Economics of Using Gin Trash in Feedlot Rations, Texas High Plains

by
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Assistant Professor and Student Assistant
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Kenneth B. Young and Curtiss Griffith*

Feed expenses are the major cost component in cattle feedlot operations. Although feeding costs are generally related to the price of feed grains, roughages also constitute an important part of the ration for ruminant animals. Most commercial feedlot rations in the Texas High Plains contain approximately 20 percent average roughage content.(1) Feeders are currently devoting greater attention to the cost and quantity of roughage used as a result of recent high grain prices and changes in the grading standards for finished cattle which allow for greater flexibility in feeding programs.

Cattle feeding is an important economic activity in the High Plains region. Cattle feedlot capacity in the Texas High Plains was 2,185,100 head in 1974 as compared with 1,698,340 head in 1970.(2) Additional capacity for 557,150 head was available in 1974 within the Panhandle Area in the states of Oklahoma, New Mexico, and Kansas. A relatively abundant supply of feed grain and other high energy feeds is produced within the region to support the feedlot industry. (6) However, there is a local deficiency in roughage production. (9) In Panhandle feedlots, the traditional roughages have been alfalfa, corn silage and cottonseed hulls. Except for corn silage, most of this roughage supply has to be shipped into the area from other parts of the Texas High Plains.

In the Texas High Plains, the cotton producing belt starts just a few miles south of the major concentration of cattle feed yards in the Panhandle Area. Gin trash that is expelled from High Plains cotton gins represents

* Kenneth B. Young is Assistant Professor, Agricultural Economics Department, Texas Tech University and Texas A & M Cooperative Research Unit. Curtiss Griffith is a former Student Assistant at Texas Tech University, Lubbock, Texas.

a low cost and virtually untapped source of roughage to reduce dependency on conventional feedlot roughages in short supply. Gin trash is a major by-product in cotton ginning and is composed largely of cotton burrs but also stems, leaf material and other miscellaneous items. This waste material has previously been burned when it accumulated at the gins. Use of gin waste for livestock feed would help to alleviate the waste disposal problem for ginners.

In view of the large amount of cotton production in the Texas High Plains, currently averaging about 20 million bales per year (8), there is a considerable volume of gin trash available locally. The quantity of gin trash expelled from gins in this area is estimated at 859 pounds per bale of cotton (4). Thus, the potential supply of gin trash is 859,000 tons per year or nearly 400 pounds per head for all feedlot cattle in the Texas High Plains assuming that the feed yards are operating at 50 percent average capacity with 200 percent turnover per year.

The problem of obtaining adequate roughage for feedlot use in the High Plains coupled with a situation of relatively abundant gin waste available in this region prompted a study of the economics of using cotton gin trash for feedlot use. Support for this study was also provided by the fact that several feeders in the area were already experimenting with gin trash in ration formulation.

Objectives and Scope of the Study

The major objective of the study was to evaluate the returns of using cotton gin waste in cattle feedlot rations. Specific objectives were to:

A. determine optimum quantities of gin waste that may be used in a cattle feedlot ration;

B. determine the value of gin wastes in cattle feedlot rations relative to other roughages; and

C. compare costs or processing and transporting gin waste products with alternative methods of processing.

Alternative rations are developed in the analysis for objectives A and B to compare nutritive value of gin waste for cattle feeding relative to other conventional feed inputs. The different rations have the same nutrient requirements except for net energy for gain levels and fiber restrictions. Alternative prices are assumed for the feed inputs that compete with gin trash in each ration.

Data were assembled directly from truckers and processors to make the cost comparisons for objective C.

Although the data analyzed for the study pertain to a cattle feedlot operation in the High Plains of Texas, the results obtained on the comparative feeding value of gin waste products and their processing costs have wider relevance for other cattle feeding areas where the existing conditions do not differ greatly from those in Texas.

Nutrient Value of Gin Waste

Comparative nutrient values of different feed ingredients evaluated in feedlot rations for this study are given in Appendix Table 1. Other than cotton gin trash, the values are taken from National Research Council data (3). According to results of a laboratory analysis obtained from Hi Pro Feeds in Friona, Texas, ground gin trash in the Texas High Plains has similar energy content to alfalfa hay although slightly lower in total digestible nutrient content. Digestible protein content of ground gin trash is 3.1 percent which is nearly half that of milo or corn and appreciably higher than cotton seed hulls. Crude fat content of gin trash is comparable to alfalfa hay.

