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Kaffir Corn and Milo Maize for Fattening Cattle

BY

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KAFFIR CORN AND MILO MAIZE FOR FATTENING CATTLE

BY F. R. MARSHALL AND J. C. BURNS

This bulletin is chiefly intended to furnish information regarding the feeding value of kaffir corn and milo maize. While our experiments with these feeds are not completed, enough has been done to show that the sections producing these crops can profitably finish cattle for market. We have also learned some interesting facts regarding the feeds most profitable to combine with kaffir corn and milo maize for fattening matured cattle.

A discussion of the subject is published at this time to answer numerous inquiries as to the value of kaffir corn from feeders in all parts of the State. There is also included a comparison of kaffir corn and milo maize with Indian corn and with molasses. Indian corn is the grain with which the kaffir corn usually comes into competition, and molasses is used to some extent to furnish the same constituents that render corn so valuable for fattening purposes. Whether or not the use of these crops for finishing cattle for the beef market is more profitable than utilizing them in such a way as to render possible the heavier stocking of the pastures with breeding animals, will not be discussed.

Kaffir corn and milo maize seem likely to become staple crops in the Pan Handle and Western Texas country. Although some localities have produced Indian corn for shipment, the majority of farmers with long experience in that country consider kaffir corn a sure crop especially adapted to that section, because it knows no critical stage. The scarcity of moisture at any period of its growth will arrest its development, but does not render it unable to respond to later rains.

It is not possible to obtain statistics to show the acreage or yield of kaffir corn and milo maize raised in Texas. Undoubtedly the crop has doubled in the last three years. With the rapid opening up of the pastures for farms and the appreciation of the value of these crops, further increased production seems certain. The Western Texas and Pan Handle lands when used for pasture under the old time ranch system were easily made to pay a fair rate of interest on their selling values. These lands at present advanced values must be made to yield greater returns. These increased returns may be obtained in three ways: by carrying more breeding stock on the same land, by fattening cattle before selling, or by selling of crops raised. To stock the grass lands more heavily necessitates the growing of some feed crops to insure supply of winter feed. Finishing of cattle requires the production on the farm of grains adapted to such use. Although kaffir corn and milo maize are peculiarly adapted to this large section of the State that is being transformed from a ranching to a stock farming country, their feeding value is imperfectly understood. In many instances farmers who raise these crops regard them lightly and purchase Indian corn with which to feed their work stock.

Kaffir Corn on the Market.

The bulk of kaffir corn and milo maize raised in Texas is used for seed and for feed on the farms where raised.

Only a part of the crop is threshed, the usual practice being to feed from the bundle. Kansas City is the only market making regular quotations on kaffir corn. This market reports only one or two cars per day, selling by the hundred weight, and at a price a little lower than that of Indian corn. As to the purpose for which the marketed kaffir is used, there is some uncertainty. It seems quite popular as a poultry food, and, no doubt, considerable quantities are used for this purpose and for seed. It is probable, however, that a good deal of kaffir corn is used, when price permits, for mixing with ground feed. Even though this be the case at this time the grower has no complaint to make, because all of the grain offered for sale up to this time has been taken at fair prices. It is altogether desirable, however, that this crop should reach its final destination under its own name, so that if in the future large quantities should be offered to the trade, it will sell at its real value and not as a cheap adulterant.

Texas produces annually in the vicinity of one hundred and fifty million bushels of corn, but this crop does not meet the State's needs. Considerable quantities are shipped in each year from Indian Territory, Oklahoma and Kansas. To some extent this shortage is being supplied by the surplus of the kaffir corn crop in the western part of the State. Bulletin 90, of this station shows that up to September, 1906, there had been registered with the Feed Control two hundred and forty-nine manufacturers of Indian corn chops and only twenty-two firms putting out kaffir corn and milo maize chops. Our experiments were designed to put kaffir corn in its rightful place before the purchasing public as well as to assist the man who raises and wishes to feed the crop.

Kaffir Corn as a Feed.

Early experiments at the Kansas and Oklahoma Stations fully demonstrated the high fattening value of kaffir corn. Few of our Texas farmers are familiar with the results of experiments at those stations. They have also to feed this grain in combination with other materials and under different conditions from those obtaining in the States mentioned. As was stated, the bulk of Texas raised kaffir corn and milo maize crops are not threshed, but fed to work and breeding stock from the bundle. There are, however, an increasing number of men and farmers engaging in the finishing of cattle and hogs in the country in which these crops are raised. Feeders in other sections sometimes have opportunity to purchase kaffir corn at a price much lower than that of Indian corn, but refuse to do so because of a misunderstanding of its actual value. It is with a view to serving these two classes as well as others likely to desire information upon the same subjects, that our experiments have been planned and conducted.

THE COMPOSITION AND DIGESTIBILITY OF KAFFIR CORN AND MILO MAIZE.

