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By

E. S. Erwin and C. B. Roubicek

Arizona Agricultural Experiment Station

UNIVERSITY OF ARIZONA

Tucson

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Summary

Cotton gin trash has been used in a growing and fattening ration for beef steers. The completion of two separate trials show the following results:

1. Steers ate unprocessed gin trash as readily as hegari silage.
2. Certain ratios of silage: gin trash produced faster and more economical gains than did all silage or all gin trash.
3. Stilbestrol implantation markedly increased rates of gain for steers on all rations.
4. Stilbestrol implanted steers fed high levels of gin trash actually made faster gains than steers fed all silage, without stilbestrol.
5. Molasses did not influence feed consumption, feed efficiency, or rates of gain when added to gin trash rations.

Introduction

In the past few years much attention has been given to the value of low quality roughages for beef cattle. It has been found that the ruminant can effectively utilize many low quality roughages when they are properly supplemented.

It has been estimated that over one million tons of cotton gin trash are available annually in the state of Arizona. Cotton gin trash is a waste material containing stems, leaves, cotton lint, and a few cotton seeds. The proportion of the various constituents in the gin trash varies markedly with the gin, methods employed in cotton picking, and the time of year. The quality of trash is directly proportional to the amount of cotton lint and cotton seeds. "Typical cotton gin trash" was subjected to chemical analysis and the results are shown in Table I.

These experiments were designed to learn if unprocessed cotton gin trash could be economically considered as a roughage source for growing and fattening steers. In view of this objective, various rations containing gin trash were tried.

TABLE I. CHEMICAL ANALYSIS OF COTTON GIN TRASH

Type of Determination	Percent
Moisture	6.3
Crude Protein	7.5
Ether Extract	1.0
Nitrogen-free-extract	39.9
Crude Fiber	33.2
Ash	12.1
Calcium	0.04
Phosphorus	0.16

Procedure: Experiment A

Thirty Hereford steers, averaging 566 pounds, were individually penned and fed twice daily throughout an 83 day growing period and a 76 day fattening period. During the growing period the steers were split into five groups, with six steers per ration, as follows:

Group No.	Ration + Supplement
1	Hegari silage
2	Hegari silage + cotton gin trash + milo grain
3	One-half cotton gin trash + one-half milo grain
4	Cotton gin trash
5	Cotton gin trash + molasses

In addition to the above dietary treatments, all steers were fed four pounds daily of the supplement shown in Table II (two pounds per head per feeding). The molasses was fed at the rate of three-fourths pound per head daily to Group 5 by sprinkling molasses on top of the cotton gin trash.

TABLE II. COMPONENTS OF SUPPLEMENT

Constituents	Percent
Dehydrated alfalfa	46.95
Cottonseed meal	46.95
Bone meal	4.70
Trace mineral salt	1.40
1/ Vitamin A concentrate per pound	2,700 I.U.

1/ Vitamin A was generously supplied by Chas. Pfizer and Co.

Daily feed consumption and individual steer weights were kept. The 83rd day weight of each steer served as the final weight for the growing phase and the beginning weight of the fattening period. The animals in the respective five treatment groups were fed the following rations during the 76 day fattening period:

Group No.	Ration + Supplement
1	Hegari silage
2	Hegari silage + cotton gin trash + milo grain
3	One-half cotton gin trash + one-half milo grain
4	One-third cotton gin trash + two-thirds milo grain
5	One-third cotton gin trash + two-thirds milo grain + molasses

The supplement and molasses were fed during the fattening period in the same way and amounts as in the growing period.

Final weight of each animal was obtained after a total of 159 days. Twenty-four hours later h steer was weighed on to the trucks that transported them to market (approximately 125 miles). -truck weights at market were also obtained. The percent shrink resulting from the difference ween final experimental weights and off-truck weights were calculated. The average shrink as luenced by diet, is shown in Table IV. The average daily gain was calculated for each steer f each period and for the combined periods. Also, Table III shows the over-all average daily gain based on off-truck weights (shrunk weight). Dressing percent of each steer was determined from warm carcass weights and off-truck weights. Individual carcass grades were obtained for all steers.

