about 12 percent less feed per unit of gain, and had a lower feed cost by $0.62, per cwt than those fed whole milo.

Summary

In these trials, complete mixed rations produced slightly faster and more efficient gain at lower cost than free-choice feeding.

Pelleting the complete mixed ration did not improve efficiency or reduce feed cost. The pelleted supplement appeared to be slightly superior to the meal form in terms of rate of gain, feed efficiency, and feed cost per unit of gain. Differences were very small. Pelleting ground milo reduced rate of gain and increased feed cost.

Grinding milo moderately fine improved rate of gain and efficiency and reduced the feed cost per unit of gain.

The Relative Value of Six Varieties of Milo For Growing and Finishing Swine

J. C. Hillier, J. J. Martin, and G. R. Waller

In earlier tests conducted at this station (1954) the relative value of four varieties of milo varied from 93 to 98 percent of the value of Number 2 yellow corn. Kafir 44-14 had the highest relative value followed by Westland, Martin, and Redlan. The protein content of these varieties varied from 9.8 percent for the Kafir 44-14 to 12.0 percent for the Martin, a range of 2.2 percent. The lysine content of the protein in the grain varied from 2.35 to 2.92 percent, a variation of about 24 percent.

Many new varieties of milo are now grown in considerable quantities; therefore, it seemed desirable to test their characteristics as feed for swine. DeKalb F 62A, Kafir 44-14, Darset, R. S. 610, Redlan, and Amak R-12 were the varieties chosen. Certified seed of these varieties was obtained and planted in one area at the Fort Reno Station, to supply the grain used in these tests.

Two types of tests were conducted: (1) A palatability test in which pigs were given a choice between the six varieties of ground milo, and (2) a regular feeding trial in which replicate groups of pigs were fed the assigned variety of ground milo and a supplement free-choice.

TABLE 1. Chemical analysis of the varieties of milo fed, with figures in percentage—air dry basis.

Variety	D. Matter %	Ash %	Protein %	Fat %	Fiber %	N.F.E. %
Dekalb F 62A	90.51	1.66	11.94	2.95	1.86	72.10
Kafir 44-14	90.95	1.57	11.31	3.31	1.85	72.91
Darset	90.99	1.53	11.25	3.96	1.73	72.52
R. S. 610	91.38	1.74	11.56	3.31	1.69	73.08
Redlan	91.05	1.54	12.56	2.11	1.86	72.98
Amak R-12	91.37	1.69	11.94	2.44	1.86	73.44

Procedure

Pigs Used and Housing

The pigs used in these tests were of purebred Hampshire, Poland China, and Yorkshire breeding. They were nine to ten weeks of age at the start of the test. Only gilts were used. As individual pigs approached 200 pounds in weight, they were removed from the trial.

The pigs were kept in concrete floored pens, about half of which was covered by a shed open to the south. Water was supplied by automatic waterers and was available at all times. In the regular feeding trials, a six-hole self-feeder was used for each lot of eight pigs. Two holes were devoted to the feeding of supplement, and four holes to grain feeding.

Palatability Test

The relative palatability of the six varieties was tested by placing each variety of the ground gain in a two-hole self feeder. Six feeders, each containing a variety of the ground grain, along with two similar feeders containing a protein-mineral-vitamin-antibiotic supplement were placed along the sides of the feeding pen. The pigs were allowed to consume as much of each variety or as much of the supplement as they desired. The position of the feeders was rotated twice a week to cause the pigs to seek out the variety they preferred.

Two lots of ten pigs each were used in this test. Lot 1 gained at the rate of 1.64 pounds per day on 3.51 pounds of feed per pound of gain. The duplicate, Lot 2, gained at the rate of 1.67 pounds per day with a feed efficiency of 3.56 pounds. The results of this test are summarized in Table 2.