Although numerous experiments have shown kaffir corn to have a feeding value uniformly a little lower than that of Indian corn, the real difference in the two feeds has not been clearly shown. Authorities agree that kaffir corn contains less fat or oil than Indian corn. Some

of them claim that kaffir corn oil is entirely indigestible, and therefore of no use to the animal; others assert that the oil is digestible and explain the lower fattening value on other grounds. This subject has been carefully studied during the past year by the Chemical Section of this Station. The average of nineteen analyses (Bulletin 95, this Station,) is shown below compared with Indian corn as given on page 619 of Henry's Feeds and Feeding.

TABLE I. COMPOSITION OF INDIAN AND KAFFIR CORN

	PERCENTAGE COMPOSITION						
	Water	Ash	Protein	Crude Fiber	Nitrogen Free Ext.	Ether Ext.	No. of Anal.
Dent Corn.....	10.6	1.5	10.3	2.2	70.4	5	86
Flint Corn.....	11.3	1.4	10.5	1.7	70.1	5	68
Corn Cob.....	10.7	1.4	2.4	30.1	54.9	.5	18
Corn Cob Meal.....	15.1	1.5	8.5	6.6	64.8	3.5	7
Kaffir Corn Chops.....	9.86	1.63	10.98	2.75	71.18	3.12	19
Milo Maize.....	9.66	2.30	10.73	3.05	72.22	2.78	14
Ground Kaffir Corn Heads.....	13.62	2.82	9.25	8.03	63.28	2.62	3
Ground Milo Maize Heads.....	9.42	2.71	9.22	6.51	69.55	2.44	3

Uses of Constituents of Feed

2 1-4 pounds of carbohydrates.

It is the nitrogen free extract or carbohydrates, and the either extract or the fat or oil, that make corn so valuable for fattening animals. A pound of fat is worth As to the amount of *protein* a fattening animal should receive authorities are not agreed. Protein is the sole source of muscular growth, and is used for other purposes. Growing animals need much more protein than maturer ones, and it is because of the relatively low proportion of protein in corn that practical feeders have come to prefer some feed such as bran, oats or cotton seed meal along with corn for undeveloped stock. The addition of some feed high in protein to a corn ration for a mature animal will usually cause a more rapid gain, though not necessarily a cheaper one.

Crude fiber is made up of woody portions of plants or grains. Wheat and corn bran contain considerable amounts of crude fiber. Rice hulls contain a great deal of this material. Crude fiber is usually largely indigestible. It will be noticed in Table I, that the difference between kaffir corn and kaffir corn heads consists principally in the increase of crude fiber. Digested crude fiber is practically of the same value as nitrogen free extract, but on account of the difficulty of its digestion, it is desirable to have as little as possible of this constituent in any feeding stuff.

Value of Analysis as Printed on Tax Tags.

The analyses given in Table I were made to be printed on the back of the tax tags placed upon all feed sold in accordance with the pure feed law. It must be borne in mind, however, that analyses such as shown in that table and guaranteed by manufacturers are only a partial evidence of the value of those feeds to live stock.

Digestibility of Kaffir Corn. Kaffir corn is given as having an ether extract or fat content of 3.12 per cent. As referred to, Kansas investigators some years ago claimed that the fat in kaffir corn was not digested, and therefore valueless. The results of the investigations made by the Chemical Section of this Station showed that 78 per cent of the fat in kaffir corn meal was digested, while some years ago Oklahoma investigators found that 46 per cent of the fat in kaffir corn meal was digested. In no case has the fat of whole kaffir corn been found to be of use to the animal. In regard to the other constituents the investigators agree fairly well and the figures given in Table II are as nearly correct as is possible to obtain at this time.

The amount of digestible nutrients in Indian corn and kaffir corn is shown below. The figures for Indian corn are taken from page 631, of Henry's Feeds and Feeding. Those for kaffir corn are furnished by the Chemical Department of this Station:

TABLE II. DIGESTIBLE CONSTITUENTS IN INDIAN CORN, KAFFIR CORN AND MILO MAIZE.

	Total Dry Matter In 100 lbs.	Digestible Nutrients in 100 Lbs.		
		Protein	Carbohydrates	Ethr. Ext.
Dent Corn.....	89.4	7.8	66.7	4.3
Flint Corn.....	88.7	8	66.2	4.3
Corn Cob.....	89.3	.4	52.5	.3
Corn and Cob Meal.....	84.9	4.4	60	2.9
Kaffir Corn.....	87.6	4.9	62.3	1.7
Milo Maize.....	89.7	6.2	62.3	2.0

The foregoing theoretical evidence would indicate that kaffir corn and milo maize have feeding values almost equal to Indian corn. Experiments reported in succeeding pages give practical evidence on this point.

EXPERIMENT I.

COMPARISON OF INDIAN CORN, KAFFIR CORN, MILO MAIZE AND MOLASSES FOR FATTENING STEERS.

