

Table 3 (Continued)

Carcass grades: ^a				
Low choice	1	.....	3	3
Top good	1	.....	4	3
Av. good	1	.....	4	2
Low good	7	8	2	1
Top standard	2	2	1	2
Av. carcass value (choice 39c, good 37c, standard 36c) ..	\$215.73	222.64	212.96	213.85
Av. live animal value at \$23.10 cwt.	\$225.55	235.00	227.21	222.18

^a Lot 10 significantly higher (P .05).

The Effects of Added Protein to Dry Rolled and Steam Rolled Sorghum Grain Fattening Rations (Project 370, 1961).

F. W. Boren, E. F. Smith, D. Richardson, R. F. Cox and D. Follis

Sorghum grain is used extensively in fattening rations for beef cattle. Its protein content reportedly varies from 6 to 12%. Wide differences in protein content result from variety, nitrogen supply in the soil, geographic location, moisture during a given year, and yield per acre.

Interest is increasing in the varying protein content of sorghum grain. The main question is whether the protein in sorghum grain can satisfy the entire ration protein for fattening cattle.

Objective of this experiment was to determine the value of adding various amounts of soybean oil meal to dry-rolled and steam-rolled sorghum grain fattening rations for yearling heifers.

Experimental Procedure

Fifty head of yearling heifers were allotted to 5 lots at random and assigned to the various treatments. The animals were brought to full feed in about 28 days. During this period all lots received 1 pound of soybean meal per head per day. When the heifers went on full feed grain, the supplemental protein was adjusted according to the feeding level designated (Table 4). During the full-feeding period, grain was fed free choice. The protein supplement, vitamin A, and calcium carbonate were fed daily. In lots receiving no protein, vitamin A and calcium carbonate were added to 10 pounds of grain and fed daily.

Good-quality prairie hay, fed daily, comprised the roughage portion of the ration.

Sorghum grain used in this experiment was obtained locally and averaged 9.8% crude protein.

Observations and Results

There was no significant difference in gains made by the cattle fed dry-rolled and steam-rolled sorghum grain, when supplemented with the same level of soybean oil meal. As in previous years, slightly less steam-rolled sorghum grain was consumed daily (Table 5).

Soybean oil meal supplementation at $\frac{1}{2}$ pound and 1 pound daily increased gain significantly (P < 0.05) more than no supplementation, and gains from 1 pound supplementation were significantly greater than from $\frac{1}{2}$ pound (P < 0.07). Average daily grain consumption increased 1 to 1½ pounds per head daily when soybean oil meal was added at either rate.

The calculated digestible protein intake of lots 13 and 14 barely satisfied minimum protein requirements, while the digestible protein intake of lots 15, 16, and 17 exceeded maximum requirements.

Based on the results of this experiment, a minimum of $\frac{1}{2}$ pound of supplemental protein was necessary to obtain satisfactory and profitable gains. One pound of added protein produced the greatest gain and also

the greatest net return. Table 5 shows that lot 16 produced the highest grading carcasses (P > 0.05).

It appears that the supplemental protein intake should represent from 15 to 30% of the total protein intake.

Table 4

Effects of added protein to dry rolled and steam rolled sorghum grain fattening ration.

April 20, 1961, to September 7, 1961—140 days.