Only limited information is available concerning the acceptability of ground gin trash by feedlot cattle relative to the traditional roughages used in rations. A performance test at the Texas Tech University Center near Amarillo, Texas by Sherrod et. al (5) compared the use of dehydrated alfalfa pellets with cotton burr pellets, which were processed from gin trash in feeding rations. With alternative roughage levels of 5, 10 and 15 percent, these researchers reported that feed utilization was significantly improved with alfalfa pellets relative to burr pellets, and that intake of burr pellets was only 49.5 percent that of alfalfa pellets in a comparative acceptability trial with steers offered both types of pellets free choice.

In a recent progress report, Thompson and co-workers (7) reported on a performance test with mother cows fed cotton seed hulls, pelleted cotton burrs and loose cotton burrs along with brood cow supplement. Prior to calving, cows on the loose cotton burr ration gained the most weight relative to those on other rations, however, the group on loose burrs lost weight after calving. Cows on the pelleted burr ration gained less weight prior to calving but continued to gain weight after calving. During the first six weeks of age, the daily gain in weight of calves was from 0.10 to 0.18 pounds less for mother cows on the pelleted burr and loose cotton burr rations. Results of this study indicate that cattle should perform satisfactorily on a ration composed largely of pelleted cotton burrs or loose cotton burrs.

Cattle feeders contacted in this study who had experience with feeding cotton gin trash reported that acceptability of trash was increased by mixing molasses with the trash. The recommended mixes obtained from feeders varied from 0.1 pounds to 0.4 pounds of molasses per pound of gin trash. Some feeders used no molasses after the cattle became accustomed to eating gin trash. Alternative combinations of molasses and ground gin trash were evaluated in this study as described in Appendix Table 1. The added molasses furnished additional energy and improved palatability of the ration.

As gin trash is primarily a roughage, limits need to be placed on the permitted level of roughage use in rations where trash is a major ingredient. Feeders ordinarily prefer not to have greater than 10 to 20 percent roughage in cattle finish rations but will tolerate higher levels in starter rations when the cattle are first placed on feed. Excess roughage levels tend to reduce the desired rate of gain in finishing stages of feeding.

One possible problem with using gin trash for livestock feed is residual dessicant from cotton defoliation. Very little dessicant is used in the High Plains of Texas due to the short growing season for cotton. However, there could be some problem with defoliant materials in gin trash used from other cotton producing areas.

Differences in Ration Requirements

Basic nutrient requirements of the different feedlot rations compared are shown in Table 1. The level of non-protein nitrogen or urea was limited to 0.5 pounds per hundredweight of ration to avoid toxicity problems. Alternative energy levels of 36, 40, 44 and 48 megacalories per hundred pounds were evaluated for feeding steers from 400 pounds initial weight to 1100 pounds final weight. These changing energy requirements at different stages of finishing cattle are typical levels for High Plains feedlots. Some restrictions on roughage were also considered for rations (Table 1).

In view of fluctuations in feed prices experienced in recent years, alternative prices for selected major feed inputs were also evaluated (Table 2). The selection of alternative feed inputs evaluated in rations

Table 1. Range in Nutrient Composition Per 100 Pounds of Ration Weight.

Nutrient	Lower Limit	Upper Limit
Net Energy for gain	36.00-48.00 mcal*	56.00-68.00 mcal
Crude Protein	11.80 lb.	---------
Non-Prot. nitrogen	0.50 lb.	0.50 lb.
Calcium	0.40 lb.	0.50 lb.
Phosphorous	0.35 lb.	0.36 lb.
Salt	0.50 lb.	0.50 lb.
Roughage	10.00 lb.	Various **

* Progressively raised from 36 to 40 to 44 and to 48 mcals during the feeding period as is done in typical commercial rations.

** Upper limits of 15 lb., 25 lb., and no upper limits.

Table 2. Alternative Price Levels for Feedstuffs Evaluated in Feedlot Rations.

