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THE COST OF GINNING COTTON – 2001 SURVEY RESULTS

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Abstract

In 2001, 970 operating gins processed the largest United States cotton crop in history, averaging 20,400 bales per gin. This trend toward fewer gins and higher ginning capacity has prompted the need to survey costs of cotton ginning. The ginning cost survey resulted in data from 176 ginners that identified production rates and variable ginning costs for the 2001 ginning season. The average variable cost was $19.59 per bale, with seasonal labor as the largest single expense reported in this survey. Full-time labor cost was the second largest expense. Cost comparison based on gin volume showed that larger annual volume reduced the per bale cost, primarily as a result of reduced labor cost. Regional cost data revealed that Southeastern and Mid-South gins have the lowest per bale cost, while California and Texas had the highest cost. California gins reported the highest energy cost per bale in both saw and roller gins. Texas and Oklahoma, where cotton is both picked and stripped, showed that additional repair and energy cost were associated with ginning stripper harvested cotton. Total ginning cost was calculated using a simplified analysis method. Since every gin has a unique cost structure, a worksheet was developed to assist ginners in this analysis. Based on the average variable cost and reasonable assumptions for gin plant fixed costs, $40.67 total cost per bale was determined. The total cost per bale decreases with higher annual volumes, but this incremental decrease becomes smaller at higher annual volumes.

Introduction

The 2001 United States cotton crop was the largest on record, producing 19.8 million running bales. This record cotton crop was ginned with the fewest number of operating gins, 970, in the past 100 years (Figure 1). The trend for fewer gins and higher ginning volume is evident. In just the past ten years, the number of active gins has decreased by 43%, while the ginning volume has increased by 44% during the same time period. This has resulted in increased ginning volume, with an average of 20,400 bales per gin. To help identify changes in ginning structure and economics, a survey was conducted to analyze the cost of cotton ginning.

Procedure

Surveys were mailed to gins in cooperation with ginner associations (California Cotton Ginners Association, Cooperative Ginners' Association of Oklahoma, Southeastern Cotton Ginners Association, Texas Cotton Ginners' Association, and Southern Cotton Ginners Association) with the requirement that individual data would be kept confidential. The survey form was structured similar to past surveys to assist in yearly comparisons. Ginners were asked to identify variable costs that include: labor (seasonal and full-time), bagging and ties, repairs and maintenance, drying and electrical costs. Gin managers also reported performance information, which included ginning rate, length of season, number of bales, and type of cotton ginned (saw ginning picker or stripper, and roller ginning).

The data was analyzed according to ginning volume, ginning rate and production regions. The cost of seed cotton transportation, which gins incur in many areas, was not included in this analysis. Labor cost was divided into two groups, seasonal and full-time. These figures include wages, Workers Compensation Insurance, Social Security, fringe benefits, bonuses, etc. Only the seasonal labor cost was included in the total variable cost, full-time labor cost was considered a fixed cost. Fixed cost also includes depreciation, interest on investment, insurance, taxes and miscellaneous expenses.

Results

Usable surveys returned for this analysis were 176, which represented 4.78 million bales or about 24 percent of the 19.8 million bales ginned in the United States. In many instances, not all survey questions were completed or entry figures were not valid and omitted from the data set. Table 1 summarizes the average and median variable costs. The average bales ginned were 27,196 with a total variable cost of $19.59 per bale. Seasonal labor cost was the largest single expense reported in this survey. Full-time labor cost was the second largest expense, and was included as a fixed cost in this analysis. In many cases, cost figures were inaccurately reported. If values were extremely low or high, they were eliminated from the data set. This was specifically true for repair cost data, which in many instances may have included capital improvements or system modifications.

Previous Studies

Variable cotton ginning costs were compared to similar analyses conducted for the 1990, 1994 and 1997 ginning seasons (Mayfield, et.al. 1992, 1996, and 1999). Figure 2 shows a gradual reduction in variable ginning costs from the 1992 to the 2001 season. The survey results show noticeable reductions in bagging and ties, repairs, and labor cost during that same time period. Between the 1997 and 2001 seasons, increases in energy cost, both electrical and dryer fuel, occurred to offset reductions in seasonal labor cost. Throughout this period, the reduction in variable ginning costs can be partially attributed to increases in gin capacity and mechanization.