On January 6th, 1907, we received from J. T. Reynolds, Alice, twenty head of three-year-old grade Shorthorn steers. These steers were the choice of a lot of sixty-five head. They appeared to have not more than three crosses of Shorthorn bulls, were horned, and had never eaten feed of any kind. When weighed at the ranch just before loading they averaged 1,182 pounds. These cattle were exceptionally gentle for range steers, and from the first ate freely of the sorghum hay that was kept before them. Their first grain feed consisted of 20 pounds of cotton seed meal and 40 pounds of corn chops. Corn chops was increased one pound per day for each steer until January 12th. On January 14th

they were eating 3 pounds of cotton seed meal and 6 pounds corn chops each per day. After the 18th the grain was mixed with cotton seed hulls. The feed was still gradually increased until on January 31st, 20 head ate 60 pounds cotton seed meal, 260 pounds of corn chops, 280 pounds of hulls, and as much as they cared for of sorghum hay. On this date the steers showed an average gain of 50 pounds over their weights at the ranch on January 3d. It was planned to feed a basal ration of cotton seed meal and hulls to all the steers. On February 1st, they were divided into four lots to be thereafter fed as follows:

Lot I. Indian corn chops, cotton seed meal and hulls.

Lot II. Molasses, cotton seed meal and hulls.

Lot III. Kaffir corn chops, cotton seed meal and hulls.

Lot IV. Milo maize chops, cotton seed meal and hulls.

Previous experiments have shown that only good results follow the feeding of a gallon of molasses daily to individual steers. It was thought that in this experiment we could entirely substitute molasses for a corn ration. On February 9th, the first day of the experiment, the rations were as follows:

Lot I. 80 pounds Indian corn, 15 pounds cotton seed meal, 40 pounds cotton seed hulls, also sorghum hay.

Lot II. 50 pounds of Indian corn, 6 quarts (18 lbs.) molasses, 15 pounds cotton seed meal, 70 pounds cotton seed hulls, also sorghum hay.

Lot III. 80 pounds kaffir corn, 15 pounds cotton seed meal, 70 pounds cotton seed hulls, also sorghum hay.

Lot IV. 80 pounds milo maize, 15 pounds cotton seed meal, 70 pounds cotton seed hulls, also sorghum hay.

On February 20th, lot II ate 25 quarts of molasses and no corn. Lots I, III, and IV, each ate 110 pounds of Indian corn, kaffir corn and milo maize respectively. With the exception, as will be noted, of lots I and II, this rate of feeding was continued until the close of the experiment on April 26th. Lot I would not eat the same quantity of hulls as was consumed by each of the other lots. It was impossible under the conditions surrounding the experiment to procure Indian corn of the same degree of fineness as the kaffir corn and milo maize furnished by the dealer. The coarse corn chops would not adhere to the cotton seed hulls, consequently the steers would pick out most of the corn and leave the hulls. This was avoided later by feeding the cotton seed meal and corn chops together, and the hulls in a separate bunk sprinkled over with a small allowance of molasses.

After the steers in lot II had been eating five quarts each of molasses daily for one week, it was clearly shown by the loose condition of their droppings that this was too large a feed of molasses. By March 10th they were changed to 50 pounds of corn and 20 quarts of molasses, or one gallon each per day, on which ration they continued until the experiment closed. Final results of this test are shown in Table III.

TABLE III. RESULTS OF SEVENTY-SIX DAY TEST WITH INDIAN CORN, MOLASSES, KAFFIR CORN AND MILO MAIZE.

NO. LOT.	Average Wt. at Start	NO. Steers	Feed Eaten	Total Gain	Average daily gain per steer.
I.	1224	5	4693.5 lbs C. S. Hulls. 1105.5 lbs C. S. Meal 7981 lbs Indian corn 8¼ Gal. molasses	770	2.10
II.	1232	5	6550 lbs C. S. Hulls 1140 lbs C. S. Meal 2903 lbs Indian corn 378 Gal. molasses	727	1.91
III.	1248	5	6550 lbs C. S. Hulls 1140 lbs C. S. Meal 8234 Kaffir Corn	986.6	2.59
IV.	1247	5	6550 lbs C. S. Hulls 1140 lbs C. S. Meal 7024 lbs Milo Maize 1210 Kaffir corn	838.3	2.20

The feeds used in this test cost us at the following rates

	Per ton.
Corn Chops	\$25.00
Cotton Seed Meal	24.00
Cotton Seed Hulls	4.00
Ground Kaffir Corn	18.00
Ground Milo Maize	18.00

The table shows that kaffir corn gave the largest and cheapest gains followed by milo maize, molasses yielding smaller though cheaper gains than Indian corn. Lot I, as stated previously, did not eat the roughage so regularly as the other lots, apparently because the coarse chops mixed less thoroughly with the hulls. The gains of this lot were also interfered with by the sickness of one steer that was withdrawn from the experiment April 11th. In computing the average daily rate of gain, the withdrawal of this steer has been considered. Repetition of this test without another form of roughage might result in a higher rate of gain for Indian than for kaffir corn and milo maize, but for feeding matured cattle a mixed ration similar to that used in this experiment, we would recommend the purchase of the lowest priced of these three feeds.