Fixed-Price Inputs	Price ($/cwt.)	Variable-Price Inputs	Price ($/cwt.)
		Milo	$3.00, $4.00, $4.65
Supplement [a/]	$5.62	Corn	3.30, 4.30, 4.95
Cottonseed Meal	8.00	Fat	9.20, 12.00
Urea	4.90	Alfalfa Hay	2.00, 3.00
Rock Phosphate	5.24	Cotton Seed Hulls	1.40, 1.60, 1.80
Salt	1.30	Gin Trash	.50 to 4.00
Corn Silage	2.25	BRMOL1[b/]	0.90 to 4.00
Alfalfa Hay	2.00, 3.00	BRMOL2[b/]	1.30 to 4.00
		BRMOL3[b/]	1.70 to 4.00
		BRMOL4[b/]	2.10 to 4.00

a/ Supplement contained 0.677 mcal NEM, 0.386 mcal MEG, and 0.248 lbs. D.P. where: NEM and NEG are net metabolizible energy levels for maintenance and gain, respectively, D.P. = digestible protein

b/ BRMOL indicates a combination of ground gin trash and molasses. The numbers 1, 2, 3 and 4 indicate changes in the combination from 0.1 to 0.4 lbs. molasses per pound gin trash.

was determined from personal interviews with Texas cattle feeders experimenting with the use of gin trash.

The only form of gin trash evaluated in the ration analysis is ground gin trash. Nutritive values of loose trash and pelleted trash are highly comparable except for differences in palatability.

Results and Discussion

The only feed ingredients containing gin trash that were selected in rations are ground gin trash and a combination of 0.4 pounds molasses per pound of gin trash. With the prices for feed inputs shown in Table 2, it was not profitable to use any corn or corn silage in rations.

Gin trash is a close substitute to cottonseed hulls in providing a low cost roughage (Table 3). In regard to protein and energy content, the gin trash is a superior feed input to cottonseed hulls and can be used to substitute for part of the milo in rations. With reduced prices for the combination of gin trash and molasses identified in Table 3 is BRMOL4 there was a considerable reduction in the use of milo in rations, however, use of cottonseed meal and fat had to be increased to maintain adequate protein and energy levels. Use of gin trash alone without molasses added was only feasible for 36 megacalories net energy for gain levels and molasses was required in combination with gin trash for higher energy levels in rations. Ration prices in Table 3 were increased with higher energy levels and reduced with lower prices for gin trash. These results are for no maximum fiber restrictions.

The effects of increasing milo prices are illustrated in Table 4. It is estimated that use of milo may be decreased to 17.65 percent of the ration by substituting gin trash, molasses, additional cottonseed meal and fat for

Table 3. Estimated Least Cost Feedlot Rations with Alternative Gin Trash Prices and Increasing Cottonseed Hull Prices

Energy Requirement	Input Costs and Use in Ration a/																
	Cottonseed Hulls		Gin Trash		BRMOL4 b/		Supplement		Cottonseed Meal		Milo		Fat		Alfalfa		Cost of Ration
(mcal NEG)	($/cwt)	(lbs.)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs.)	($/cwt)	(lbs)	($/cwt)
36	$1.40	32.58	$2.75		$3.11		$5.62	6.77	$8.00	4.39	$4.00	55.20	$9.20		$3.00		$3.44
			$1.14	15.53	$1.96	38.63				5.06		39.20					$3.41
40		23.66	$2.75		$3.11			7.30		2.43		65.64					$3.60
			$0.74		$1.67	56.42				6.12		32.42		3.40			$3.11
44		14.75	$2.75		$3.11			7.82		0.48		76.07					$3.76
			$0.74		$1.67	56.64				7.78		25.04		8.93			$3.46
48			$2.75		$3.11			2.60				85.30		0.82		10.00	$3.98
			$0.74		$1.67	56.84				9.43		17.65		14.45			$3.80
36	$1.60	17.98	$2.75		$3.11					3.03		57.70				19.59	$3.49
			$2.24	15.53	$2.74	38.63				5.06		39.20					$3.44
40		7.93	$2.75		$3.11					0.98		68.33				21.10	$3.64
			$0.74		$1.67	56.42				6.12		32.42		3.40			$3.11
44		9.62	$2.75		$3.11			5.44				76.95				6.87	$3.79
			$0.74		$1.67	56.64				7.78		25.04		8.93			$3.46
48			$2.75		$3.11			2.60				85.29		0.82		10.00	$3.98
			$0.74		$1.67	56.84				9.43		17.65		14.45			$3.80
36	$1.80	17.98	$2.75		$3.11					3.03		57.70				19.54	$3.53
			$2.44	15.53	$2.89	38.63				5.06		39.20					$3.49
40		7.93	$2.75		$3.11					0.98		68.33				21.10	$3.65
			$0.74		$1.67	56.42				6.12		32.42		3.40			$3.11
44		0.53	$2.75		$3.11							78.60				19.27	$3.79
			$0.74		$1.67	56.63				7.78		25.04		8.93			$3.46
48			$2.75		$3.11			2.60				85.29		0.82		10.00	$3.98
			$0.74		$1.67	56.84				9.43		17.65		14.45			$3.80

a/ The rations also included 0.5 pounds urea, and approximately 0.5 pounds each of rock phosphate and salt per 100 pounds of ration. Other feed inputs evaluated were not used in these rations.