Growing Period:

The small differences in average daily gain for Group 1 (straight silage), Group 2 (silage-grain-gin trash) and Group 3 (grain-gin trash) were not significant. The ration for Group 2 (silage-grain-gin trash) did result in a significantly greater gain than did gin trash alone (Group 4) or gin trash plus molasses (Group 5). The addition of molasses to gin trash did not improve the gain of the steers.

Steers fed 50 percent grain-50 percent gin trash consumed more dry matter per day than the animals fed any other rations. The all-silage fed steers consumed the least dry matter daily of any treatment.

No difference was found in the amount of feed required to produce 100 pounds gain by the addition of molasses to cotton gin trash. No difference in feed efficiency was found between steers that consumed all-silage, grain-gin trash-silage, or a 50 percent grain-50 percent gin trash ration. However, the last three treatments required significantly less feed to produce 100 unds of beef than the all-gin trash or the gin trash-molasses rations.

Fattening Period:

During the fattening period, 11 pounds of grain were fed to steers that consumed gin trash (Group 4) and gin trash-molasses (Group 5). The remaining Groups (1, 2, 3) were fed the same ration as during the growing period. The average daily gains of the steers in Groups 4, 5 and 2 were 2.32, 2.28 and 2.09 pounds per head daily. Though there is a variation in daily gain it is not significant. However, all the above Groups of steers gained faster than Group 3 (50 percent grain-50 percent gin trash) and Group 1 (all silage). The better gain on steers fed all gin trash plus 11 pounds of grain and those fed 50 percent grain-50 percent gin trash during the fattening phase was probably due to their slow rates of gain during the growing period. Feeding all-silage rations during the fattening period produced slower rates of gains than those on any other ration.

During the fattening period, the steers that consumed 50 percent grain-50 percent gin trash (Group 3) and those fed gin trash-molasses plus 11 pounds grain consumed more dry matter per day than the other groups. Furthermore, the all-silage fed steers (Group 1) consumed significantly less dry matter than any other group. Apparently molasses feeding resulted in an increased dry matter intake with no increase in rate of gain.

Presented in Table III are the pounds of dry matter that were required to produce 100 pounds of gain, and Table IV shows the cost of gain per cwt.

Carcass Data:

All animals were shrunk for 24 hours. The steers were then trucked approximately 125 miles to market. Those steers fed high level of grain (Group 3) throughout periods A and B, and those fed gin trash shrunk significantly less in transit than any other treatment. Although the average shrink of the molasses-fed steers was as large as any group, one animal was "well out of

"Line," probably due to chance alone. The steers fed silage rations resulted in greater transit shrink than those fed grain-gin trash.

No significant difference was found between the dressing percent in the steers fed 50 percent grain-50 percent gin trash (Group 3) and silage-grain-gin trash (Group 2). However, a lower dressing percent occurred in other groups of steers. Furthermore, silage-fed steers (Group 1) resulted in a significantly lower dressing percent than the animals in the remaining treatments.

Table IV shows the percent market loss as influenced by the type of ration. This loss is the difference between final experimental weight and warm carcass weight. When all groups were compared, a significantly larger loss occurred in the silage-fed steers while the smallest loss was found in steers fed 50 percent grain-50 percent gin trash.

The results of the fattening period are probably influenced by the animals growth response in the growing period. This fact should be considered in the interpretation of results.

Experiment B

This study was initiated because the results of the previous investigation showed that unprocessed gin trash was as palatable as silage. Furthermore, the most desirable steer gains were observed by feeding a mixture of silage, grain, and gin trash. Therefore, various ratios of silage and gin trash were fed to steers that were implanted with stilbestrol by two different methods.

Procedure

One-hundred and eight yearling steers were divided into six pens of 18 head each. The following six ratios of hegari silage to unprocessed cotton gin trash was fed during a Growing Period A and a Fattening Period B: (1) 100:0, (2) 80:20, (3) 60:40, (4) 40:60, (5) 20:80, and (6) 0:100. During the 91 day growing period, pellet No. 1 (Table V) was fed to all steers at the rate of four pounds per head daily. Six steers in each pen were subcutaneously implanted with 36 milligrams of stilbestrol at 0 and 91 days. Furthermore, six other steers in each pen were implanted with 12 milligrams of stilbestrol at 0, 30, 60, 91 and 120 days of the experimental periods. The remaining six animals in each pen did not receive stilbestrol.

