corn meal $\frac{4}{5}$ , soy-bean meal $\frac{1}{5}$ . . . . .	86.6 "	13.0 "	435 "

This experiment shows a saving in feed of 33 per cent. by adding soy beans to the Kafir-corn.

These experiments show that when soy beans were fed with Kafir-corn to fattening hogs a saving was made in the amount of feed needed to make 100 pounds of gain of 13, 27, 31, 33 and 37 per cent., the amount varying in different experiments.

QUALITY OF PORK FROM KAFIR-CORN.

We shipped fifty head of Kafir-corn-fed hogs to Swift & Co., St. Joseph, Mo., for slaughter tests. The different fed lots dressed as follows:

Kafir-corn whole . . . . .	80.4 per cent.
Kafir-corn meal . . . . .	80.0 "
Kafir-corn whole and alfalfa hay . . . . .	79.5 "
Kafir-corn meal and alfalfa hay . . . . .	79.0 "
Kafir-corn meal four-fifths, soy beans one-fifth . . . . .	80.0 "

Swift & Co. report "that the hogs showed good, firm flesh, with good distribution of lean and fat on the bellies; the hogs that were fed on Kafir-corn meal and alfalfa hay showing fat of a good, white color not common in corn-fed hogs. The hogs fed whole Kafir-corn alone varied considerably in weight, but were the most suitable for bacon hogs, and a few would have been suitable for English cuts, on account of the evenness of the fat and the good distribution of lean through the bellies."

We shipped eighty head of Kafir-corn-fed hogs to Armour & Co., Kansas City. The different fed lots dressed as follows:

Kafir-corn whole . . . . .	80.3 per cent.
Kafir-corn and alfalfa pasture . . . . .	81.0 "
Kafir-corn and skim-milk . . . . .	81.0 "
Kafir-corn, skim-milk, and alfalfa pasture . . . . .	80.5 "

Armour & Co. reported as follows: "The hogs fed Kafir-corn alone, flesh irregular and rather soft; the hogs having Kafir-corn and alfalfa pasture, flesh firm, color of fat good; the hogs fed Kafir-corn and skim-milk, flesh firm, fat white, good distribution of fat and lean in the bellies; and hogs having Kafir-corn, skim-milk, and alfalfa pasture, flesh firm, nice white fat, good proportion of fat to lean."



FIG. 4. Pork from hogs fed on Kafir-corn.

KAFIR-CORN FOR STEERS.

Our present Station force has not had funds available to make tests of the value of Kafir-corn for fattening steers. Prof. C. C. Georgeson made a trial at this Station, using five steers in a lot, with the following results:

FEED.	Average weight at beginning.	Feed eaten per steer.		Ave. gain per steer.	Feed for 100 lbs. gain.	
		Grain.	Roughage.		Grain.	Roughage.
Corn-meal . . . . . lbs.	1,036	3,254	1,859	326	997	569
Red Kafir-corn meal "	1,021	3,254	2,060	299	1,086	688
White Kafir-corn meal "	1,025	3,254	2,166	313	1,041	692

The rough feed during the first part of the trial was Kafir-corn fodder, and later alfalfa hay and Kafir-corn fodder were used.

Averaging these gains from Kafir-corn, and taking our yield, there has been raised on the College farm Kafir-corn to supply the grain needed to produce an average, each year for eleven years, of 242 pounds of beef per acre, and corn to produce 194 pounds of beef per acre.

KAFIR-CORN FOR DAIRY COWS.

Kafir-corn grain and alfalfa hay make the cheapest combination of feeds in Kansas for milk production; each of these feeds contains the properties which the other lacks. Fed in the proportion of twenty pounds of alfalfa to eight pounds of Kafir-corn, in such quantities as the cow will eat, a good flow of milk is secured at a low cost, from

which butter can be made of good quality in regard to firmness. All such a ration lacks is variety.

Beginning February 2, 1898, we made a seven-weeks' test in milk production with 18 scrub cows shipped a month previous from western Kansas. It required 1295 pounds of Kafir-corn meal and 2383 pounds of alfalfa hay for 100 pounds of butter-fat. The best cow in the lot required 914 pounds of Kafir-corn meal and 1690 pounds of alfalfa hay per 100 pounds of butter-fat. Alfalfa hay is worth \$3 per ton on Kansas farms and Kafir-corn meal not more than 50 cents per 100 pounds. This makes the cost of feed for producing one pound of butter-fat 10 cents for the herd and 7.1 cents for the best cow. All were scrub cows. With these feeds, better cows would have produced butter-fat at less cost.