b/ BRMOL4 is a mix containing 0.4 parts molasses per one part of ground gin trash.

Table 4. Estimated Least-Cost Feedlot Rations with Alternative Gin Trash Prices and Increasing Milo Prices. [a/]

Energy Requirement	Milo		Gin Trash		BRMOL4 [c/]		Supplement		Cottonseed Hulls		Cottonseed Meal		Fat		Alfalfa		Cost of Ration
(mcal NEG)	($/cwt)	(lbs.)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)
36	$3.00	57.70	$2.75		$3.11		$5.62		$1.41	17.98	$8.00	3.03	$12.00		$2.00	19.59	$2.68
		53.30	$1.02	40.22	$1.87			1.62				3.52					$2.43
40		68.30	$2.75		$3.11					7.93		0.97				21.10	$2.73
		64.25	$1.02	29.22	$1.87			3.56				1.80					$2.62
36	$4.00	57.70	$2.75		$3.11				$1.60	17.98		3.03	$ 9.20		$3.00	19.59	$3.49
		39.20	$2.24	15.53	$2.74	38.63						5.06					$3.44
40		68.33	$2.75		$3.11					7.93		0.98				21.10	$3.64
		32.42	$0.74		$1.67	56.42						6.12		3.40			$3.11
44		76.95	$2.75		$3.11			5.44		9.62						6.87	$3.79
		25.04	$0.74		$1.67	56.64						7.78		8.93			$3.46
48		85.29	$2.75		$3.11			2.60						0.82		10.00	$3.98
		17.65	$0.74		$1.67	56.84						9.43		14.45			$3.80
36	$4.65	55.20	$4.00		$4.00			6.77		32.58		4.39					$3.87
		39.20	$1.26	15.53	$2.04	38.63						5.06					$3.27
40		65.64	$4.00		$4.00			7.30		23.66		2.43					$4.07
		32.40	$2.03		$2.59	56.42						6.12		3.40			$3.84
44		76.08	$4.00		$4.00			7.82		14.75		0.48					$4.29
		25.04	$2.03		$2.59	56.64						7.78					$4.14
48		85.29	$4.00		$4.00			2.60						0.82		10.00	$4.56
		17.65	$2.03		$2.59	56.64						9.43		14.45			$4.44

Note: "Input Costs and Use in Rations [b/]" spans the columns from Milo through Alfalfa.

[a/] There were also changes in fat and alfalfa prices entailed in the first four rations.

[b/] The rations also included 0.5 pounds urea and approximately 0.5 pounds each of rock phosphate and salt per 100 pounds of ration. Other feed inputs evaluated were not used in these rations

[c/] BRMOL4 is a mix containing 0.4 parts molasses per 1.0 parts ground gin trash milo in rations with no fiber restrictions. The roughage content of rations would exceed 40 percent at these low milo levels.

Effects of maximum fiber restrictions on ration formulation and ration costs are shown in Table 5. It is evident in Table 5 that even with a maximum fiber limit of 15 percent, use of gin trash would still figure prominently in rations if molasses is combined with the gin trash. The imposition of fiber limits caused more concentrate supplement and milo to be used in rations relative to those with no fiber limit restrictions. At the 15 percent maximum fiber limit, the break-even prices for BRMOL4 range from $1.71 per hundred-weight for 48 megacalories energy level to $2.65 per hundredweight for 36 megacalories energy level. With a price of $80. per ton for molasses, this means that feeders could only afford to pay $2.20 per ton for ground gin trash with a $1.71 price for BRMOL4 but could pay $21.00 per ton for ground gin trash with the $2.65 price for BRMOL4. Prices higher than $2.65 per hundredweight for BRMOL4 shown in Tables 3, 4 and 5 would indicate that feeders could afford to pay even higher prices for ground gin trash and meet the nutrient requirements of rations shown in Table 1.