During the fattening period, pellet 2 (Table V) was fed to all steers at the rate of 12 pounds per head daily. After 63 days of the fattening period the heaviest two steers taken from the stilbestrol-group in each pen (36 steers in all) were marketed. The remaining steers were fed 47 days longer and then marketed. All steers were periodically weighed and average daily gains by period were compared statistically. Feed consumption and feed efficiency was determined for each pen.

TABLE V. PERCENT CONSTITUENTS IN EXPERIMENTAL SUPPLEMENTS*

	Pellet Number	
Ingredients	1	2
Cottonseed Meal	41.7	12.0
Dehydrated Alfalfa	41.7	12.0
Molasses	10.0	10.0
Barley	----	32.5
Milo	----	32.0
Bone Meal	4.1	1.0
Salt (Trace mineral)	2.5	0.5
Vitamin A/lb.	4,000 I.U.	1,100 I.U.

*Supplements were mixed and fed as one-half inch pellets.

TABLE III. RATES OF GAIN, FEED CONSUMPTION, AND FEED EFFICIENCY

AS INFLUENCED BY TYPE OF RATION IN EXPERIMENT A

	Experimental Rations									
	83 Day Growing Period					76 Day Fattening Period				
Group Number	1	2	3	4	5	1	2	3	4	5
[1]/Feed per day per steer, lbs.										
Silage	38.0	24.2	----	----	----	46.1	26.7	----	----	----
Gin Trash	----	3.9	9.6	----	----	----	4.4	10.0	11.1	11.1
Grain	----	3.9	9.6	----	----	----	4.4	10.0	11.1	11.1
Supplement	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Molasses	----	----	----	----	1.5	----	----	----	----	1.5
D.M. per steer per day, lbs.	13.3	16.4	21.6	15.9	17.5	15.2	18.5	22.3	19.9	21.4
Number steers	6	6	6	6	6	6	6	6	6	6
Av. initial wt., lbs.	558	570	587	561	552	735	757	763	652	654
Av. final wt., lbs.	735	757	763	652	654	858	916	914	828	827
Av. daily gain, lbs.	2.14	2.25	2.13	1.09	1.23	1.62	2.09	1.99	2.32	2.28
Av. daily gain at market wt., lbs.										
Feed per 100 lbs. gain, lbs.										
Silage	1785	1075	----	----	----	2904	1267	----	----	----
Gin Trash	----	173	451	1202	1106	----	211	521	273	281
Grain	----	173	451	----	----	----	211	521	488	491
Supplement	187	178	188	368	325	251	194	209	176	174
Molasses	----	----	----	----	122	----	----	----	----	66
[2]/D.M. per 100 lbs. gain, lbs.	624	728	1029	1591	1496	960	906	1164	873	953

[1]/Dry matter percent: Hegari silage, 25; Cotton gin trash, 93; Milo grain, 93; Supplement, 93; Molasses, 70.

[2]/D.M. = Dry Matter.

TABLE IV. CARCASS DATA, COSTS, AND RETURNS FROM VARIOUS TREATMENTS DURING EXPERIMENT A

	Groups									
	1		2		3		4		5	
% wt. lost in marketing (incl. transit loss)	47.6		43.7		40.5		44.0		44.3	
% shrink (24 hours including transit loss)	6.2		6.7		3.2		4.5		6.7	
Dressing % (based on off-truck wt. and warm carcass wt.)	55.7		60.4		61.5		58.7		59.7	
1/ Carcass grade	1.83		1.67		1.30		2.0		1.83	
2/ Experimental Period	G	F	G	F	G	F	G	F	G	F
3/ Cost per 100 lbs. gain:										
Silage	8.93	14.52	5.38	6.34	-----	-----	-----	-----	-----	-----
Gin Trash	-----	-----	0.43	0.53	1.13	1.30	3.01	0.68	2.77	0.73
Grain	-----	-----	5.19	6.33	13.53	15.63	-----	14.64	-----	14.73
Supplement	5.61	7.53	5.34	5.82	5.64	6.27	11.01	5.28	9.75	5.22
Molasses	-----	-----	-----	-----	-----	-----	-----	-----	2.44	1.32
Total	14.55	22.05	16.34	19.02	20.30	23.20	14.02	20.60	14.96	21.97
4/ Returns:										
$ per head	149.15		164.25		180.65		142.53		143.56	
$ per 100 lbs. steer	18.57		19.29		20.39		18.00		18.60	
$ net return on rations	1.10		1.86		-1.00		-0.93		-1.58	

1/ Carcass grade: Choice, 1.0; Good, 2.0.

