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COMPARISON OF ROUGHAGES FOR FINISHING STEERS

BY

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Comparison of Roughages for Finishing Steers

By

D. S. BUCHANAN*

INTRODUCTION

Low average yields of corn within the State and high freight rates when feed is bought forces the use of the readily available concentrate cottonseed meal as the main concentrate along with a roughage or roughages to feed cattle in Mississippi. It is well known that such a ration will not finish immature animals; therefore, the method of feeding beef cattle within the State is limited to two-year-old or older cattle. Practically all such available cattle are of native or Jersey stock. Those showing prominence of Jersey blood are referred to locally as Yellow Hammers. These cattle, of course, cannot be fed on high priced feeds and shipped to river markets to compete with grain-fed, high grade steers. It has been found to be profitable, however, to finish such steers on a cottonseed meal and roughage ration and put them on the market in competition with cheaper cattle. Such cattle often find a desirable market in April and May and will always bring a higher price at the season between the heavy run of grain-fed cattle of February and March, and Southwestern grass cattle which usually starts in June.

OBJECTS OF THE EXPERIMENT

The objects of the experiment were to find the most economical ration combination consisting of cottonseed meal and roughages for the finishing of common mature steers, also to compare the yield and production costs of those silage crops best suited to Mississippi conditions.

PLAN OF EXPERIMENT

The experiment has been conducted for a period of three years and in each of the three tests representative groups of common native cattle, mostly of Jersey breeding and two years old or over have been used. The steers were weighed on three consecutive days at the beginning of the period and were divided as nearly as possible into equal lots according to size, type, and breeding. The averages of the three consecutive weights at the beginning and at the end of the experiment were taken as the initial and final weights. Intermediate weights were taken at fourteen day intervals and all weights were taken as near 10 a. m. as possible. The first test was for a period of ninety-three days and the last two tests each continued for a period of one hundred and twenty days.

All lots were fed twice each day and the times of feeding, 6:30 a. m. and 4:30 p. m., were as regular as possible. The rations by lots were as follows:

Lot I Cottonseed meal 6.5 pounds	Lot III Cottonseed meal 6.5 pounds
Corn silage ad libitum	Sorghum silage ad libitum
Johnson Grass hay 3 pounds	Johnson Grass hay 3 pounds
Lot II Cottonseed meal 6.5 pounds	Lot IV Cottonseed meal 6.5 pounds
Cottonseed hulls ad libitum	Sorghum silage ad libitum
Johnson Grass hay 3 pounds	Johnson Grass hay 3 pounds

A fifth lot was added at the beginning of the second experiment and was fed as follows:

Lot V Cottonseed meal 6.5 pounds
Johnson Grass hay ad libitum

*C. J. Goodell planned and conducted the experiment in 1926-27.

The cottonseed meal in the last two tests was fed in the beginning at the rate of two pounds per head daily. This amount was increased one pound each fourth day until six pounds was being fed. This amount was continued through the first sixty days of the test. Seven pounds was fed for the next thirty days and eight pounds was fed during the last thirty days of the test.

Fresh hydrant water and block salt were available at all times.

CATTLE USED

Native grade Jersey or Yellow Hammer steers were used in all of the experiments with the exception of the first year when there were two grade steers in each lot. The steers used the first year, 1926-27, weighed approximately 800 pounds and were delivered to the feed lot for \$5.50 per hundred weight. The steers used the second year, 1927-28, weighed approximately 725 pounds and were placed in the feed lot at a cost of \$5.75 per hundred weight. The steers used in the third year, 1929-30, averaged approximately 875 pounds and were placed in the feed lot at a cost of \$7.50 per hundred weight. The cattle used in 1929-30 were exceptionally fat for grass cattle and it is the writer's opinion that this caused the smaller daily gains made in comparison with other years.