Kafir-corn fed with alfalfa hay makes a balanced dairy ration. Kafir-corn alone has too much fat- and heat-making materials for milk production; and when fed with prairie, timothy or sorghum hays or corn-fodder, feeds having the same defect, it tends to dry up the cow and, if fed in sufficient quantity, to fatten her. Where this kind of roughage is used, linseed, cottonseed, or soy-bean meals or bran should be fed with the Kafir-corn.

#### KAFIR-CORN FOR CALVES.

Kafir-corn meal is the ideal grain to feed calves raised on skim-milk. The meal is constipating and overcomes the tendency of the skim-milk to cause scours. In the summer of 1899 we raised 13 calves on skim-milk. The calves fed skim milk, Kafir-corn meal and Blachford's calf meal made an average daily gain of 1.9 pounds each; those fed skim-milk, Kafir-corn meal and flaxseed jelly gained an average of 1.6 pounds each daily; while those fed skim-milk and Kafir-corn meal only gained 1.8 pounds each daily. This shows good daily gains with all the feeds, and that Kafir-corn meal can take the place of rich and expensive meals usually fed calves.

Whole milk is nature's food for the calf. When we skim it we remove the fat, and Kafir-corn meal, rich in starch, takes the place of the fat removed. The Kafir-corn meal should be fed dry to calves and never mixed with the milk. The more the calf chews the Kafir-corn the better it will digest it. Fed in the milk, the Kafir-corn meal is bolted, and much of it remains undigested and has an irritating effect on the calves' digestive tract, tending to produce scours.

Kafir-corn is an excellent feed to give calves after weaning, whether they have run with their dams or have been raised on skim-milk. At any time in his life a calf may be fed regularly all the Kafir-corn meal he will eat.

KAFIR-CORN FOR HORSES.

We have fed Kafir-corn meal to horses doing heavy farm work, and have found it to be a good feed. We feed the same weight of the Kafir-corn as we would of corn. Kafir-corn is generally fed to work horses on Kansas farms, when raised in large quantities. Some farmers grind it, some feed the thrashed grain, and others feed it in the head. Feeding in the head saves all expense of preparation, and the stems of the head being eaten with the grain seem to be of value. To young horses and those not working Kafir-corn may be fed just as it is harvested—stalk and heads—and makes a good feed.

KAFIR-CORN FOR SHEEP.

We have not fed Kafir-corn to sheep at this Station, but have found the sheep feeders in the Kafir-corn sections of the state getting good returns from it when fed with alfalfa.

PREPARATION FOR FEEDING.

Most of our trials of the value of different methods of preparing Kafir-corn for feeding have been made in fattening hogs. The results of these trials are given below. The trials were not made to test this question, but for other purposes. This explains why the methods are not more uniform in the four trials.

		Required to make 100 lbs. of gain.
First trial .	{ Whole Kafir-corn, dry . . . . .	542 lbs.
	{ Whole Kafir-corn, soaked 48 hours . . . . .	632 "
	{ Kafir-corn meal, wet . . . . .	471 "
Second trial .	{ Whole Kafir-corn, dry . . . . .	512 "
	{ Whole Kafir-corn, soaked 48 hours . . . . .	550 "
	{ Kafir-corn meal, wet . . . . .	559 "
Third trial..	{ Whole Kafir-corn, dry . . . . .	655 "
	{ Kafir-corn meal, dry . . . . .	749 "
	{ Kafir-corn meal, wet . . . . .	691 "
Fourth trial	{ Whole Kafir-corn, wet . . . . .	640 "
	{ Kafir-corn meal, wet . . . . .	653 "

In the first trial we lost 16.6 per cent. by soaking the Kafir-corn. and in the second trial the loss was 7.4 per cent. Both trials were made in winter, and there was no loss from souring, as might have happened in hot weather. Only one trial shows a gain from grinding the Kafir-corn, and all others a loss. In the first trial a gain of 15 per cent. was made by grinding; in the second trial the loss from grinding was 9.1 per cent.; in the third trial the losses from grinding were 5.5 per cent. and 14.3 per cent., and in the fourth trial 2 per cent. After carefully watching the feeding during these trials, we think the best way to feed Kafir-corn to fattening hogs is to place it dry in the feeding troughs at the time of feeding, and pour over it sufficient water so that a small quantity of water will be left in the trough after

the hogs have finished eating the grain. Kafir-corn is dusty, and when fed dry starts the hog to coughing severely before a meal is finished.

We have usually fed Kafir-corn ground to cows, calves, and horses, but have not made sufficient trials to determine whether grinding is best for these animals or not. For mature cattle and horses we know that feeding it in the head is a satisfactory method.