Variable Ginning Costs based on Annual Volume

Variable ginning costs were summarized according to their annual volume and production area (Table 2). The data was divided into four categories: gins producing less than 15,000 bales per year (Category I), 15,000 to 25,000 bales per year (Category II), 25,000 to 40,000 bales per year (Category III), and greater than 40,000 bales (Category IV). Category I represents the largest group of gins reporting and had the highest variable cost, with seasonal labor being the largest component. Although variable costs tended to decrease with annual volume, little difference was reported between Categories III and IV, primarily due to higher per bale repair cost in Category IV gins.

Cost data was divided into four cotton production regions and separated by annual ginning volume, as shown in Table 2. The Mid-South region includes gins located in Arkansas, Louisiana, Mississippi, Missouri, and Tennessee, with 31 surveys returned for analysis. The Southeast region includes Alabama, Florida, Georgia, North Carolina, South Carolina, and Virginia, totaling 34 returned surveys. Texas and Oklahoma provided 67 surveys and California returned 44 usable surveys.

Variable Ginning Costs based on Gin Capacity

Table 3 shows the average variable costs reported by gin capacity and the four production regions. The three groups are: 1) less then 15 bales/hr, 2) 15 to 25 bales/hour, and 3) greater than 25 bales/hour. Cost comparison by gin capacity better represents gin plant equipment and facilities that allows for the improved plant efficiencies derived from increased volume. Capacity based costs are similar to volume based costs, with larger gins having lower variable costs, primarily as a result of reduced labor cost. This is not true in all cases, especially when gins have unused capacity. Ginning capacity has more effect on seasonal labor than on any other variable cost component, where cost range from $8.74 to 5.59 for Groups 1 and 3, respectively. There appears to be a clear difference in variable costs between Groups 1 and 2, with little or no differences between Groups 2 and 3. The regional comparisons also show Texas/Oklahoma gins having the highest variable costs and the Southeast having the lowest.

Regional Comparisons

Table 4 summarizes the regional data for the 2001 ginning season. The Southwest region (Texas and Oklahoma) represents the highest variable ginning cost, primarily attributed to high labor and repair cost, along with the smallest annual ginning volume. Past studies have shown that underutilized gin capacity contributes to the higher ginning cost (Shaw, 1985). California has the highest average ginning capacity of all the other regions. It also has the highest fuel cost (both electricity and gas) and is second in total variable cost. The Southeast region has the lowest total variable ginning cost, which is represented in all cost categories except seasonal labor cost. The Southeast region has the second highest ginning capacity reported in the survey.

Table 5 shows additional survey data that can help to explain regional differences in ginning costs. The Southeast region had the longest operational time, with the highest ginning rate. The number of seasonal workers and full-time workers per 10,000 bales was lowest in California and followed by the Southeast region. Texas and Oklahoma gins had the highest number of workers per 10,000 bales, attributable to the smaller gins. Some of these differences are unique to the region and others are unique to the environmental conditions during harvest and ginning for that region.

California

California produces more extra-long staple (Pima) cotton then any other state and consequently has more roller gins. Three surveys were returned that processed over 90% of their cotton with a roller gin. These cost and performance data were compared to saw ginning data from California, as shown in Table 6. The number of roller gins responding to the survey was small, however, it does indicate slightly higher energy (electric and dryer fuel) and labor cost for the roller gins. Although previous studies have shown repair cost to be higher for roller gins (Hughs and Leonard, 1986), in this study, repair cost was slightly less for roller ginning as compared to saw ginning.

Texas/Oklahoma

In Oklahoma, seven gins returned usable surveys that were included in the variable cost analysis. These gins received both machine picked and stripped cottons. Table 7 shows the average volume and costs compared to the overall Beltwide average. Although the annual volumes are relatively small, variable ginning costs are similar to the average.