Results of Molasses Test. This is the third year of our experimental work with molasses. We now feel satisfied that one gallon per head per day is the largest amount that can be fed with profit. The gains of the molasses fed cattle in this test were lowered by our attempt to feed five quarts continuously with no grain other than three pounds of cotton seed meal. After March 10th, on which date corn was substituted for part of the molasses, the gains of lot II were practically equal to those of other lots. At 10c per gallon the feeding of a medium ration of

molasses will prove profitable added to a meal and a hulls ration, and at that price it can profitably replace part of a ration of corn worth 70c per bushel. We consider 10c molasses to be about on a par with 60c corn for feeding with a mixed ration.

EXPERIMENT II.

COTTON SEED VERSUS COTTON SEED MEAL AS SUPPLEMENTS TO A KAFFIR CORN RATION FOR THREE-YEAR-OLD STEERS.

This experiment was conducted at Clarendon, Texas, in co-operation with Mr. Thos. S. Bugbee. Mr. Bugbee is a Panhandle farmer and cattle raiser whose experience with kaffir corn has led him to esteem it highly as a fattening feed. It was considered desirable, however, to make in that section a demonstration of the fattening value of kaffir corn. It was also desired to arrive at a knowledge of the profits from feeding cotton seed with kaffir corn meal as compared with cotton seed meal and kaffir corn meal. It was, therefore, arranged to feed two bunches of steers as follows:

Lot I. Ground kaffir corn, cotton seed and kaffir corn stover for roughness.

Lot. II. Ground kaffir corn, cotton seed meal, and kaffir corn stover for roughness.

On November 1st, cotton seed meal cost \$30.00 per ton laid down at Clarendon, while at the same time cotton seed could be procured for \$12.00.

Kind of Stock Used	Early in November Mr. Bugbee brought one hundred and fifty dehorned steers, mostly three-year-olds, from the range pastures to his feeding pens at Clarendon. Most of these steers were well graded Shorthorns, though there were a number of Herefords and a few cross-breds; they were considerably above the average in conformation and quality, being valued in that month at \$32.00 per head. During the previous winter the herd in which these steers were running had had access to kaffir corn stalk fields, but none of them had ever received any grain feed. About November 20th, Mr. T. M. Reddell, who was to represent this Station in the experiment, took charge of the feeding. The entire lot of cattle was fed on bundle kaffir corn until December 16th, on which date ground kaffir corn was fed, and since these steers had been receiving a fair amount of grain from bundled corn, the beginning ration was a liberal one. On December 19th fifty of the poorest steers were cut out and the remaining one hundred divided into two lots practically alike in weight and quality. Those which were to receive cotton seed with their kaffir corn were designated lot I, and those to which meal was to be fed as lot II. The experiment did not begin until January 5th, but from the time they were divided both lots were fed on the feeds that were to comprise the test ration. The grain feed having commenced on December 16th, on December 29th the cattle were eating per head as follows:
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Lot I. 21 pounds kaffir corn meal, 4 pounds cotton seed, and kaffir corn stover.

Lot II. 22 pounds kaffir corn meal, 3 pounds cotton seed meal, and kaffir corn stover.

This is bringing cattle up to feed more quickly than is ordinarily considered safe, but these were mature steers, were eating freely of the roughage and were never allowed more than they would clean up within an hour and a half after feeding. By getting them on full feed in this time they were ready for market much sooner than they would otherwise have been. This system, however, is not preferable when it is desired to place dependence upon a more nutritious form of roughage, as the heavy grain feed causes the cattle to consume small amounts of the hay or fodder.

Roughage Fed Throughout this test the roughage consisted of threshed kaffir corn stalks and bundled fodder, which was fed in the grain bunks. Feeding the grain on top of the roughness caused the former to be eaten more slowly and prevented its being blown away. Undoubtedly a larger amount of roughage could have been utilized if fed in separate racks and renewed daily.

On January 5th, the day the cattle were weighed and the experiment begun, lot I was still receiving per head 21 pounds of kaffir corn meal and four pounds of cotton seed, while the ration for lot II was 21 pounds of kaffir corn and four pounds cotton seed meal per head. Between January 8th and 12th, lot I was carried up to five pounds of cotton seed, the corn remaining the same. At the same time lot II was raised to 22 pounds of kaffir corn meal and their cotton seed meal reduced to three pounds per head. These amounts remained unchanged until March 7th. On this date the feed of both lots was increased as it was expected they would be marketed at the end of the month.

All changes were made very gradually and only as considered safe by the feeder, who watched the animals closely, at all times being guided by their appetites and the condition of the droppings. None of the steers refused their feed at any time, but the lot receiving cotton seed meal met the feed wagon more eagerly and cleared up their feed more quickly than the others.

Weighing On January 5th, the average weight of steers in each lot was 1,114 pounds; when weighed on February 4th lot I showed gain of seventy-two pounds per head and lot II 63 pounds. From February 4th to March 6th lot I gained 111 pounds and lot II 90 pounds each. The test closed on March 30th, on which day the cattle were loaded for shipment to Kansas City.