Lot no.	13	14	15	16	17
	Dry rolled sorghum grain	Steam rolled sorghum grain	Dry rolled sorghum grain	Dry rolled sorghum grain	Steam rolled sorghum grain
Treatment					
Soybean oil meal per head daily, lbs.	0	0	0.5	1.0	1.0
No. heifers per lot	10	10	10	10	10
Av. initial wt., lbs.	646	641	648	641	649
Av. final wt., lbs.	848	847	883	904	895
Total gain, lbs.	202	206	235	263	246
Av. daily gain per animal, lbs.	1.44	1.47	1.68	1.88	1.76
Av. daily ration, lbs.: ¹					
Dry rolled sorghum grain	14.6	.....	15.7	15.5	.....
Steam rolled sorghum grain .....	.....	14.1	.....	.....	15.4
Soybean oil meal .....	.....	.....	0.5	1.0	1.0
Prairie hay	5.0	5.0	5.0	5.0	5.0
Feed required per cwt. gain, lbs.:					
Dry rolled sorghum grain	1011.6	.....	932.3	822.6	.....
Steam rolled sorghum grain .....	.....	955.3	.....	.....	875.4
Soybean oil meal .....	.....	.....	29.8	53.2	56.9
Prairie hay	346.5	339.8	297.9	266.2	284.6
Total	1358.1	1295.1	1260.0	1142.0	1216.9
Feed cost per cwt. gain: ¹					
Dry rolled sorghum grain	\$18.20	.....	16.78	14.80	.....
Steam rolled sorghum grain	\$	17.20	.....	.....	15.76
Soybean oil meal .....	\$ .....	.....	1.04	1.86	1.99
Prairie hay	\$ 2.60	2.55	2.23	2.00	2.13
Total	\$20.80	19.75	20.05	18.66	19.88
Av. carcass value per head ²	\$190.30	184.80	207.99	213.53	207.85
Initial cost per head ³	\$148.58	147.43	149.04	147.43	149.27
Cost of feed ⁴	\$ 42.07	40.69	47.12	49.08	48.90
Total cost, animal plus feed	\$190.65	188.12	196.16	196.51	198.17
Profit or loss per head ⁵ ..	\$ -1.35	-3.32	+11.83	+17.02	+9.68

1. Feed cost: Sorghum grain, dry or steam rolled, \$1.80 per cwt.; soybean meal, \$3.50 per cwt.; prairie hay, \$15 per ton.

2. Carcass grade price × carcass wt.; Choice, \$38 per cwt.; good, \$26 per cwt.; standard, \$24 per cwt.

3. Initial live wt. × \$23 per cwt.

4. Feed cost per cwt. gain × total gain.

5. Each lot supplemented with 10,000 I.U. vitamin A and 30 gms. calcium carbonate per head daily; salt fed free choice. None of these included in cost of feed.

Table 5

The effects of added protein to dry rolled and steam rolled sorghum grain fattening ration. A progress report—carcass data.

April 20, 1961, to September 7, 1961—140 days.

Lot no.	13	14	15	16	17
Av. area rib eye, sq. in.	10.5	9.9	10.9	11.1	11.0
Av. fat thickness at 12th rib, in.	0.68	0.62	0.74	0.73	0.68
Av. carcass grade ¹	18.2	17.9	19.1	19.4	18.5
Choice + = 21.....	..	..	2	2	..
Choice = 20.....	2	3	3	4	2
Choice - = 19.....	2	1	2	1	2
Good + = 18.....	2	2	1	2	5
Good = 17.....	4	1	1	1	1
Good - = 16.....	..	2	1	..	..
Standard + = 15.....	..	1	..	..	..

Factors Affecting the Feeding Value of Sorghum Silage, 1961-62 (Project 623). A Progress Report.

F. W. Boren, E. F. Smith, D. Richardson, D. L. Follis and G. E. Fairbanks

This is the second year of an experiment designed to investigate factors that affect the feeding value of sorghum silage. The Fort Hays Branch Experiment Station, the Departments of Agronomy, Dairy Science, Agricultural Engineering, and Animal Husbandry are cooperating, with feeding trials at Fort Hays and Manhattan being of the same design: both stations doing winter feeding tests, digestion trials and obtaining chemical and agronomic data. In addition, to meat animal feeding and digestion experiments, the dairy science department is feeding the same sorghum silages as used by the animal husbandry department and Fort Hays. Lactating cows are used to determine digestibility as well as to measure the effects of the silage on lactation.

Agronomic data are being collected by the Department of Agronomy.