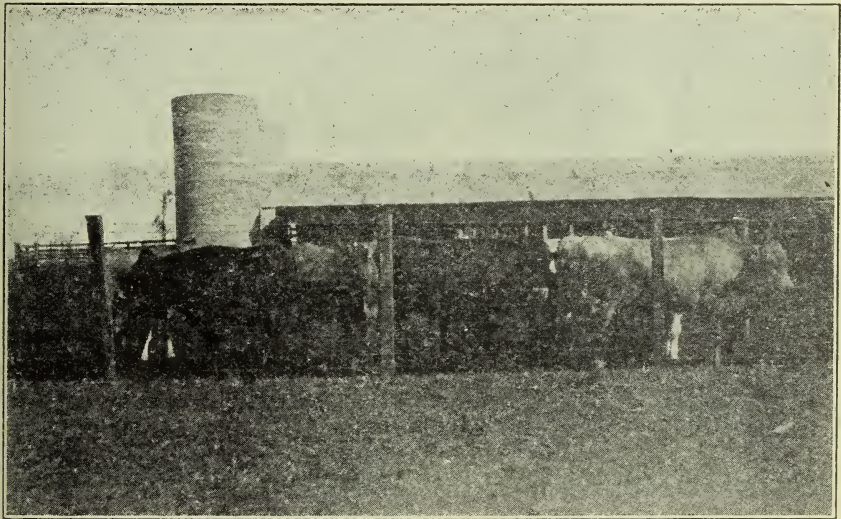


Figure 1. Fat Yellow Hammer Steers—Lot I 1927-28.

FEED USED

Cottonseed Meal

The cottonseed meal was purchased on bid for prime cottonseed meal. Analyses were run by the State Chemist and are reported in Table 1.

Cottonseed Hulls

Cottonseed hulls were purchased on bid and no analysis of the material was made. Delinted hulls were used in the third year of the experiment. In each test, the cottonseed hulls were clean, new, and of good quality.

Johnson Grass Hay

Johnson grass hay used in all experiments was produced on the Station farm and probably all would have graded No. 1.

Corn Silage

Goliad corn, a heavy forage producing white corn, was the variety used in the test. As stated, one of the objects of the experiment was to compare



Figure 2. Honey Sorghum, Corn, and Saguin.

the yield of different silage plants. In each silage field the three silages were produced on adjoining plots. Careful estimates of yields were made each year and the corn silage yielded in 1926 8.2 tons per acre; in 1927, 7.93 tons per acre; and in 1929, 8.07 tons per acre. Silage samples were taken

at intervals during the feeding period and the analyses made by the State Chemist are shown in Table 1.

Sorghum Silage

Honey Sorghum, commonly called Texas Ribbon Cane in this section, was used for sorghum silage production. This is an extremely heavy producing variety and the following tonnages were produced during the three-year period:

1926—19.70 tons
1927—18.33 “
1928—20.81 “



Figure 3. Cutting 1927 Crop of Honey Sorghum.

Sagrain Silage

This is a new plant or is a variety of Kaffir very closely related to the so-called Shrock sorghum. It has been very successfully used in the Mississippi Delta in producing sorghum fodder for mule feeding. This crop, under Delta conditions, produced in a test and reported in Circular No. 72 of this station, 25 to 45 bushels of grain per acre on soil where corn produced from nothing to 12 bushels per acre. The heads are either harvested and fed as grain or the entire plant is cut, cured, and fed in bundles. Previous silage tests with this particular variety are unknown.

Considerable difficulty was experienced in producing a high grade silage from this plant. The first year the silage was black in color, foul in odor, and kept very poorly. The second year the crop was allowed to stand in the field until it was considerably more mature than in the first year and much better silage was produced. The third year the crop was not cut until the seed were mature and beginning to shatter. Water was added as the silage was put in the silo and a much better quality of silage was produced than in pre-

vious years. It was, however, considerably darker in color and not so pleasant in odor as either the corn or sorghum silages. The yields for the three-year period are as follows:

1926— 9.6 tons
 1927— 9.85 “
 1928—12.24 “

Analyses of this silage were made as in the case of the other two by State Chemist and are reported below:

TABLE 1
 *Chemical Analyses of Feeds Used in Test

Feed	Number of Analyses	Moisture	Ash	Crude Protein	Crude Fat	Crude Fiber	Nitrogen free Extract
Cottonseed Meal							
1926-27	3	6.91	7.01	40.59	7.66	9.14	28.69
1927-28	5	8.05	6.57	42.55	6.84	8.09	27.90
1929-30	2	6.19	6.35	43.07	6.76	8.96	28.67
Corn Silage							
1926-27	2	76.52	1.32	2.15	.70	6.90	12.41
1927-28	2	70.05	1.61	2.36	.86	7.27	17.72
1929-30	2	71.68	1.51	2.17	.99	7.16	16.49
Sorghum Silage							
1926-27	2	75.60	1.29	1.00	.51	6.95	14.65
1927-28	2	77.78	1.31	1.36	.78	6.10	12.67
1929-30	2	75.80	1.19	1.08	.94	6.69	14.30
Sagrain Silage							
1926-27	2	77.83	1.86	2.00	.73	6.04	11.54
1927-28	2	62.31	2.43	3.10	1.19	8.46	22.51
1929-30	2	61.44	2.21	2.57	1.22	9.72	22.84

*All analyses made by W. F. Hand, State Chemist.

TABLE 2
 Feed Prices

Feed	Year	Price per Ton
Cottonseed Meal*	1926	\$25.00
	1927	40.00
	1929	38.50
Cottonseed Hulls*	1926	4.50
	1927	8.30
	1929	8.30
Johnson Grass Hay**	1926	12.00
	1927	12.00
	1929	12.00
Corn Silage**	1926	4.98
	1927	4.75
	1929	5.25
Sorghum Silage**	1926	2.82
	1927	2.78
	1929	2.82
Sagrain Silage**	1926	4.44
	1927	4.06
	1929	3.89

*Actual price. **Estimated price.

FEED PRICES

The cottonseed meal and cottonseed hull prices reported are actual costs for the particular year indicated. The price used for Johnson Grass hay is the usual price for No. 1 hay in this state. The method of determining the cost of silage as outlined in Mississippi Station Bulletin No. 229 was followed in

determining the cost of all silages. The tonnage produced is reported elsewhere. The prices for all feeds are shown in Table 2, page 6.

A comparison of the feeding value of the silages with that of cottonseed hulls was made in the following manner:

The amount of beef produced by 100 pounds of hulls and a certain amount of cottonseed meal was determined on basis of daily gain and daily ration consumed. Then the amount of silage necessary to produce a like amount of gain was computed. If during this time more cottonseed meal was required by the silage-fed steers than by the hull-fed steers, the amount of silage that could be purchased with the meal was added to the silage that would equal 100 pounds of hulls. If the amount of meal was less in the silage lot, a reduction of silage was made. The small difference in amount of hay in the lots being compared was considered negligible. By this computation in these three experiments, 100 pounds of cottonseed hulls equalled 189 pounds of corn silage, 272 pounds of sorghum silage, or 249 pounds of sagrain silage.



Figure 4. Sagrain Heads, Left, and Honey Sorghum, Right.



Figure 5. Lot II, 1927-28. Cottonseed hull fed steers.



Figure 6. Lot III, 1927-28. Sorghum silage fed steers.

SUMMARIES BY YEARS

In the following tables, the complete data by years is given.

TABLE 3—1926-1927 Test

Date of Test—December 22, 1926, to March 25, 1927.

Length of Test—93 Days.

Breeding of Steers—Native Yellow Hammer and two grade steers in each lot.

Age of Steers—Mature.