The summary of the experiment is shown herewith:

TABLE IV. RESULTS OF EIGHTY-FOUR DAY TEST OF COTTON SEED AND COTTON SEED MEAL AS SUPPLEMENT OF A KAFFIR CORN RATION.

No. of Lot	Av. Weight at Start	No. of steers	Feed eaten per lot	Total gain	Average daily gain per steer	Food cost per pound gain*
I	1114½ lbs.	50	90565 lbs Kaffir corn, ground. 21815 lbs cotton seed	13080	3.1lbs	6.2 cts.
II	1114½ lbs.	50	95135 lbs. Kaffir corn, ground. 13930 lbs cotton seed meal	10155	2.4lbs	8.8 cts.

* Value of roughage not included.

In determining the cost of gains in the above table feeds were charged at these prices:

Kaffir Corn Meal, per cwt.	75c
	Per ton.
Cotton Seed	\$12.00
Cotton Seed Meal	26.00

The roughage was not weighed, and is not included in the cost of gains. In this test 21,815 pounds cotton seed was very considerably superior to 13,930 pounds meal and the extra 4,570 pounds kaffir corn fed to lot II. The cotton seed cattle also sold for 5c per hundred more than the meal fed cattle. The shrinkage in shipping and killing, however, is in favor of the other lot. This point is discussed further below.

Shipping

The final Clarendon weights were taken on Saturday morning, March 30th, and it is these weights that were used in estimating total gains in Table IV. The afternoon of the day before the cattle were to be shipped they were given a large feed of pea-vines and hay and only one-half grain feed on that evening. On the morning of shipping day they were given only one-fourth of the grain feed and more roughage. They were loaded on Saturday afternoon and did not pass over the scales for sale in the Kansas City Stock Yards until eleven o'clock Tuesday morning, over sixty hours after loading. They were unloaded and fed by the railroad company at Emporia, Kansas, Monday morning. They were allowed feed and water until Monday night, and arrived at Kansas City next morning not in a very presentable condition nor empty enough to take on a good fill. The cotton seed cattle sustained an average shrinkage of 133 pounds per head, and the meal fed cattle 99 pounds, or 9.2 and 7.5 per cent respectively. Could it have been known that the shipment could not be delivered in the market within thirty-six hours after loading, the unloading for feed could have been done earlier, thus bringing the cattle into market after a longer run and securing a more reasonable fill and a lighter shrinkage from the home weights.

Selling

Lot I (fed cotton seed) sold by Crider Bros. Commission Co. to the St. Louis Union Packing Co., at \$5.20 per cwt. Lot II (fed cotton seed meal) was sold by Geo. R. Barse Commission Co. to Morris & Co. at \$5.15 per cwt.

The following letters from the packers show how the cattle were estimated on the hooks:

Dressing

St. Louis, April 4th, 1907.

Crider Bros. Commission Co.,
Stock Yards Station, Kansas City, Kan.

Gentlemen: We beg to advise you that the fifty head of cattle on which you asked us to report, dressed as follows:

	Pounds.
Live Weight	1249
Dead Weight	749
	Per cent.
Dressing	60
Cost, in the beef	\$8.90

Beef rough; hips and shoulders more or less bruised.

Yours truly,

E. V. B.

(Signed)

St. Louis Union Packing Co.,
C. D. Middlebrook.
Kansas City, Kas., April 9, 1907.

Geo. R. Barse Commission Co.,

Exchange Building, Kansas City, Mo.

Gentlemen: We shipped out the last of these cattle yesterday. Same were divided up on seven of our Eastern markets. They ribbed down very good and were a nice, meaty bunch of cattle, the ribs and loins being exceptionally good. There were six bad hip bruises, most likely caused in transit. For Texas-fed stock they were about as good a bunch of cattle as we have had. Following are the weights and dressings:

	Pounds.
Live Weight	60830
Dressed Weight	37714
Average Live Weight	1216
Average Dressed Weight	754
Dressing 62-per cent, which is exceptionally good.	

Morris & Company.

Deducting from the total receipts of this transaction the cost of the cotton seed and meal, the expense of market and the original value of steers at \$32.00 each, we find that the kaffir corn meal fed with cotton seed returned \$1.34 per hundred, and that fed with cotton seed meal \$1.12 per hundred. Charging the kaffir corn meal to the cattle at 75c per hundred, after all shipping expense is taken out, we find the owner of these cattle received \$43.20 per head for those in lot I, and \$39.00 per head for the others.