Experimental Procedure

Forty head of choice-quality Hereford heifer calves, weighing about 440 pounds each, were randomly allotted 10 head to a lot, and randomly assigned to each of the four types of silage. Silage was fed free choice and 1.25 pounds of soybean meal were fed per head daily. Dicalcium phosphate was fed daily in the soybean meal. Salt was kept before the calves at all times.

The silage used in this experiment was the hybrid variety FS210, utilizing the sterile and fertile parent. The following design was used: Lot 3. Fertile hybrid—The heads of the sorghum were removed in the field, immediately ahead of the ensilage field cutter, taken to the silo and ground through a hammer mill from which the screen had been removed. The field-chopped sorghum stalks and ground heads were combined at a uniform rate and ensiled.

Lot 4. Fertile hybrid (control)—Entire plant field chopped and ensiled at medium to hard-dough stage.

Lot 5. Sterile hybrid—Entire plant field chopped and ensiled at the same stage of maturity as the fertile hybrid used in lot 4.

Lot 6. Fertile hybrid—Entire plant field chopped and ensiled at 10 days past full bloom.

Upright silos were used.

Observations

The performance of the calves is shown in Table 6. Highly significant differences in average daily gains were obtained, with lot 4, fed fertile (control) silage, gaining most; lots 3 and 5 having essentially the same gain, and lot 6 producing the least gain.

All silages were readily consumed by the calves, with lot 4 having the greatest intake. Total daily dry matter intake, and pounds of feed required to produce 100 pounds of gain, were closely correlated with average daily gain.

Forage sorghum production data are presented in Table 7.

Table 6
Factors affecting the feeding value of sorghum silage.
November 21, 1961, to March 14, 1962—112-day wintering period.

Lot no.	3	4	5	6
No. heifers per lot	10	10	10	10
Silage treatment	Fertile— ground heads	Fertile— control	Sterile	Fertile— early cut
Silage dry matter content, %	25.7	29.0	25.0	20.2
Initial wt. per heifer, lbs.	441	435	436	443
Av. gain per heifer, lbs.	127	181	132	59
Final wt. per heifer, lbs.	568	616	568	502
Av. daily gain per heifer, lbs.	1.13	1.62	1.18	0.53
Av. daily ration, lbs.:				
Silage—as fed basis	32.68	34.55	31.93	33.56
Soybean oil meal	1.25	1.25	1.25	1.25
Soybean oil meal—90% dry matter	1.13	1.13	1.13	1.13
Silage—dry matter basis	8.40	10.02	7.98	6.78
Total dry matter consumption daily	9.53	11.15	9.11	7.91
Lbs. feed per cwt. gain:				
Silage—as fed basis	2892	2133	2706	6332
Soybean oil meal	111	77	106	236
Total lbs. feed required per cwt. gain—as fed basis	3003	3210	2812	6568
Lbs. feed per cwt. gain:				
Silage—dry matter basis	743	619	677	1279
Soybean oil meal—90% dry matter	100	69	95	212
Total lbs. feed required per cwt. gain—dry matter basis	843	688	772	1491
Feed cost per cwt. gain: ¹				
Silage	\$ 8.66	\$ 6.40	\$ 8.12	\$19.00
Soybean oil meal	\$ 4.00	\$ 2.77	\$ 3.82	\$ 8.50
Total feed cost per cwt. gain	\$12.66	\$ 9.17	\$11.94	\$27.50

1. Feed prices on page 2.

Table 7
Forage sorghum production data, 1961—FS210 variety.

	Fertile control		Fertile control	Sterile	Early cut
	Heads	Stalks			
Yield per acre, tons	1.68	13.32	15	10	11
% dry matter, when harvested	57.1	28.5	30.40	27.1	21.5
Dry matter yield per acre, tons	0.96	3.80	4.56	2.71	2.37
Silage dry matter, when fed, %	25.7	29.0	25.0	20.2	