2/ G = Growing Period; F = Fattening Period.

3/ Relative feed prices: Hegari silage, $10/T; Cotton gin trash, $5/T; Milo Grain, $60/T; Supplement, $60/T; Molasses, $40/T.

4/ Returns per 100 lbs. beef: Choice, $21.50; Good, $18.00.

Results and Discussion: Experiment B

Growing Period:

Table VI shows the average daily gains of the steers as influenced by the ratios of silage: cotton gin trash and by stilbestrol implantation. No difference in rates of gain were found between steers fed all-silage and those animals that consumed silage:gin trash ratios of 80:20 and 60:40. Silage:gin trash ratios of 40:60, 20:80 and 0:100 resulted in significantly slower gains than the all-silage fed steers. Lower gains were made on all gin trash rations compared to rations with some silage.

Table VI shows the influence of stilbestrol on rates of gain. The implantation of stilbestrol at the rate of 12 milligrams monthly or 36 milligrams initially increased gains 0.46 (38 percent) and 0.55 (45 percent) pounds per head daily. No significant difference was found between methods of stilbestrol administration, or on the kind of the ration fed. Also shown are results on feed consumption, feed efficiency, and cost of gain in steers fed the various ratios of silage:gin trash. These results are similar to those found in experiment A in that consumption of unprocessed gin trash was equal to silage. However, some silage was essential for efficient dry matter utilization. Twice as much dry matter was required by steers that consumed all gin trash to equal the gain of animals fed silage.

Fattening Period:

Twelve pounds per day of Pellet 2 (Table V) was fed during the fattening period. The same gin trash ratio was fed for both the fattening and growing period throughout. Table VI shows significant difference in rates of gain between the steers that consumed all-silage roughage and the following silage:gin trash roughage ratios: 80:20, 60:40, 40:60. However, all-gin trash and the roughage ratio of 20 percent silage:80 percent gin trash produced significantly lower gains than all-silage rations.

The reimplantation of stilbestrol resulted in high tail heads and depressed loins after 30 to 40 days of the fattening period, possibly due as much to an insufficient time between implantations as the reimplantation itself. During the fattening phase, stilbestrol did significantly increase the rates of gain 17.4 percent and 15.7 percent in those steers implanted with 36 milligrams and with 12 mg. per month respectively. There was no significant difference between methods of implantation. Stilbestrol increased gains in all rations approximately the same percentage.

Shrink (the difference between "on and off truck" weights) during 125 miles to market is shown in Table VI.

Upon slaughter, no significant difference in dressing percentage could be attributed to experimental treatment. However, grades of the carcasses were lowered as gin trash was increased in the respective steer rations. The all-silage fed steers graded higher than any other group, and steers fed all-gin trash and 80 percent gin trash graded lower than the other steer groups. Stilbestrol also reduced carcass grade, possibly due to improper implantation of the "hormone." The lowest grades were in steers implanted with 12 milligrams of stilbestrol monthly. Carcasses from steers implanted with 36 milligrams at 0 and 91 days were intermediate in grade. Stilbestrol influence on carcass grades was uneffected by the quality of roughage.

Costs and Returns:

Table VII shows the feed cost per steer daily as well as the cost of feed per pound gain, during the growing and fattening periods. In the growing period as the amount of gin trash increased the daily feed costs were reduced. However, these daily feed costs do not correspond with cost per pound of gain. Higher silage intakes increased the cost of gain, a ratio of 20 percent silage:80 percent gin trash resulted in the most economical gain in steers

during the growing period. However, when no silage was fed, the cost of gain increased 5.4 cents per pound over the low level silage group. The all-gin trash diet was the most economical fattening ration. However, this rate and cost of gain is affected by the growing period. The most economical ration was 60 percent silage:40 percent gin trash while the most costly ration was all-silage. The returns are also shown in Table VII.