	Lot I	Lot II	Lot III	Lot IV
	C. S. Meal Corn Silage Johnson Grass hay	C. S. Meal Cottonseed Hulls Johnson Grass hay	C. S. Meal, Sorghum Silage Johnson Grass hay	C. S. Meal Sagrain Silage Johnson Grass hay
Number of steers per lot	10	10	10	10
Average initial wt. (lbs.)	805.00	801.50	802.30	802.30
Average final wt. (lbs.)	1011.40	979.50	971.30	953.30
Average daily gain (lbs.)	2.22	1.91	1.82	1.62
Initial cost per cwt. in feed lot (dollars)	5.50	5.50	5.50	5.50
Average daily feed for steers				
Cottonseed meal (lbs.)	6.37	6.37	6.36	6.37
Silage (lbs.)	52.10	—	50.00	53.00
Cottonseed hulls (lbs.)	—	25.00	—	—
Johnson Grass hay (lbs.)	3.00	3.00	3.00	3.00
Feed required per cwt. of gain				
Cottonseed meal (lbs.)	286.80	332.60	350.00	392.10
Silage (lbs.)	2348.80	—	2553.30	3263.90
Cottonseed hulls (lbs.)	—	1304.20	—	—
Johnson Grass hay (lbs.)	187.10	160.70	169.20	189.40
Cost of 100 lbs. gain (dollars)	10.26	8.06	9.27	13.28
Shrink (per cent)	6.16	6.94	6.48	4.64
Dressing per cent (warm weight)	55.20	55.60	55.70	55.50
Financial Statement:				
Initial cost per steer (dollars)	44.26	44.83	44.13	44.13
Cost of feed per steer (dollars)	21.14	14.31	15.62	20.02

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Table 3—Continued

	Lot I	Lot II	Lot III	Lot IV
Shipping and selling cost				
per steer (dollars)	6.06	5.82	5.80	5.81
Total cost of steer (dollars)	71.46	64.96	65.55	69.96
Price received per steer (dols.)	79.72	77.48	74.48	74.99
Necessary selling price per				
cwt. to break even (dols.)	7.53	7.13	7.21	7.69
Selling price per cwt. (dollars)	8.40	8.50	8.20	8.25
Profit or loss per steer (dols.)	8.26	12.52	8.93	5.03



Figure 7. Lot IV, 1927-28. Sagrain silage fed steers.



Figure 8. Lot V, 1927-28. Johnson Grass hay fed steers.

TABLE 4—1927-1928 Test

Date of Test—December 8, 1927, to April 6, 1928.

Length of Test—120 Days.

Breeding of Steers—Native Yellow Hammer.

Age of Steers—Mature.

	Lot I	Lot II	Lot III	Lot IV	Lot V
	C. S. Meal Corn Silage Johnson Grass hay	C. S. Meal C. S. Hulls Johnson Grass hay	C. S. Meal Sorghum Silage Johnson Grass hay	C. S. Meal Sagrain Silage Johnson Grass hay	C. S. Meal Johnson Grass hay
Number of steers per lot	8	8	8	8	8
Average initial wt. (lbs.)	728.7	727.7	727.6	726.8	728.3
Average final wt. (lbs.)	962.7	965.6	952.0	936.2	931.4
Average daily gain (lbs.)	1.95	1.98	1.87	1.74	1.69
Initial cost per cwt. (dollars)	5.75	5.75	5.75	5.75	5.75
Average daily feed per steer:					
Cottonseed meal (lbs.)	6.55	6.55	6.55	6.55	6.55
Silage (lbs.)	43.35	—	50.96	42.53	—
Cottonseed hulls (lbs.)	—	21.88	—	—	—
Johnson Grass hay (lbs.)	3.00	3.00	3.00	3.00	21.11
Feed required per cwt. gain:					
Cottonseed meal (lbs.)	335.88	830.84	350.29	376.43	387.56
Silage (lbs.)	2222.19	—	2725.34	2444.20	—
Cottonseed hulls (lbs.)	—	1105.16	—	—	—
Johnson Grass hay (lbs.)	153.84	151.53	160.44	172.41	1249.09
Cost of 100 lbs. gain (dollars)	12.91	12.12	11.72	13.52	15.24
Shrink (per cent)	7.35	8.70	8.04	8.60	6.21
Dressing per cent (warm wt.)	56.20	55.51	53.89	54.24	53.97
Financial statement:					
Initial cost per steer					
(dollars)	41.90	41.84	41.84	41.79	41.89
Cost of feed (dollars)	30.22	28.78	26.38	28.24	30.92
Shipping and selling cost					
(dollars)	5.51	5.44	5.41	5.35	5.46
Total cost (dollars)	77.63	76.06	73.63	75.38	78.37
Price received per steer					
(dollars)	98.11	96.98	94.99	91.99	93.91
Necessary selling price per					
cwt. to break even (dols.)	8.70	8.62	8.41	8.80	8.97
Selling price per cwt.					
(dollars)	11.00	11.00	10.85	10.75	10.75
Profit or loss (dollars)	20.48	20.92	21.36	16.61	15.54

TABLE 5—1929-1930 Test

Date of Test—November 26, 1929, to March 26, 1930.