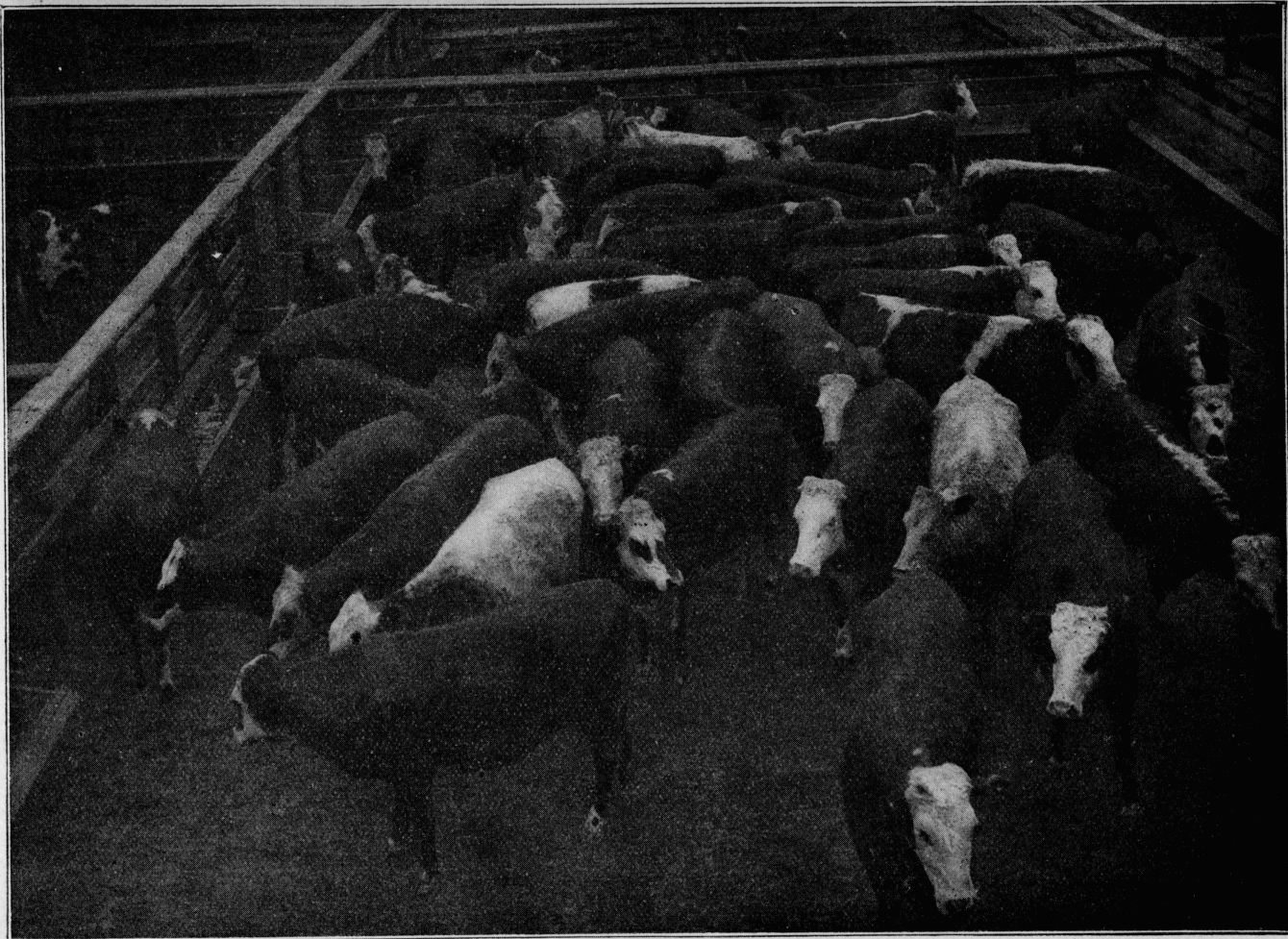


PLATE II. Fifty Steers Comprising Lot II in Clarendon Experiment, Fed on Kaffir Corn and Cotton Seed and sold in Kansas City for \$5.20 per hundred.



PLATE II. Fifty Steers Comprising Lot II in Clarendon Experiment, Fed on Kaffir Corn and Cotton Seed Meal and sold for \$5.15 per hundred

EXPERIMENT III

LIGHT VERSUS MEDIUM FEED OF COTTON SEED CAKE FOR SUPPLEMENTING A KAFFIR CORN RATION FOR TWO-YEAR-OLD STEERS.

This experiment was conducted in the early months of 1906, at Channing, Texas. The report which follows was published in the form of a press bulletin after the experiment closed, and is reprinted here to complete discussion of subject.

REPORT OF AN EXPERIMENT CONDUCTED BY THE TEXAS EXPERIMENT STATION IN CO-OPERATION WITH THE X. I. T. RANCH AT CHANNING, TEXAS.

While the old-time ranch methods are fast passing away, and should do so, the Panhandle should ever remain a stock country. It should remain a stock country because it is naturally well fitted for a breeding ground, because the dry, mild winters are favorable for the finishing of this stock, and because the feeding of the stock will afford a home market for the crops that will be raised in the Panhandle, and which should be fed there for the ultimate good of the land.

Furthermore, some of the crops that are proving themselves to be best adapted to this locality are new to the country, and have, as yet, no established place in the general markets.

