

COTTON GIN OPERATING COSTS IN THE MIDSOUTH: 1973/74 AND 1977/78

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16. Abstracts Cotton gin operating costs averaged \$27.90 per bale in the Midsouth for the 1977/78 season, up \$5.46 from the 1973/74 season. Average 1977/78 capacity utilization of those gins sampled was 54 percent, compared to 58 percent in 1973/74. Rated hourly capacity of gins increased about 6 percent, due to installation of larger equipment and some higher capacity gin stands. Energy and labor costs accounted for a major part of the increase in ginning costs. The greatest potential operating cost savings lie in management, labor, and repair.				
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INTRODUCTION

This report, analyzing cotton gin operating costs in the Midsouth, updates a similar study conducted following the 1973/74 ginning season. Findings are based on a sample of 50 cotton gins surveyed in the earlier study and resurveyed following the 1977/78 ginning season. Decisionmakers can use these findings to evaluate the efficiency of present and proposed operating methods, equipment, and policies.

The types of detailed cost and operating data presented here are being incorporated into economic engineering models of the ginning industry. These models will be used to help determine the full economic impact of proposed cotton dust standards and to evaluate costs associated with alternative control technologies. Moreover, national interindustry models are being developed emphasizing the cotton textile system in which these and other regional cotton ginning cost coefficients are to be an important part.

The Delta counties of Arkansas, Louisiana, Mississippi, and Missouri comprise the study area. Except for a few counties in northwestern Louisiana, the Midsouth is defined as the Mississippi Delta in an earlier cotton production cost study. 2/ The sample gins for 1973/74 represent slightly over 8 percent of the region's ginning capacity. 3/ All gins in the Midsouth were classified by rated capacity in bales per hour and stratified into four size groups. Size groups by rated hourly capacity for the sample gins were: group 1, 6 bales per hour or less; group 2, 7 to 8 bales per hour; group 3, 9 through 15 bales per hour; and group 4, 16 through 36 bales per hour. A random subsample was selected from each group in proportion to total capacity of the group.

This report presents both ranges and averages in rated hourly capacities, annual ginning volumes, rates of plant capacity utilization, and ginning costs by individual items. It also estimates operating costs at an assumed 70-percent plant capacity utilization. Comparisons of 1973/74 and 1977/78 costs are made to examine changes and to identify developing trends.

1/ Agricultural economists, Commodity Economics Division, Economics, Statistics, and Cooperatives Service, stationed at the Delta Branch, Mississippi Agricultural and Forestry Experiment Station, Stoneville, Miss., and Washington, D.C., respectively.

2/ Starbird, I. R., and F. K. Hines, Cost of Producing Upland Cotton in the United States, 1964. U.S. Dept. Agr., Econ. Res. Serv., AER-99, Sept. 1966.

3/ A sample gin is a ginning operation of one or more plants, in one or more locations, operating as a single business, which were included in the survey.

FINDINGS

There have been increases in rated ginning capacities and volumes ginned among facilities sampled and for the Midsouth as a whole since 1973/74. But, plant capacity utilization declined slightly, and average operating costs per bale have continued to increase.

Rated Hourly Capacities

Rated hourly capacities among all size groups increased 0.6 bale per hour over the 1973/74 season (table 1). This is because several gins in each group increased their hourly ginning capacity by installing larger saws in existing gin stands or by installing new, higher capacity gin stands.

Volume Ginned

Seasonal ginning volumes were generally higher during 1977/78 than in 1973/74 (table 1). The volume processed per gin was up only 2 percent, averaging 4,430 bales compared to 4,343 bales in the earlier period. Gins in groups 1 and 2 experienced increases in volume while those in the larger size groups (groups 3 and 4) had moderate declines in annual volume processed.

Plant capacity utilization rates averaged 4 percentage points lower in 1977/78 than in 1973/74. Plant capacity utilization is the ratio of volume ginned to estimated total seasonal ginning capacity without seed cotton storage. This is based on a typical ginning season of 906 operating hours and a sustained seasonal ginning

Table 1--Cotton actually ginned compared to rated gin capacity

Gin size group by season	Rated hourly capacity <u>1/</u>		Annual volume ginned		Rate of capacity utilization	
	Range	Average	Range	Average	Range	Average
	----- <u>Bales</u> -----				----- <u>Percent</u> -----	
1973/74:						
Group 1 <u>2/</u>	5- 6	5.5	1,274- 5,335	2,744	28-139	65
Group 2	7- 8	7.1	647- 7,373	2,918	11-137	53
Group 3	9-15	11.5	1,040-14,238	4,912	10-185	55
Group 4	16-36	20.4	5,145-24,843	10,052	25- 91	64
Combined <u>3/</u>	5-36	10.0	647-24,843	4,343	10-185	58
1977/78:						
Group 1	5- 6	5.7	1,210- 5,476	2,858	26-142	65
Group 2	7- 8	7.2	1,411- 8,310	2,966	26-154	54
Group 3	9-15	11.8	2,024-13,246	4,152	21-104	46
Group 4	5-40	21.0	4,893-22,697	9,080	38- 81	56
Combined	5-40	10.6	1,210-22,697	4,430	21-154	54