Length of Test—120 Days.

Breeding of Steers—Native Yellow Hammer.

Age of Steers—Mature.

	Lot I	Lot II	Lot III	Lot IV	Lot V
	C. S. Meal Corn silage Johnson Grass hay	C. S. Meal C. S. Hulls Johnson Grass hay	C. S. Meal Sorghum Silage Johnson Grass hay	C. S. Meal Sagrain Silage Johnson Grass hay	C. S. Meal Johnson Grass hay
Number of steers per lot	8	8	8	8	8
Average initial wt. (lbs.)	878.12	878.75	875.41	873.54	875.62
Average final wt. (lbs.)	1093.12	1087.00	1052.29	1076.04	1024.37

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Table 5—Continued

	Lot I	Lot II	Lot III	Lot IV	Lot V
Average daily gain (lbs.)	1.79	1.74	1.47	1.69	1.24
Average daily ration:					
Cottonseed meal (lbs.)	6.41	6.41	6.41	6.41	6.41
Silage (lbs.)	49.88	—	51.81	46.73	—
Cottonseed hulls (lbs.)	—	23.64	—	—	—
Johnson Grass hay (lbs.)	3.00	3.00	3.00	3.00	24.54
Feed required per cwt. of gain:					
Cottonseed meal (lbs.)	358.06	368.38	436.01	379.28	516.90
Silage (lbs.)	2786.30	—	3524.12	2765.01	—
Cottonseed hulls (lbs.)	—	1358.59	—	—	—
Johnson Grass hay (lbs.)	167.58	172.41	204.06	177.51	1978.91
Cost of 100 lbs. gain (dollars)	15.16	13.92	14.56	13.78	21.82
Shrink (per cent)	6.37	9.20	8.29	9.66	7.16
Dressing per cent (warm wt.)	57.06	55.91	56.25	57.06	56.28
Financial statement:					
Initial cost per steer					
(dollars)	65.86	65.91	65.66	65.51	65.67
Cost of feed (dollars)	32.68	28.74	25.74	28.13	32.46
Shipping and selling cost					
(dollars)	6.05	5.83	5.69	5.74	5.61
Total cost (dollars)	104.59	100.48	97.09	99.38	103.74
Price received per steer					
(dollars)	111.05	103.63	98.91	102.07	97.48
Necessary selling price per cwt. to break even					
(dollars)	10.21	10.18	10.06	10.22	10.90
Selling price per cwt.					
(dollars)	10.85	10.50	10.25	10.50	10.25
Profit or loss per steer					
(dollars)	6.46	3.15	1.82	2.69	-6.26

SUMMARY AND RECOMMENDATIONS

In this three years' work, the corn silage yield was 8.07 tons; sorghum silage, 19.61 tons; and sagrain silage, 10.56 tons.

For thin lands and where rainfall is variable, sorghum is far more certain than corn as a silage crop and will produce a much greater tonnage per acre.

Sagrain as a silage crop is particularly adapted to the buckshot soil of the Mississippi Delta.

Sagrain is not as easily cured into bright, palatable silage as the other two crops and the cutting should be delayed as long as possible or until the seed begin to shatter.

Cottonseed hulls are available and in combination with cottonseed meal and a small amount of hay, give satisfactory results when fed to mature steers.

In these experiments, 100 pounds of hulls were equal in feeding value to 189 pounds of corn silage. The range was from 161 to 204 pounds.

One hundred pounds of hulls were equal to 272 pounds of sorghum silage. The range was from 219 to 325 pounds.

One hundred pounds of hulls were equal to 249 pounds of sagrain silage. The range was from 210 to 276 pounds.

Johnson Grass hay and cottonseed meal were not as desirable as the other ration combinations in daily gains made or profits returned.