To obtain some information as to the value of these crops (milo maize and kaffir corn) as the basis of rations for fattening cattle, and also to test the practicability of grain feeding steers at this distance from a general market, an experiment was conducted at the X. I. T. Ranch at Channing, commencing January 20, 1906.

Forty steers, coming two years old, were divided into two lots. Lot I was fed a grain ration containing about eight and a half per cent by weight of cotton seed cake, and the remainder a mixture of ground milo maize and kaffir corn. The roughage used was sorghum hay, kaffir corn and milo maize fodder, and for a short time some millet hay. The roughage was not weighed, but kept in full racks where all the steers could go to it when they wanted to.

Lot II was fed the same as lot I, except that they got a larger proportion of cotton seed cake.

Kind of Cattle Used	There were ten high-grade Angus and ten high-grade Herefords in each lot. These steers had eaten some grain feed in the early months of 1905, but had never been highly fed, and from early summer until a few days before the experiment started had been in the regular steer pastures. The Herefords averaged 626 pounds and were valued at \$3.80 per hundred, while the Angus averaged 588.75 pounds and were considered worth \$4.00 per hundred when put into the lots. Many disadvantages were encountered during the course of the experiment that affect the results. Owing to various delays in arranging the
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quarters for the work, feeding was not begun until January 20th instead of November 1st, as had been planned. By this time the steers had passed, on the open range, one of the worst months of the winter and had taken a decided start on the down grade. This late start threw a considerable part of the feeding period into the hottest part of the season when the quality of the roughage is poor and the flies are a very great annoyance to cattle. With the steers at hand it was impossible to get as much uniformity in either quality or condition as is desirable in a lot of steers that are to be fed and marketed together. This was a decided handicap, as was also, from the financial standpoint, the very light weight of the cattle. Owing to the presence of mange in the vicinity both lots were dipped during the second month of the feeding period.

Amount of Grain Fed A very light grain ration, 6.5 pounds per head daily, was fed at the start. This contained cake in the proportions previously mentioned. About seven weeks was taken in getting up to a full feed. The heaviest feeding was at the rate of 15 pounds per head daily.

The following table summarizes the salient feature of the experiment. Cotton seed cake is charged at \$1.40 per hundred. The kaffir corn and milo maize charged at 75c per hundred, or 42c per bushel. The roughage was not weighed or valued, but the net returns are credited to show the value received for roughage when other feeds were charged at above prices:

TABLE I—Weights, gains and feed consumed for each lot:

No. of Lot	No. of Steers	Average Weight Jan. 20	Average Weight July 20	Food Eaten by lot	Total gain per steer	Daily gain per steer
1	20	602.25 pounds	1048.5 pounds	4304 lbs cotton seed cake. 46099 lbs. Kaffir corn and milo maize	446.24	2.47
2	20	597.6 pounds	1035.5 pounds	5654 lbs cotton seed cake 44742 lbs. Kaffir corn and milo maize	427.9	2.42

HOGS USED IN THE EXPERIMENT.

At the beginning of the feeding, twenty-five hogs, weighing about 100 pounds each, were placed behind each lot of steers. Until near the close of the period the hogs received only what they got out of the droppings, but as they were not doing as well as desired, the number in each lot was reduced on March 20th. For a time before shipping the hogs were fed some grain from the trough, the amounts of which are shown in Table II, which also shows the amount of pork made in each lot. The hogs were sold at Fort Worth on June 18th at \$6.40 per hundred.

TABLE II—Showing returns from hogs and total meat returns per acre of grain:

	Grain fed to hogs	Pork made per steer	Beef made per* acre of milo maize	Beef and pork made* per acre of milo maize
LOT I.	2197 lbs	109.75 lbs.	418.20 lbs.	497.33 lbs.
LOT II	2130 lbs	114 lbs.	422.70 lbs.	508.47 lbs.

* Based on a yield of 40 bushels per acre of milo maize.

The experiment closed July 20th, at the end of six months. The cattle were by this time in condition to make very nice beef, but owing to their thin condition at the start, were not ripe enough to sell to the best advantage on the market. As the commission salesman remarked after the sale at Kansas City, they were in a class too well filled, being in about the same stage of ripeness as the bulk of the grain fed cattle then coming to market. That this would be the case was realized before the cattle were shipped, and it was only because no more milo or kaffir corn could be obtained that they were not carried to a higher finish. They sold in Kansas City for \$5.05 per hundred.

FINANCIAL OUTCOME.

The net profits are shown in Table III. The total cost of labor including teams for hauling all feed and grinding the grain amounted to \$2.66 per head. This item is not included in Table III.

TABLE III—Showing expenditures and receipts for the entire experiment:

	Value of steers and pigs Jan 20	Cost of grain consumed	Total cost	Proceeds of sale of steers and pigs	Balance*
LOT 1	\$526.92	\$422 78	\$949.70	\$1213.23	\$263.52
LOT 2	\$516.26	\$428 96	\$975.22	\$1227.88	\$252.66

* In computing the balance the roughage fed has not been considered. J. J. Edgerton, Chairman
F. R. Marshall, College Station.