We have tried grinding the heads without thrashing. They grind easily in a power Bowsher iron grinding mill; the resulting meal is a good feed for animals who need roughness, and the expense of thrashing is saved.

#### KAFIR-CORN AS A HAY CROP.

We prefer the sweet sorghums to Kafir-corn for a hay crop, as they give with us a greater yield and more palatable fodder, but many Kansas farmers think Kafir-corn the best.

It may be sown either broadcast or with a grain-drill, putting on from one and one-half to two bushels of seed per acre. The amount of seed will depend upon the richness and condition of the land. Kafir-corn for hay cannot be cultivated, and the stand should be thick enough to keep down the weeds and to furnish slender stalks at the time of cutting. Cut with a mowing-machine when the seed is in the thick milk or dough, and cure in large cocks. In eastern Kansas Kafir-corn hay should be fed before January 1, as it loses its freshness by this date. In western Kansas it will remain palatable for a longer time.

In parts of eastern Kansas it is difficult to cure and keep sorghum hay on account of damp weather. This difficulty can be overcome by sowing sorghum and Kafir-corn mixed half and half. The stalk of the Kafir-corn is much drier than that of sorghum, and the mixed hay keeps better.

Kafir-corn fodder with the heads removed has about the same value as corn-fodder with the ears removed.

#### DANGER FROM SECOND GROWTH.

If Kafir-corn is cut early a second growth starts up. Usually stock can eat this second growth with safety, but deaths are frequent. Most of these deaths can be explained by the cattle bloating, but sometimes deaths occur where it seems that the green Kafir-corn acts as an acute poison. Cases are reported where animals have broken into a field of Kafir-corn while being driven along an adjoining road and securing only a mouthful or two of the green second growth, have been immediately attacked with symptoms of acute poisoning, and have died in an hour or two. Cattle have been herded in a large field in which was a small patch of second-growth Kafir-

corn; animals have strayed on the Kafir-corn while being driven by the herdsman and secured only a bite or two and have been attacked and died within an hour. Neither veterinarians, chemists nor feeders have been able to explain the cause of such deaths. They are rare, but occur often enough to make it unsafe to allow cattle to pasture green second-growth Kafir-corn. After this second growth has been cured or killed by frost the danger seems to be over. We have never heard of a case where second-growth Kafir-corn fodder has injured stock.

#### OBJECTIONS TO KAFIR-CORN.

Like all sorghums, Kafir-corn makes a weak, slow early growth, which is in strong contrast to its vigor and hardiness after becoming a foot high. In damp ground, in wet seasons and on weedy land, the weeds in the early season will often make a strong growth while the Kafir-corn is too small to cultivate easily. This makes cultivation expensive and difficult.

When fed alone, stock tire of Kafir-corn much more quickly than they do of corn. Some stockmen feed red and white Kafir-corn alternately. This gives some variety, but only partially overcomes the defect. When Kafir-corn is fed with feeds rich in protein, as alfalfa, soy beans, bran, or oil-meal, animals relish it for any length of feeding period. Hogs fattened on Kafir-corn alone get so that they loathe it, but fed Kafir-corn with either alfalfa hay, soy beans, or skim-milk, they have a keen appetite for every feed.

This lack of protein (flesh- and blood-forming material) and an excess of starch and other heating substances makes Kafir-corn an undesirable feed to be given alone, but combined with the other drought-resisting feeds—alfalfa and soy beans—makes a ration containing all the material in proper proportions needed for meat and milk production and the growth of young stock.

Kafir-corn is a very constipating feed, and for this reason, when fed alone to either horses, cattle, or hogs, induces an unhealthful condition. Fed with other constipating feeds, such as prairie or timothy hays or corn-fodder, the condition is made worse. On the other hand, alfalfa and soy beans are laxative feeds, and either fed with Kafir-corn secures a healthful condition of the animal, as shown by the glossy hair, oily skin, good appetite, and good returns.

There is a general feeling all over Kansas among farmers who have raised but little Kafir-corn that it is very exhaustive to the soil, and they find that for a year or two after a good crop of Kafir-corn has been raised on a field that following crops are poor. This comes from wrong handling. We raise Kafir-corn every year on the College farm—sometimes for several years in succession on the same

field—and have not had following crops shortened by the Kafir-corn. We have in our office heads of Kafir-corn twelve to sixteen inches in length and well filled that were raised on thin upland that has been in Kafir-corn continuously for seven years. The yield per acre was heavy.