In the first period, sixty percent of the milo consumed was the R. S. 610 variety. Kafir 44-14 was consumed in the second largest amount

TABLE 2. Summary of results, palatability test on six varieties of milo

Variety	Percent of Total Milo Consumed					
	First Variety 11-26-58 to 1-3-59			Second Period 1-4-59 to 1-31-59		
(Replicate Lot)	A	B	Av.	A	B	Av.
Kafir 44-14	14.4	11.5	12.9	41.7	51.2	46.4
Darset	12.1	6.6	9.4	21.8	14.8	18.3
R.S. 610	60.6	60.7	60.7			
Redlan	6.8	5.4	6.1	4.1	4.0	4.1
Amak R-12	3.7	7.2	5.5	4.9	3.8	4.3

(12.9 percent). In as much as R. S. 610 was consumed in much larger quantities than any of the other five varieties during the first 75 days of the test, it seemed desirable to drop this variety and get more information on the other five varieties.

During the second period, Kafir 44-14 was preferred to the other four varieties. This checks with previous work in which Kafir 44-14 was consumed in larger quantities than Darset or Redlan. Dekalb F62A, R. S. 610, or Amak R-12 have not been tested previously at this station. These six varieties are being analyzed for tannin content and other characteristics which might influence their palatability. Also, an analysis is being made for some of the more critical amino acids in each of these varieties. Neither the tannin or the amino acid figures are available at this time.

Rations Used in Feeding Tests

All groups in these tests were self-fed free-choice of the specific variety of milo assigned and of the protein-mineral-vitamin-antibiotic supplement shown in Table 3. The milo was ground moderately fine in a burr mill. This supplement was calculated to contain the different levels of nutrients as shown in Table 3.

This supplement was designed to meet the nutrient needs of pigs of the age used in this test if consumed in the ratio of 4.5 to 5.5 parts of grain to 1 part supplement. A six-hole feeder was used for each lot of eight pigs, with four holes devoted in grain feeding and two holes to supplement feeding. Water was available in automatic water cups at all times.

TABLE 3. Protein-mineral-vitamin-antibiotic supplement used in feeding test.

Nutrient	Amount	Ingredient	Amount
Protein	36.0 %		
Calcium	3.2 %	Milo (ground)	3.5 %
Phosphorous	2.1 %	Soybean meal	81.0 %
Iron	75.6 mg/lb.	Dicalcium phosphate	8.0 %
Copper	10.0 mg/lb.	Calcium carbonate	2.5 %
Cobalt	11.5 mg/lb.	Trace mineral salt	2.5 %
Zinc	250.0 mg/lb.	Vitamin-antibiotic-	
Vitamin A	5000.0 U.S.P./lb.	trace mineral pre-mix	2.5 %
Vitamin D	1350.0 U.S.P./lb.		
Pantothenic acid	30.2 mg/lb.	Total	100.0 %
Riboflavin	11.4 mg/lb.		

Results and Discussion

The six varieties of milo used proved to be much more alike in chemical composition than those used in earlier tests (Table 1). The results are summarized in Table 4. As in the earlier test, the grain used was obtained by planting certified seed of the varieties in one area and on as uniform a soil type as possible.

The palatability tests indicated a distinct preference for R.S. 610 over the other five varieties, with Kafir 44-14 as second choice. However, when fed as the only grain, pigs consumed about as much of one variety as of another when one considers the entire feeding period. During the first forty-two days of the trial, the groups on R.S. 610 and Kafir 44-14 were distinctly superior in both rate and efficiency of gain to those being fed the other varieties. However, these differences did not carry through the entire trial.

Considering the average results of the two lots on each variety for the entire period, these points seem to stand out. Differences in rate of gain among lots were small and rather inconsistant. In terms of feed required per unit of gain, it appears that Darset is somewhat different than the other five varieties. An average of 402 pounds of feed was required to produce 100 pounds of gain when Darset was used, whereas, only 373 pounds was required, on the average, for the other five varieties.

In free-choice feeding, the proportion of grain and supplement consumed has a distinct bearing on the cost of producing pork. In addition to having the lowest total feed requirement, the pigs fed Kafir

44-14 also consumed the smallest proportion of supplement to grain. Both of these factors contributed to the low feed cost for the pigs fed this variety.

TABLE 4. Summary of results, milo variety test (November 22, 1958 to February 20, 1959).