Processing and Handling Costs for Gin Trash

Alternative methods of processing gin waste for use in feedlot rations are grinding, pelleting and cubing. No information on cubing gin waste was available for this study and this method is not included in the analysis of alternative processing costs.

With either grinding or pelleting, the first step is to screen excess dirt from the gin trash and then use a tub grinder. Portable tub grinders are available which may be used at several gins during the ginning season to grind the trash at the site of disposal and avoid excess transportation

Table 5. Estimated Least-Cost Feedlot Rations with Alternative Gin Trash Prices and Increasing Maximum Fiber Restrictions

Energy Requirement	Maximum Fiber	Input Costs and Use in Rations a/																Cost of Ration
		Gin Trash		BRMOL4 b/		Supplement		Cottonseed Meal		Milo		Fat		Alfalfa Hay		Cottonseed Hulls		
		($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)	(lbs)	($/cwt)
36	no limit	$4.00		$4.00		$5.62	6.77	$8.00	4.39	$4.65	55.20	$12.00		$3.00		$1.60	32.58	$3.87
		$2.58		$2.82	50.94		0.38		4.70		42.46							$3.87
40		$4.00		$4.00			7.30		2.43		65.64						23.66	$4.07
		$2.58		$4.82	37.00		2.65		2.66		56.38							$3.94
44		$4.00		$4.00			7.82		0.48		76.08						14.75	$4.29
		$2.58		$2.82	23.06		4.93		0.63		70.30							$4.29
48		$4.00		$4.00			2.60				85.29		0.82		10.00			$4.56
		$0.78		$1.70	14.56		6.32				76.02		2.13					$4.38
36	25 percent	$4.00		$4.00			7.22		2.72		64.08						25.00	$4.05
		$2.11		$2.65	35.00		3.29		2.13		58.29							$4.05
40		$4.00		$4.00			7.30		2.43		65.64						23.66	$4.08
		$2.11		$2.65	35.00		3.29		2.13		58.29							$4.04
44		$4.00		$4.00			7.82		0.48		76.08						14.75	$4.29
		$0.79		$1.71	35.00		3.30		2.74		55.60		2.07					$3.89
48		$4.00		$4.00			2.60				85.29		0.82		10.00			$4.56
		$0.79		$1.71	35.00		3.33		4.34		48.50		7.53					$4.34
36	15 percent	$4.00		$4.00			7.80		0.53		75.78						15.00	$4.28
		$2.11		$2.65	21.00		5.45		0.17		72.30							$4.28
40		$4.00		$4.00			7.81		0.53		75.78						15.00	$4.28
		$2.11		$2.65	21.00		5.45		0.17		72.30							$4.28
44		$4.00		$4.00			7.82		0.48		76.08						14.75	$4.29
		$2.11		$2.65	21.00		5.45		0.17		72.30							$4.28
48		$4.00		$4.00			2.60				85.29		0.82		10.00			$4.56
		$0.79		$1.71	21.00		5.47		1.08		68.30		3.09					$4.34

a/ The rations also included 0.5 pounds of urea and approximately 0.5 pounds each of rock phosphate and salt per 100 pounds of ration weight. Other feed inputs evaluated were not used in the rations.

b/ BRMOL4 is a mix containing 0.4 parts molasses per pound of ground gin trash costs. Initial cost of a tub grinder was $30,000. in 1974. A heavy duty loader is required to handle gin trash for the grinding operation with an initial cost of $20,000. With this equipment and two laborers, output of ground gin trash would range from 350 to 450 tons per day depending on weather conditions which affect the handling of gin trash. Estimated grinding cost for gin trash is from $6.00 to $7.00 per ton.

Estimated pelleting costs for gin trash in 1974 are shown in Appendix Table 2. A relatively large outlay for initial investment in equipment is required for a pelleting operation. Estimated costs per ton for pelleting gin trash range from $17.55 for a 50 ton per day operation to $8.77 for a 100 ton per day operation. Initial costs for screening dirt and grinding prior to pelleting are included in these estimates.