Kafir-corn is our great drought-resisting crop and will continue to extract water from a dry soil and grow long after corn has stopped growing. If a good soil mulch is not kept on the surface during such a time the ground on which Kafir-corn is growing will become hard and lumpy, this condition continuing through the growth of succeeding crops. We cultivate Kafir-corn to keep a good earth mulch on the surface, if necessary cultivating the last time with a five-toothed cultivator set shallow. This prevents the ground from becoming hard and giving reduced yields the following seasons. Kafir-corn removes practically the same plant-food from the soil that corn does, and is not more exhaustive than corn for the same yield, except in the manner indicated.

Kafir-corn will not mature in the extreme western part of the state. The high altitude there gives cool summer nights, retarding the growth, and frost kills the Kafir-corn before it is ripe. In sections of Kansas where this is the case, the near relatives of Kafir-corn, Jerusalem corn and rice-corn, do mature, and, with fair treatment, yield from twenty-five to fifty bushels per acre. The grain of these crops has practically the same value as Kafir-corn, but the yield of fodder is much less and the fodder is less palatable.

WHERE SHALL KAFIR-CORN BE GROWN?

We cannot take space in this bulletin to thoroughly discuss the facts shown by the maps, but it will pay the reader to make an exhaustive study for himself. The figures given in the maps were computed from tables published in Secretary Coburn's reports of the state board of agriculture and shows the yield of corn by counties.

Map. No. 1 shows the average yield of corn per acre in bushels for the years 1897, 1898, and 1899, the figures at the left being for 1897, those in the center for 1898. and those at the right for 1899; thus:

Doniphan  
33-24-40. indicates that the average yield of corn per acre in Doniphan county was 33 bushels in 1897, 24 bushels in 1898, and 40 bushels in 1899.

Map No. 2 shows the average yield of corn per acre in bushels for the three years—1897, 1898, and 1899—and the average number of acres grown per year for this period; thus:

Riley  
26  
86,932 indicates that for the period mentioned the average yield of corn was 26 bushels per acre per year, and that an average per year of 86,932 acres were planted.





It is safe to say that corn must average at least twenty bushels per acre or it will not pay to raise it. By reference to the maps, it will be seen that the east tier of counties all show a greater average than this for the three years. In these counties it is probable that it will not pay to raise Kafir-corn, except on thin lands. Take the tier of counties represented by Washington, Clay, Dickinson, Marion, Butler, and Cowley: the average yield per year for the three years is above twenty bushels for each county, but some years show low yields, Clay averaging seven bushels of corn per acre in 1898, Washington seventeen bushels in 1898, Dickinson eighteen bushels in 1897 and sixteen in 1898, Marion twelve bushels in 1897, and Butler ten bushels in 1897. In these counties Kafir-corn should be raised on all uplands, and will probably show an average yearly yield as great as that of the College farm—forty-six bushels per acre,

The tier of counties composed of Smith, Osborne, Russell, Barton, Stafford, Pratt and Barber shows an average yearly yield of less than twenty bushels of corn for every county, and it is probable that the farmers in these counties would get much greater returns in feeding if most of their corn lands were planted to Kafir-corn. We believe that the section of the state represented by these and adjoining counties will average as much beef, pork and milk per acre per year from Kafir-corn as will the eastern tier of counties from corn.

A study of the counties west of this last group shows strikingly the low yield of corn, and the advisability of planting Kafir-corn.

Kafir-corn stands drought much better than corn, and will draw more plant-foods out of tough, hard soils than will corn. For this reason, it will pay to raise it instead of corn on the uplands of eastern Kansas, where it will furnish feed that will produce more beef, more pork and more milk per acre than will corn. Corn will probably yield as much on bottom lands in eastern Kansas as Kafir-corn, and, bushel for bushel, is worth more to feed. In central Kansas, Kafir-corn is the best yielder on uplands, and often pays on the bottoms.

In many sections of western Kansas corn is not a paying crop in the most favorable season, while Kafir-corn will give a good yield almost every year, and enable these sections to become feeding districts for their own cattle and for cattle raised west and south of them. Where Kafir-corn will not mature plant Jerusalem and rice corns.

All remember what wonderful prosperity was open to Kansas in 1899, while we had a promise of 300 to 350 million bushels of corn, and how prosperous we are to-day, even though those three days of terrible hot winds in September cut the yield to 225 million bushels of corn. If the land now in corn in this state but not adapted to it,

but adapted to the better drought resister, Kafir-corn, should be planted to Kafir-corn, and this Kafir-corn should be fed with our other drought resisters, alfalfa and soy beans, every year in Kansas would show a meat production equal to a year producing 350 million bushels of corn.