Lot No.	Dekalb F 62A 1	Kafir 44-14 2	Darset 3	R.S. 610 4	Redlan 5	Amak R-12 6
No. of Pigs	7	8	8	8	8	8
Initial wt., lbs.	88.4	86.6	86.7	86.6	86.9	87.6
Final wt., lbs.	204.4	202.3	201.5	204.0	202.7	206.1
Av. daily gains, lbs.	1.59	1.69	1.68	1.76	1.72	1.77
Feed/lb. gain						
Milo	3.257	3.303	3.482	3.206	3.401	3.138
Supplement	.547	.474	.607	.613	.469	.484
Total	3.80	3.78	4.09	3.82	3.87	3.62
% Protein in ration as consumed	15.40	14.41	14.92	15.48	15.40	15.16
Feed cost/cwt. gain	$ 9.03	$ 8.83	$ 9.74	$ 9.19	$ 9.02	$ 8.53
Replicate						
No. of Pigs	8	8	8	8	8	8
Initial wt., lbs.	58.6	56.5	58.1	57.4	57.1	58.3
Final wt., lbs.	201.4	189.6	195.9	198.9	197.5	198.1
Av. daily gains, lbs.	1.73	1.62	1.59	1.68	1.70	1.63
Feed/lb. gain						
Milo	3.127	2.987	3.246	3.086	3.020	3.160
Supplement	.646	.597	.697	.601	.575	.624
Total	3.77	3.58	3.94	3.69	3.59	3.78
% Protein in ration as consumed	16.06	15.42	15.41	15.54	16.30	15.91
Feed cost/cwt. gain	$ 9.15	$ 8.66	$ 9.60	$ 8.88	$ 8.64	$ 9.13
Av. Two Replicates						
Av. initial wt., lbs.	73.5	71.6	72.4	72.0	72.0	73.0
Av. final wt., lbs.	202.9	195.6	198.7	201.5	200.1	202.1
Av. daily gain, lbs.	1.66	1.66	1.64	1.72	1.71	1.70
Av. feed/lb. gain						
Milo	3.192	3.145	3.364	3.146	3.210	3.149
Supplement	.597	.536	.652	.607	.522	.554
Total	3.79	3.68	4.02	3.75	3.73	3.70
Av. % Protein in ration as consumed	15.73	14.97	15.17	15.51	15.85	15.54
Av. cost feed/cwt gain	$9.09	$ 8.75	$ 9.67	$ 9.04	$ 8.83	$ 8.83
Relative value per cwt milo	$ 1.99	$ 2.10	$ 1.82	$ 2.01	$ 2.07	$ 2.07
Relative value (%) on basis of cost of gains	95	100	87	96	99	99

Summary

The varieties of milo used in these tests were not distinctly different from the standpoint of chemical analysis.

A definite preference was shown for R.S. 610 in the palatability tests. Kafir 44-14 appeared to be the second most palatable, with Redlan and Amak R-12 distinctly less palatable.

In feeding trials where the assigned variety of ground milo was fed free-choice with supplement, the rates of gain were not greatly different among treatments.

The pigs fed Darset, as the grain, required about 29 pounds more feed per 100 pounds of gain than was required on the average for the other five varieties.

In terms of the cost of producing pork, with Kafir 44-14 rate at 100 percent, the relative values of the other varieties were: Amak R-12, 99; Redlan, 99; R.S. 610, 95; Dekalb F 62A, 95; and Darset, 87 percent.

Mineral Supplementation of Weathered Range Grass When Fed in Wintering Rations of Cattle

Allen D. Tillman and Robert J. Sirny

In previous research at this station, it was found that the minerals of alfalfa hay improved the utilization by sheep or cattle of rations containing high levels of ground corn cobs, cottonseed hulls, or wheat straw, but no improvement was noted when prairie hay was the roughage. Also, additional minerals in general have not been beneficial when fed to cattle maintained on the native blue stem grass ranges during the winter season if cottonseed or soybean meal were the source of supplemental protein.

As it is possible that the results obtained on the range were confounded by the availability of early spring grasses which contain a high level of minerals, it was thought that the feeding of weathered range grass to cattle maintained in drylot would give a more critical test. The results of such a test presented in this report.