Both Texas and Oklahoma have gins devoted to picker and stripper harvested cotton. Processing stripper harvested cotton generally requires additional cleaning equipment and processing costs (Kenkel and Tilley, 1993). To identify these costs, the survey data was analyzed according to harvest type and only those surveys were used with greater than 90 percent of the cotton either picker or stripper harvested. Although the greatest percentage of the stripper gins received field cleaned seed cotton, additional cleaning equipment is used in the gins. Table 8 indicates the additional cost related to processing stripper harvested cotton, primarily due to increased repair and energy cost.

Southeast and Mid-South

As shown in Table 4, the Southeast region reported the lowest variable cost for ginning. Most of this difference was identified as energy cost, both electrical and drying. The Southeast region power requirements reported in the survey averaged 37 kwh/bale, with a derived energy price of $0.06/kwh (Figure 3). The second lowest power usage was reported by Mid-South region gins, averaging 41 kwh/bale, with an average price of $0.07/kwh. Both Texas and California had similar power requirements, but the average price for electricity in California was $0.12/kwh.

Fixed and Total Costs

Up to this point, only variable costs compiled from returned surveys have been considered in this analysis, however, the most important question ginners ask: “What are the total ginning costs?” Some past attempts to determine total costs have utilized these variable costs and assumed fixed costs, which include capital investment, depreciation, interest, taxes, insurance, and salaries for full-time employees (Mayfield, et.al. 1992, 1996, and 1999). Each of these values can vary greatly between gins and would be difficult to use in comparisons.

Figure 4 includes a worksheet based on a simplified method that can assist ginners in making those calculations. Depreciation is the largest fixed cost in this analysis using a straight line method with a salvage value of 10 percent of the initial investment (Mayfield, 1988). In cases where capacity increases or updates have been made, this calculation can be made separately for each capital improvement. The useful life of new gin machinery is at least 20 years and generally more. The risk you take with using a useful life figure greater than 20 is that cotton production may dwindle or competition will reduce the annual capacity, increasing per bale costs. In any case, annual volumes should be estimated using both conservative and optimistic projections. Another large fixed cost is the interest on investment. The worksheet uses a simplified method of charging the annualized interest expense on one-half the loan value (Shaw, 1985). Although more complex methods are available, this method corresponds to methods utilized in past studies. These variables can be changed to fit the individual gin analysis.

Taxes and insurance costs have been estimated at one percent of the gin value. This estimate has been used in the past for a preliminary analysis, but it is recommended that actual values be utilized. Fixed management costs include all full-time employees (manager, office staff, etc.) Average management cost can be obtained from the survey data in Table 3 or from individual records. Miscellaneous cost was estimated at $3.00 per bale and includes seed cotton insurance, travel expenses, association dues, telephone, etc. Cost associated with transporting seed cotton to the gin is not included in these estimates.

Total costs are shown in Figure 5 using the simplified analysis method with the assumptions as stated above. Variable and management costs were obtained from Table 3 using a 20 year life, 8 % interest rate and an initial gin value of 1.5, 3.5, and 4.5 million for Groups 1, 2 and 3 capacity gins, respectively. The total cost per bale decreases with higher annual volumes, however, this incremental decrease in cost becomes smaller at higher volumes.

Conclusions

While the number of gins in the United States continues to decrease, the annual ginning volume has continued to increase to keep unit cost low as shown by the results of a survey conducted during the 2001 ginning season. The ginning cost survey resulted in data from 176 ginners that identified production rates and variable ginning costs. The average variable cost was $19.59 per bale, with seasonal labor as the largest single expense reported in this survey. Full-time labor cost was the second largest expense. Cost comparison based on gin volume showed that larger annual volume reduced per bale cost, primarily as a result of reduced labor cost. It is no surprise that larger gins have lower cost per bale, but this incremental decrease becomes smaller at higher annual volumes. Regional cost data revealed that the Southeastern and Mid-South region gins have the lowest per bale cost, while California and Texas had the highest cost. California gins reported the highest energy cost per bale in both saw and roller gins. Texas and Oklahoma, where cotton is both picked and stripped, showed that additional repair and energy cost were associated with ginning stripper harvested cotton.