Due to the bulkiness of gin trash products, transportation costs are an important consideration in evaluating the economics of using this material for cattle feeding. Estimated transportation costs for ground gin trash in 1974 ranged from $0.20 per ton-mile on short hauls to $0.09 per ton-mile on long hauls. Assuming that the gin charges $3.00 per ton for the trash, the delivered prices for ground trash at the feedlot would therefore range from approximately $11.00 per ton for a 5-mile haul to $16.75 per ton for a 75-mile haul. The alternative of pelleting the trash at the gin location would reduce transportation costs about 50 percent. Delivered costs for pellets would be approximately $12.50 per ton for a 5-mile haul and $15.50 per ton for a 75-mile haul. However, this would assume that the gin is large enough to support a 100-ton per day pelleting operation as the pelleting equipment could not be easily transported to service different gins.

In comparing different processing methods for gin trash for feedlot use it should be mentioned that ground trash is not easily conveyed by augers and is frequently dirty, thus unpleasant to handle and potentially damaging to mill mechanisms. Excessive bulkiness of this product also presents storage problems at feed yards. Desirable properties of ground trash are better roughage qualities and improved bonding action for other ration ingredients as compared with pellets. Pellets have advantages in being easier to blend into feedlot rations, in being cleaner to handle and in being more acceptable by livestock relative to ground trash. The pellets are relatively compact compared with ground gin trash thus permitting economic indoor storage. In view of the slight additional processing cost relative to grinding for large scale pelleting plants, this processing method would be more attractive to users located long distances from the gin.

Summary and Implications

The principal objective of this study was to evaluate the economies of using cotton gin trash in cattle feedlot rations and to compare alternative processing methods for gin trash.

Assuming a molasses price of $80.00 per ton, the estimated feed value of ground gin trash ranged from $2.20 per ton for high energy rations with 15 percent fiber limits to $24.40 per ton with less restrictions when molasses was included in the ration. Without molasses, the estimated feed value of ground gin trash was $22.80 per ton for some of the rations shown in Tables 3, 4 and 5. The value of gin trash in rations was influenced by milo and cottonseed hull prices as well as energy and fiber restrictions.

In comparing different processing methods for gin trash it is evident that grinding is a more economical method costing only $6.00 to $7.00 per ton relative to approximately $9.00 to $18.00 per ton for pelleting. A relatively small investment is required for tub grinders and they may be used to service several gins whereas pelleting equipment is not mobile and entails a relatively high investment cost. From the standpoint of cattle feeders, however, transportation cost for pelleted gin trash would be about half that of ground trash and the pellets are also more convenient to handle at the feed yard. In projecting the likely trends in processing gin trash it appears that pelleting plants would only be installed at the larger gins with sufficient volume to warrant an economical pelleting operation while the smaller gin would probably share in the use of a portable tub grinder for processing gin waste. Cattle feeders located close to the source of supply would probably continue to use ground gin trash while those located greater distances from supply would prefer the pellets.

Comparing the estimated feed value of gin waste with the delivered cost of processed gin waste at feedlots, there appears to be a sufficient profit margin for either the gin suppliers or feedlot users to develop more processing facilities for gin waste in the Texas High Plains. The implications for expanded processing facilities are to provide more returns to producers through the sale of cotton gin waste and to assure a roughage supply at reasonable cost to cattle feeders.

REFERENCES CITED

1. Dietrich, Raymond A., Costs and Economies of Size in Texas-Oklahoma Cattle Feedlot Operations, Bulletin 1083, Texas Agricultural Experiment Station, Texas A & M University, College Station, Texas 1969.

2. Fed Cattle Industry: 1974 and 1970 Reports, Agricultural Development Department, Southwestern Public Service Company, Amarillo, Texas.

3. Nutrient Requirements of Beef Cattle, National Academy of Science, National Research Council Publication 1137.

4. Page, Gordon C., Pollution Control for Cotton Gin Effluents, (Unpublished MSc. Thesis), Texas Tech Un iversity, August 1971.

5. Sherrod, L. B., K. R. Hansen, R. D. Furr and C. E. DeBord, "Nutritive Value of Alfalfa and Cotton Burr Pellets", Proceedings, Western Section, American Society of Animal Science, Vol. 21, 1970. pp. 177-182.

6. Texas Department of Agriculture. U.S. Department of Agriculture, Statistical Reporting Service and Texas Crop and Livestock Reporting Service Cooperating. Texas Field Crop Statistics, Austin, Texas.

7. Thompson, Leif H., Confinement Management of Beef Cows Fed Various Roughage Sources, Progress Report, Texas Tech University, January, 1976.

8. U.S. Department of Commerce, Bureau of the Census, " Cotton Production in the United States, 1970", U.S. Government Printing Office, Washington, D.C.