EXPERIMENTS AT OTHER STATIONS.

The following self-explanatory table is given as a summary of experiments conducted at the Oklahoma and Kansas Experiment Stations:

KAFFIR VERSUS INDIAN CORN FOR STEERS.

Station	Bulletin or Report	Page.	Lot. No.	Year.	No. Steers in Lot.	Av. Weight at Start.	No. Days. Fed	Feed Eaten. By Lot	Total gain.	Av. Daily gain pr. steer.
Kansas	67	59	1	1896-7	5	1036	175	16271 lbs. corn meal 7864 lbs. Kaffir corn stover 615 lbs. Alfalfa hay	1632	1.86
"	67	59	2	"	5	1021	"	16271 lbs. Red K. corn meal. 8837 lbs Kaffir corn stover. 615 lbs. Alfalfa	1497	1.71
"	67	59	3	"	5	1025	"	16271 lbs. White Kaffir corn meal. 9376 lbs. Kaffir corn stover. 615 lb. Alfalfa.	1563	1.78
Okla.	99-00	69	2	99-00	5	976	112	6991 lbs. corn meal. 7210 lbs. Alfalfa hay	1426	2.54
"	"	96	1	"	5	"	"	9617 lbs. K. corn meal 6414 lbs. Alfalfa hay.	1308	2.34
Okla.	99-00	62	4	"	5	"	"	10456 lbs. Corn meal 5786 lbs. Kaffir corn stover.	1124	2.01
"	"	"	3	"	5	"	"	13270 lbs. Kaffir corn meal. 5321 lbs Kaffir corn stover.	1254	2.33
Okla.	00-01	99	2	00-01	5	1026	151	13711 lbs. Corn meal 13604 Alfalfa hay.	2056	2.73
"	"	"	1	"	5	1026	"	15660 lbs. K. corn meal 14257 lbs. Alfalfa hay.	2502	2.72
Okla.	"	"	4	"	5	"	"	16960 lbs. corn meal 17668 lbs. Kaffir corn stover.	1785	2.38
"	"	"	3	"	5	"	"	17509 lbs. K. corn meal 17892 lbs. Kaffir corn stover.	1760	2.33
Kansas	132	25	1	1906	8	842.5	152	16016 lbs Indian corn 18040 lbs. Alfalfa.	2704	2.22
"	"	"	2	"	8	853	"	14922 lbs. Kaffir corn 18200 lbs. Alfalfa	2516	2.06
"	"	"	4	"	8	866	152	15978 lbs. Indian corn 18200 lbs. K. corn hay	1774	1.45
"	"	"	5	"	8	855	152	14920 lbs Kaffir corn 18200 lbs- K. corn hay	1316	1.08
"	"	"	6	"	8	852.5	152	15724 lbs. Indian corn 17740 lbs. sorghum	1407	1.15
"	"	"	7	"	8	743	152	13198 lbs. Kaffir corn 16017 lbs. Sorghum.	1124	1.05

The average daily gain from a kaffir corn ration is uniformly a little lower than the gain made from Indian corn, except in cases where a heavier ration of kaffir than of Indian corn was fed. The gains from either kaffir or Indian corn when fed with alfalfa hay are always greater than when kaffir corn stover, sorghum or prairie hay constitutes the roughage. In composition alfalfa resembles cotton seed meal, and the feeder who has a good supply of home grown alfalfa to feed with kaffir corn, does not need to purchase anything with which to balance the ration.

SUGGESTIONS TO INEXPERIENCED FEEDERS. *

We receive many inquiries from persons who have cattle and feed, but are entirely unfamiliar with the business of finishing cattle for market. We make the following suggestions:

1. That not more than one or two cars be fed the first season.
2. That only well bred cattle be used.
3. That only cattle of one age be fed in a lot and that they be grown steers.

Calves and yearlings will return more gains from feeds of the character of alfalfa, but will not thrive as well as older stock on a ration composed principally of corn. They are also more likely to get off feed.

4. That the feeding commence early in the fall.

Cattle left in pasture until December are often losing flesh at that time and require considerable time in the feed lot to regain their former condition. No matter when the feeding is commenced, there is a disposition to market when the weather begins to get warm and other work demands attention. Cattle started late are only half or three-quarters fat at this time, sell low and discourage the owner. If started earlier the feeder would not be forced to ship, but after the stock was well along could wait for a favorable market or close out at any time a reasonable profit was certain.

SUMMARY.

I. Kaffir corn and milo maize are not properly appreciated in the feed trade.

II. Kaffir corn and milo maize contain considerably less fat or oil than Indian corn; in other constituents the differences are not important.

III. The protein and fat of Kaffir corn are much less easily digested than the same constituent of Indian corn.

IV. In the 1907 experiments Kaffir corn produced greater gain than milo maize with Indian corn in third place.

V. In an experiment at Clarendon, twelve-dollar cotton seed was more profitable than twenty-six dollar cotton seed meal for supplementing a kaffir corn ration.