

# AGRO-INDUSTRIAL REPORT

Don Ethridge



COTTON INCORPORATED

4505 CREEDMOOR ROAD, RALEIGH, NORTH CAROLINA 27612

$$\text{CH}_3(\text{CH}_2)_3\text{CH}=\text{CH}(\text{CH}_2)_2\text{CH}=\text{CH}(\text{CH}_2)_6\text{OCCH}_3$$

$$\text{TEC}(s) = C_1 \sum_{r=0}^s P(r)(S-r) + C_2 \sum_{r=S+1}^{\infty} P(r)(r-S)$$

## COTTON-GIN TRASH AS A RUMINANT FEED

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## COTTON GIN TRASH AS A RUMINANT FEED

W.F. Lalor, J.K. Jones, G.A. Slater

### Introduction

Every bale of stripped cotton not contaminated by chemicals yields as a byproduct about 500 pounds of cotton gin trash (CGT) usable as feed. Spindle-picked cotton yields about 150 pounds per bale. Depending on the price of competing ration ingredients, the nutritive value of CGT gives it a money value at the feed lot of up to \$35 a ton. Pelleted CGT sold last winter for \$35 a ton, f.o.b. Lubbock. It was shipped north to feed lots.

On behalf of cotton producers, Cotton Incorporated has completed a study of CGT as a ruminant food.

The study consisted first of a survey to determine the nutritive constituents of CGT from various parts of the cotton belt. Next, using the results of the survey, CGT was incorporated into rations formulated on a basis of lowest cost to meet specific nutritional needs. The procedure gave a dollar value to CGT relative to well established feed stuffs.

### Nutritive Value of CGT

The nutritive make-up of CGT varies markedly, depending on where the cotton is grown and on weather conditions during ginning and harvesting. Sample analyses are shown in Table 1. The average nutritive value of CGT and its dollar-value relationships to other roughage feeds are shown in Table 2.

Most variable was the ash content, which ranged from a low of about eight per cent to a high of over 28 per cent. Cotton

Table 1. Chemical Composition of CGT Samples

<u>Feed</u>	<u>D.M.</u>	<u>C.P.</u>	<u>C. Fat</u>	<u>C. Fiber</u>	<u>Moisture</u>	<u>Ash</u>	<u>N.F.E.</u>	<u>Source</u>
				(Per Cent)				
Cottonseed trash	90.7	7.7	1.6	27.9	9.3	9.3	-	U.S.-Canadian tables of feed composition
Spindle-picked CGT unpelleted	90.69	5.94	3.16	31.78	9.31	11.04	38.78	Mississippi
Stripper-harvested CGT pelleted	91.44	10.13	1.28	38.50	8.56	8.10	33.43	Texas
Loose CGT	93.7	6.3	1.0	33.2	6.3	12.1	39.9	Arizona
CGT cubes	88.32	10.43	2.44	25.0	11.68	19.53	-	Arizona
CGT cubes	93.06	10.55	1.90	20.29	6.94	28.44	-	Arizona
Loose CGT	78.20	7.4	4.5	20.0	21.8	14.9	-	New Mexico
CGT cubes	(89.66)	8.92	1.16	26.97	10.34	22.02	-)	Arizona
	(85.50)	8.67	2.17	25.15	14.50	23.60	-)	Arizona
	(82.12)	11.81	3.53	20.70	17.88	16.67	-)	Arizona
CGT pellets	91.44	10.13	1.28	38.50	8.56	8.10	-	Texas
Cotton burrs	92.0	8.5	2.0	35.9	8.0	8.0	37.9	Texas
CGT	92.0	7.0	1.5	35.0	8.0	10.0	-	SRI

D.M. = Dry matter  
 C.P. = Crude Protein (N x 6.25)  
 C.Fat = Crude Fat  
 C. Fiber = Crude Fiber  
 N.F.E. = Nitrogen-Free Extract

Table 2. Comparative Chemical Composition and Nutritive Value of Selected Roughages

	Alfalfa	Bermuda	Cotton	Cotton-	Prairie	Rice	Sorghum
	Hay	Hay	Burrs	Seed Hulls	Hay	Hulls	Stover
ENE <sup>1</sup> Maintenance (MC/Cwt)	55	48	44	46	49	41	41
ENE Production (MC/Cwt)	23	13	14	15	13	15	13
TDN Ruminant (%)	54.2	43	42	45	45	32	40
Crude Protein (%)	17.0	7.9	4.5	7.0	4.5	3.0	3.6
Dig Protein (%)	12.6	4.0	2.0	3.0	2.5	1.5	1.2
Crude Fat (%)	2.0	2.0	1.25	1.5	3.2	1.0	1.2
Crude Fiber (%)	24.3	28.7	40.0	35.0	33.0	40.0	32.3
Ash (%)	9.0	N.A.	N.A.	10.0	8.0	10.0	8.0
Calcium (%)	1.4	0.41	0.15	0.15	0.34	0.1	0.6
Phosphorous-Total (%)	0.2	0.21	0.10	0.25	0.21	0.1	0.12
Potassium (%)	0.12	1.57	0.75	0.9	1.08	N.A.	1.6
Roughage Activity (%)	20	100	N.A.	100	100	100	100
Relative Value/Ton (%)	176.98	82.54	70.63	100	88.89	57.14	14.29