9. Williams, W. F., West Texas Agriculture, Past-Present-Future, Texas Tech University, August 1973.

Table 1. Comparative Nutrient Composition of Feed Inputs Evaluated in Feedlot Rations*

FEED INPUT	Nutrient Composition[a/]										
	NEM	NEG	TDN	CP	DP	NPN	CFAT	CF	CA	P	ROU
Supplement [b/]	0.677	0.387	0.546	0.314	0.248	-----	0.004	0.107	0.051	0.014	-----
Cottonseed Meal	0.707	0.462	0.686	0.410	0.332	-----	0.019	0.120	0.002	0.011	-----
Urea	-----	-----	-----	2.810	2.250	1.000	-----	-----	-----	-----	-----
Milo	0.785	0.520	0.750	0.094	0.066	-----	0.028	0.025	-----	0.003	-----
Corn	0.820	0.550	0.764	0.089	0.070	-----	0.041	0.022	-----	0.003	-----
Animal Fat	2.030	1.270	-----	-----	-----	-----	0.950	-----	-----	-----	-----
Alfalfa Hay	0.460	0.160	0.510	0.154	0.112	-----	0.016	0.284	0.014	0.002	1.000
Silage	0.284	0.180	0.280	0.032	0.019	-----	0.010	0.098	0.001	0.001	1.000
Cottonseed Hulls	0.424	0.081	0.370	0.039	0.002	-----	0.008	0.429	0.001	-----	1.000
Rock Phosphate	-----	-----	-----	-----	-----	-----	-----	-----	0.240	0.180	-----
Salt	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Ground Gin Trash	0.460	0.150	0.419	0.085	0.031	-----	0.015	0.351	0.007	0.002	1.000
BRMOL1 [c/]	0.553	0.212	0.508	0.094	0.036	-----	0.016	0.351	0.008	0.002	1.000
BRMOL2 [d/]	0.645	0.273	0.597	0.102	0.041	-----	0.017	0.351	0.008	0.002	1.000
BRMOL3 [e/]	0.738	0.335	0.686	0.111	0.046	-----	0.018	0.351	0.008	0.002	1.000
BRMOL4 [f/]	0.830	0.397	0.775	0.120	0.051	-----	0.019	0.351	0.008	0.002	1.000

* Source (2) except for gin trash which is based on analysis by Hi-Pro Feeds, Friona, Texas.

a/ NPN = non-protein nitrogen in pounds, NEM = net metabolizable energy for maintenance in megacalories, NEG = net metabolizable energy gain in megacalories, TDN = total digestible nutrients in pounds, CP - crude protein in pounds, DP = digestible protein in pounds, CFAT = crude fat in pounds, CF = crude fiber in pounds, CA = calcium in pounds, P = phosphorus in pounds, and ROU = roughage in pounds.

b/ Commercial ration supplement in pounds

c/ Combination of one pound ground gin trash and 0.1 pounds molasses

d/ Combination of one pound ground gin trash and 0.2 pounds molasses

e/ Combination of one pound ground gin trash and 0.3 pounds molasses

f/ Combination of one pound ground gin trash and 0.4 pounds molasses

Table 2. Estimated Pelleting Costs for Gin Waste with a Large Volume Fixed Pelleting Plant Operating 24 Hours Per Day

Operating Costs Per Month:	
Labor [a/] (4 men @ $2.00/hr. x 24 hours/day for 30 days)	$5,760
Electricity [a/]	6,250
Repairs and Maintenance [b/]	5,000
Miscellaneous [b/]	545
Total Operating Costs Per Month	$17,555
Overhead Costs Per Month:	
Depreciation (10 year life for $500,000 outlay)[a/]	$4,167
Interest on Investment (6% rate)[a/]	2,500
Insurance, Taxes and Miscellaneous Overhead [b/]	1,000
Manager's Salary [b/]	1,100
Total Overhead Costs Per Month	$8,767
Total Costs Per Month	$26,322
Cost Per Ton (100 tons/day)	$ 8.77

[a/] Cost data furnished by Mr. A. L. Black of Friona Industries, Friona, Texas.

[b/] Cost data estimated from input requirements provided by J. Zurenko and C. Rust, An Economic Analysis of Alfalfa Dehydration, Montana Agricultural Experiment Station Report, Montana State University, Bozeman, Montana, 1970.