1/ Based on observation in plants operating under normal conditions. 2/ See Introduction for descriptions of groups. 3/ Combined sample and group averages expanded to the universe.

rate capability set at 85 percent of rated capacity. Several of the sample gins stored seed cotton in modules or ricks either in the field or on the gin yard. This practice, in effect, extends the ginning season and makes it possible to exceed 100 percent of capacity utilization. Six sample plants exceeded their rated annual capacities in 1977/78, compared with three in the earlier survey.

Average Costs

Average out-of-pocket and total book costs are shown in each size group and all groups combined for 1973/74 (table 2) and 1977/78 (table 3). Costs were taken directly from gin records, with only minor adjustments to limit costs to those actually incurred in ginning.

Per bale cost for individual items varied widely within both groups in both years, mainly because of the broad range of volumes ginned. Average unit cost tended to be lower as gin size and volume increased. However, 1977/78 costs were considerably higher than in 1973/74 in all groups because of substantial increases in input costs. Labor and energy cost accounted for a major portion of the increase, averaging \$1.33 and \$1.95 more per bale in 1977/78. Substantial increases also occurred in per-bale costs for management, insurance, bagging and ties, and taxes. Average total-cost increases from 1973/74 to 1977/78 ranged from \$4.89 per bale in group 4 to \$6.37 per bale in group 2. Per bale ginning costs increased nearly 25 percent for all gins combined between the two time periods.

Operating Costs at 70-Percent Plant Capacity Utilization

To illustrate the positive effect of operating at a higher capacity, adjustments in costs for both seasons were made to reflect operation at 70 percent of capacity utilization for all sample gins. New averages were calculated for each group (table 4). Results show that spreading such costs as management, office labor, depreciation, interest, and taxes over a larger volume reduces average total ginning costs markedly. Greater ginning volumes may also reduce per-bale costs of such variable items as general labor and energy. Also, ginning at 70-percent capacity generally results in lower cost as gin size is increased, reflecting economies of scale which exist among the sizes of gins studied. ^{4/}

Out-of-pocket costs for all gins combined in 1977/78 were up \$5.13 over 1973/74; but total costs were up only \$5.03, largely due to a reduction in depreciation cost (table 4).

INTERPRETATION OF FINDINGS

A gin plant must be fully utilized in order to achieve minimum operating cost, as declines in capacity utilization rates usually result in increases in ginning cost. As would be expected, total fixed costs at a 50-percent utilization rate are twice that at full utilization, but Shaw, Cleveland, and Ghetti have shown that for different plant size, total variable costs increase between 12 to 24 percent when moving from full utilization to a 50-percent rate, with the largest increase being in the smaller plants. ^{5/} Moreover, their research shows that fixed costs account for 40

^{4/} Shaw, Dale L., O. A. Cleveland, Jr., and Joseph L. Ghetti, Economic Models for Cotton Ginning. U.S. Dept. Agr., Econ. Res. Serv. and College of Agr. Sci., Texas Tech Univ., College of Agricultural Sciences Publication No. T-1-158, Aug. 1977.

^{5/} Ibid.

Table 2--Ginning costs per bale, 1973/74 1/

Cost item 2/	Group 1		Group 2		Group 3		Group 4		Weighted average 3/
	Range	Average	Range	Average	Range	Average	Range	Average	
	Dollars								
Management	1.17-4.29	2.15	0.60-9.12	3.08	1.47-18.45	2.88	0.62-3.01	1.51	2.31
Insurance	.39-2.69	.77	.27-2.19	.60	.22-5.64	.69	.17-1.19	.41	.58
Taxes	.34-1.16	.53	.15-1.85	.47	.14-1.09	.40	.03-.77	.31	.40
Energy	.88-4.50	2.17	1.14-5.10	2.49	.94-4.20	2.09	1.52-3.80	2.01	2.15
Labor	2.95-7.44	4.83	3.72-8.51	4.89	2.34-9.68	3.71	2.93-5.75	3.94	4.22
Begging and ties	3.68-4.68	4.06	3.12-4.30	3.70	2.51-4.85	3.42	2.05-4.31	3.46	3.60
Repairs	1.76-4.24	2.66	2.23-9.48	4.18	1.25-8.85	3.85	.15-5.36	3.14	3.44
Miscellaneous	.78-1.77	1.30	.46-6.17	1.66	.66-5.70	1.74	.77-2.79	1.35	1.51
Out-of-pocket subtotal 4/	12.64-26.25	18.47	15.96-39.49	21.07	12.82-53.92	18.78	12.70-19.85	16.13	18.21
Depreciation	.79-3.43	1.72	.38-15.23	3.92	1.04-16.57	3.10	1.12-18.15	3.73	3.24
Interest	0 - 2.96	.74	0 - 3.92	1.53	0 - 5.73	.93	0 - 6.93	.89	.99
Total 5/	16.80-32.22	20.93	20.59-54.71	26.52	15.59-71.95	22.81	16.73-44.01	20.75	22.44