Source: Producers Grain Corporation, Amarillo, Texas  
SRI

<sup>1</sup>ENE = Estimated net energy

<sup>2</sup>MC = Millions of calories

<sup>3</sup>Values in the last line of Table 1 were used in this comparison

<sup>4</sup>N.A.= Not applicable

raised in areas of blowing soil, or cotton salvaged from the ground, tends to produce CGT of high ash content. It needs cleaning before marketing.

Next to ash in variability is the crude protein content, which ranges from a low of just below six per cent to a high of just under 12 per cent. Crude protein content is directly related to the amount of immature seed in the CGT and depends on weather conditions during the growing season and frosts at harvest time.

Gin run trash is a bulky, low-density material. It is difficult to handle and expensive to transport; therefore, it is suitable only for local use.

Pelleted CGT has a bulk density ten times that of gin run trash. It can be transported 400 miles or more at \$30 to \$35 a ton, f.o.b. point of origin.

Ground up CGT has brought up to \$25 a ton for local use, but excess soil must be removed before either grinding or pelleting is done.

Pelleted CGT has the highest density of all (Table 3). Of particular interest for local utilization is CGT in modules. The moduled, compacted stack results in a reasonably high bulk density. This can be done with module builders already in use in many gin communities, where loading and transporting equipment for palletized modules is also available.

Cubed CGT is another convenient form, but it tends to have higher moisture content because of moisture added during the

cubing process. This might lead to some deterioration if storage conditions are inadequate. Grinding of cubes is normally required for all uses except range feeding.

Table 3. Forms and Densities of CGT

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<u>Form</u>	<u>Density (lb/ft<sup>3</sup>)</u>
Loose gin run	3 - 4
Chopped gin run	5 - 7
Compacted modules	20 - 23
Pelleted	35 - 40
Cubed	30 - 32

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#### Uses of CGT

CGT is a ruminant roughage of moderate protein and energy value. It rates high as a roughage possessing the properties needed to induce optimum digestive conditions in ruminants. It can be used in feed lot finishing and growing rations and in cow maintenance rations.

Fed at levels of ten per cent or less in the ration, the protein and energy contributions of CGT are unimportant because they are fulfilled by the other 90 per cent of the ingredients. (This accounts for some tendency to attribute no nutritional value to CGT.)

But in growing rations, CGT can be fed at levels of up to 40 per cent of the ration before palatability becomes a problem. Even at the more moderate 25 per cent-level, the nutrient contribution of CGT is an important factor. CGT can greatly increase the carrying capacity of any range operation where year-round natural feed is limited.

Techniques commonly used by nutritionists for formulating least-cost rations have entered CGT into maintenance rations at levels of almost 50 per cent. This may not be desirable from a palatability point of view, but it does reflect the nutritive value of CGT, especially when other ingredients become higher priced.

Feeding gin run CGT at levels up to 90 per cent of a maintenance ration has been reported in the High Plains of Texas, where the product has been an established ration component for as long as ten years at some feed lots. Palatability problems evidently can be overcome.

#### Other Considerations

Chemical residues could be a real stumbling block to the beltwide use of CGT as a feed. Some cotton grown in the High Plains of Texas has virtually a clean bill of health in this respect, especially when arsenic is not used as a desiccant or herbicide. Some suppliers of pellets in the High Plains guarantee that no arsenic was used in desiccation of the crop in which the pellets originated. When treated toward the end of the growing season with certain chemicals, cotton crops can produce dangerous CGT. Label warnings on the chemicals should be heeded.

Studies of chemical residues are in progress, and reports are available from the Mississippi Agriculture and Forestry Experiment Station and the Texas Agricultural Experiment Station. Production Research Report No. 137, USDA, ARS, deals with toxicity of organic herbicides to cattle, sheep and chickens.

With high moisture content and poor storage conditions, mold growth in CGT may occur, eventually causing it to spoil. Worse, certain mold growth types could produce aflatoxin at levels that would be deleterious.

#### Future Work on Behalf of Cotton Producers

Cotton Incorporated will continue to investigate and report developments with respect to handling, marketing, and feeding CGT. Little hard scientific information has been generated about CGT because of its traditionally low dollar value. Circumstances have now changed, and investigations are gathering momentum. Cotton Incorporated has acquired and will test a new cuber this ginning season. Cubing costs per ton are expected to be lower than with traditional cubers.

#### Additional Information

Details of ration formulations and their costs are too voluminous to publish here but will be sent free on request to interested parties.

#### Acknowledgement

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