Acknowledgements:

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The cotton gin trash used in this study was provided by the Cottonseed Oil Producers Association. The Stilbestrol pellets used in Experiment B were supplied by Chas. Pfizer and Co., through the Courtesy of Dr. W. C. Sherman.

The statistical assistance of Dr. Henry Tucker, Experiment Station Statistician, is acknowledged.

TABLE VI. EFFECT OF ROUGHAGE RATIOS AND STILBESTROL IMPLANTATION DURING THE GROWING AND FATTENING PERIOD: EXPERIMENT B

	Growing Period						Fattening Period					
[1] Silage:Gin Trash Ratios:	100:0	80:20	60:40	40:60	20:80	0:100	100:0	80:20	60:40	40:60	20:80	0:100
Av. daily gain, lbs.:												
No DES	1.65	1.34	1.24	1.20	1.24	0.65	2.06	1.89	1.97	1.67	1.67	1.77
12 mg. per mo. DES	1.91	2.02	1.77	1.67	1.77	0.92	2.04	2.17	2.45	2.15	1.88	2.06
36 mg. DES	2.06	1.83	2.09	1.75	1.69	1.19	2.23	2.14	2.24	2.01	1.75	1.88
Feed per steer per day, lbs.												
Silage	43.6	32.7	24.5	16.1	8.2	----	32.3	26.7	20.8	12.6	7.2	----
Gin trash	----	2.8	5.4	8.1	11.0	14.5	----	2.1	4.6	6.3	9.7	11.7
Pellets	4.0	4.0	4.0	4.0	4.0	4.0	11.9	11.9	11.8	11.8	12.0	11.8
Av. D.M. per day per steer, lbs.	18.4	17.7	17.6	17.5	17.7	18.5	22.7	22.9	23.3	22.3	24.1	23.5
D.M. per 100 lbs. gain, lbs.	9.8	10.1	10.4	11.4	11.3	20.1	10.2	10.7	10.4	11.1	13.8	12.5
Transit shrink, %												
No DES							2.7	3.0	1.3	3.5	3.6	3.5
12 mg. per mo., DES							2.2	2.5	2.8	2.7	2.8	0.5
36 mg., DES							1.9	2.9	3.7	3.0	3.2	2.8
Dressing %:												
No DES							61.8	61.0	59.7	60.1	58.9	57.9
12 mg. per mo., DES							61.3	60.0	59.9	60.3	59.1	58.2
36 mg., DES							61.9	62.1	60.5	60.7	60.9	59.6
[2] Carcass grade:												
No DES							1.83	2.67	3.50	3.67	3.67	5.67
12 mg. per mo., DES							3.16	3.67	4.83	4.00	4.67	5.50
36 mg., DES							2.83	3.17	4.33	4.50	4.83	4.50

[1] Low Choice = 1; High Good = 2; Medium Good = 3; Low Good = 4; High Standard = 5; Medium Standard = 6; Low Standard = 7.

[2] Key to abbreviations: DES = stilbestrol implant; D.M. = dry matter.

TABLE VII. COST AND RETURNS AS INFLUENCED BY

SILAGE:GIN TRASH RATIOS DURING EXPERIMENT B

	100:0	80:20	60:40	40:60	20:80	0:100
Growing Phase:						
*Cost (cents):						
per steer per day	33.8	29.2	25.9	22.5	19.4	16.4
per 100 lbs. gain	18.0	16.8	15.2	14.6	12.4	17.8
Fattening Phase:						
*Cost (cents):						
per steer per day	51.8	49.6	47.2	43.6	42.3	38.9
per 100 lbs. gain	23.2	23.2	21.1	21.7	24.2	20.7
Returns (cents per lb. gain)						
No DES	22.3	22.0	21.5	22.0	21.2	19.7
12 mg. per mo., DES	22.1	21.6	20.5	21.7	20.5	19.8
36 mg. DES	22.3	22.3	21.3	21.2	20.7	20.9

*Relative feed prices per ton: Hegari silage, $10; cotton gin trash, $5; milo grain, $60; supplement, $60; Molasses, $40.