Individual items may not add to the total due to rounding.

1/ See Introduction for description of groups. The universe includes all gins in the study area.

2/ Taken from gin records and subjected to uniform allocation procedures.

3/ Sample average across groups, weighted by each group's representative proportion of the total rated hourly ginning capacity in the study area gin universe.

4/ Sample ginning cost excluding depreciation and interest.

5/ Out-of-pocket cost plus depreciation and interest.

Table 3--Ginning costs per bale, 1977/78 1/

Cost item 2/	Group 1		Group 2		Group 3		Group 4		Weighted average 3/
	Range	Average	Range	Average	Range	Average	Range	Average	
	Dollars								
Management	1.54- 5.55	2.83	.79-12.02	4.06	2.29-28.82	4.50	.96- 4.68	2.35	3.29
Insurance	.87- 5.97	1.71	.60- 6.08	1.33	.35- 9.07	1.11	.18- 1.91	.66	1.12
Taxes	.58- 1.97	.90	.25- 3.15	.80	.20- 1.55	.57	.04- 1.09	.44	.63
Energy	1.67- 8.53	4.12	2.16- 9.69	4.73	2.01- 8.06	4.01	2.93- 7.30	3.86	4.10
Labor	4.17-10.53	6.84	6.14- 8.75	6.93	2.77-11.51	4.41	3.46- 6.83	4.68	5.55
Bagging and ties	3.69- 4.68	4.07	3.11- 4.30	3.70	3.06- 5.95	4.19	2.77- 5.86	4.69	4.09
Repairs	2.22- 5.33	3.35	2.79-11.95	5.27	.89- 6.19	2.69	.11- 3.76	2.20	3.36
Miscellaneous	.89- 2.03	1.49	.53- 7.05	1.90	.68- 5.90	1.80	.80- 2.79	1.40	1.64
Out-of-pocket subtotal 4/	17.31-35.94	25.31	20.92-51.61	28.72	15.85-66.58	23.28	17.01-40.74	20.28	23.78
Depreciation	.56- 2.42	1.22	.28-10.85	2.79	1.05-16.58	3.10	1.13-18.23	3.73	2.82
Interest	0 - 1.70	.67	0 - 3.53	1.38	.53-10.47	1.70	0 -12.66	1.63	1.30
Total 5/	23.56-45.19	27.20	21.90-58.05	32.89	18.93-87.44	28.08	20.61-54.10	25.64	27.90

Individual items may not add to the total due to rounding.

1/ See Introduction for description of groups. The universe includes all gins in the study area.

2/ Taken from gin records and subjected to uniform allocation procedures.

3/ Sample average across groups, weighted by each group's representative proportion of the total rated hourly ginning capacity in the study area gin universe.

4/ Sample ginning cost excluding depreciation and interest.

5/ Out-of-pocket cost plus depreciation and interest.

Table 4--Estimated gin costs per bale at 70-percent capacity utilization 1/

Cost item 2/	1973/74				1977/78					
	Group : 1	Group : 2	Group : 3	Group : 4	Weighted : average : 3/	Group : 1	Group : 2	Group : 3	Group : 4	Weighted : average : 3/
					Dollars					
Management	2.03	2.52	2.47	1.49	2.06	2.67	3.32	3.68	2.32	2.93
Insurance	.73	.46	.57	.39	.52	1.62	1.02	.85	.63	1.00
Taxes	.49	.35	.31	.28	.34	.83	.60	.48	.40	.54
Energy	2.11	2.23	1.92	1.95	2.04	4.00	4.59	3.59	3.74	3.90
Labor	4.68	4.34	3.36	3.80	3.88	6.63	6.72	4.25	4.51	5.10
Bagging and ties	4.06	3.70	3.42	3.46	3.60	4.07	3.70	4.19	4.69	4.09
Repairs	2.58	3.76	3.55	3.05	3.08	3.25	4.74	2.42	2.14	3.01
Miscellaneous	1.28	1.57	1.71	1.33	1.55	1.46	1.80	1.74	1.38	1.63
Out-of-pocket subtotal 4/	17.96	18.98	17.31	15.76	17.07	24.53	26.49	21.12	19.81	22.20
Depreciation	1.59	2.97	2.45	3.41	2.75	1.12	2.11	2.82	3.41	2.39
Interest	.68	1.11	.74	.82	.84	.61	1.00	1.57	1.50	1.10
Total 5/	20.23	23.10	20.50	19.98	20.66	26.26	29.60	25.51	24.72	25.69

Individual items may not add to the total because of rounding.

1/ See Introduction for description of groups. The universe includes all gins in the study area. See actual capacity utilization rates in table 1.

2/ Taken from gin records and subjected to uniform allocation procedures.

3/ Sample average across groups, weighted by each group's representative proportion of the total hourly ginning capacity in the study area gin universe.

4/ Sample gin cost excluding depreciation and interest.

5/ Out-of-pocket cost plus depreciation and interest.

to 45 percent of the total cost of operation at full utilization rates; as utilization rates decrease, fixed costs as a proportion of total costs increase, reaching 50 and 65 percent of total cost at 70- and 80-percent utilization, respectively.

Therefore, if the present trends toward rising cost and inadequate utilization continue, more and more gins will eventually be forced to cease operation. Those remaining and able to operate at a profit will be forced to continually look for ways to cut costs and increase efficiencies. Management, labor, and repairs offer the most immediate opportunity for cost reduction.

Variations in the level of management costs appear to be more directly related to type of ownership than to firm size or managerial responsibilities and should be carefully examined for possible cost reduction.

Inefficient use of labor is a perennial problem facing the cotton ginning industry. Most gins maintain more personnel than actually needed in case of an unexpected need for additional gin crew members. Excessive labor adds substantially to the cost of ginning and should be thoroughly examined. Adoption of such technology as automatic bale strapping and tying bales naked offers substantial labor-cost saving opportunities. 6/

High repair costs are to be expected, since the sample contains plants of various ages and operating practices. However, the wide variation noted among groups appears to be excessive and may be another area offering potential cost savings.

RELATED REPORTS

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6/ Bales are tied out without bagging being placed around the bales. Bagging material is placed around the bale as it enters the storage warehouse.

APPENDIX

Gins vary widely by type of organization, ownership structure, accounting procedures, and in many other ways. In analyzing costs reported by sample gins, uniform allocation procedures were employed to compensate for some of these differences. Costs of hauling cottonseed and lint, such as truckdrivers' wages, truck depreciation, insurance, road-use taxes, and associated truck-operating costs, were excluded.

Cost Allocations

Management: Where applicable, includes salaries, bonuses, commissions, expense allowance, house rent, and personal insurance policies for owners and managers, bookkeeping and other office salaries, and home office cost (line companies); and social security taxes, workers' compensation insurance, and any other insurance on management and office personnel.

Depreciation: Allowances for depreciation exactly as carried on gin records.

Interest: Interest exactly as carried on gin records.

Insurance: All forms of insurance on gin buildings, equipment, housing furnished to management and labor, cotton products, and automotive equipment (except large trucks and trailers).

Taxes: All taxes on real property only.

Energy: All utilities--electricity, gas, and water--used in ginning and directly related operations.

Labor: Gin wages, social security, workers' compensation, and other insurance on gin labor borne by the gin, and expenses related to any rental housing furnished labor. (Excludes gin repair labor; see Repairs below.)

Bagging and ties: Actual cost of bagging and ties purchased.

Repairs: Gin repair wages; social security, workers' compensation, and other insurance on gin repair labor borne by the gin; and cost of repair materials and supplies.

Miscellaneous: Combined car and pickup, tractor, and other automotive expense; telephone and telegraph; advertising and promotion; legal and audit; dues (except National Cotton Council dues), memberships, and subscriptions; annual meeting and director's fees and expenses; conventions and travel expense; donations and contributions; cotton losses from fire; sampling, compressing, and related charges; gin supplies; and any other costs not included elsewhere.

Costing Methods

Sampling gin costs: Gin costs which have been subjected to the above allocations are identified in this report as sample gin costs.

Out-of-pocket: Sample gin costs from which depreciation and interest have been excluded.

Weighting

In computing weighted averages, the sample weighted average cost per bale for each group was further weighted by its representative proportion of total rated hourly ginning capacity in the area to reflect more accurately the cost of ginning cotton in the Midsouth.

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