Total ginning cost was calculated using a simplified analysis method which included variable cost survey data and fixed cost. Based on the average variable cost and reasonable assumptions for gin plant fixed costs, $40.67 total cost per bale was determined. This cost, however, did not include module transportation. The total cost per bale decreases with higher annual volumes, but this incremental decrease becomes smaller at higher annual volumes.

Cotton gin owners and investors considering increasing ginning capacity can use this information on the cost of ginning cotton. Also, gin managers can use average ginning cost data to evaluate their operations and improve efficiency. Although volunteered survey data may not be the most accurate data source, it does provide an indicator of the costs and efficiency of gin facilities and management. It is important to acknowledge that each gin plant has a unique design and seasonal operating characteristics that sets it apart from others across the cotton belt. This manuscript presents the average cost figures for selected variables with the understanding that not all costs have been included in this analysis.

References

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Table 1. 2001 Beltwide cotton ginning cost survey results.

	Avg. Bales Ginned	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)	Full-Time Labor* ($/bale)
Count**	176	162	162	174	174	173		168
Average	27,196	$3.36	$4.26	$3.79	$1.26	$6.93	$19.59	$5.85
Median	23,944	$3.32	$3.41	$3.49	$1.06	$6.31	$17.59	$5.07

* Labor cost is not included in the total variable cost.
**Number of usable survey data included in analysis.

Table 2. 2001 Variable costs based on annual gin volume and regional production.

Bales per Year x1000	Avg. Bales Ginned (Count)*	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)
			Beltwide Variable Costs				
<15	9,149 (62)	$3.49	$4.52	$4.05	$1.33	$8.44	$21.83
15 -- 25	19,664 (28)	$3.47	$3.80	$3.65	$1.21	$6.99	$19.12
25-- 40	31,877 (47)	$3.29	$3.36	$3.69	$1.17	$5.94	$17.45
40 +	55,654 (39)	$3.14	$3.55	$3.39	$1.29	$5.66	$17.03
			California Variable Costs				
<15	10,223	$3.32	$3.72	$6.22	$1.39	$7.40	$22.05
15--25	19,912	$3.51	$3.90	$6.09	$1.72	$5.08	$20.29
25--40	32,463	$3.40	$3.58	$5.63	$1.60	$5.70	$19.91
40 +	62,576	$3.06	$2.44	$5.65	$1.68	$6.30	$19.14
			Texas and Oklahoma Variable Costs				
<15	8,255	$3.55	$4.34	$4.07	$1.22	$9.06	$22.23
15--25	20,242	$3.50	$4.63	$3.47	$1.24	$7.62	$20.47
25--40	32,331	$3.44	$3.76	$3.00	$0.78	$7.55	$18.52
40 +	49,078	$3.22	$4.01	$2.93	$1.48	$6.77	$18.42
			Mid-South Variable Costs				
<15	10,897	$3.38	$5.02	$3.49	$1.46	$6.87	$20.22
15--25	19,818	$3.31	$4.50	$2.85	$1.15	$6.99	$18.79
25--40	31,209	$2.95	$4.20	$2.59	$0.90	$5.63	$16.28
40 +	55,156	$3.17	$4.60	$2.47	$0.90	$4.70	$15.84
			Southeast Variable Costs				
<15	10,889	$3.20	$4.82	$2.87	$1.12	$6.22	$18.23
15--25	20,906	$3.46	$1.77	$2.34	$0.83	$6.32	$14.72
25--40	33,100	$2.81	$1.86	$2.19	$0.95	$6.27	$14.08
40 +	53,182	$3.04	$3.15	$2.24	$0.89	$4.99	$14.31

*Number of surveys returned in each category.

Table 3. Regional variable costs based on ginning capacity.

Category Bales/hr	Avg. Bales Ginned	Avg. Bale/hr	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)	Full-Time Labor* ($/bale)
				Beltwide Variable Costs					
<15	13,248	12	$3.46	$4.56	$4.29	$1.52	$8.74	$22.57	$7.46
15-25	25,940	21	$3.36	$3.58	$3.78	$1.13	$6.38	$18.23	$4.94
>25	45,838	34	$3.25	$4.36	$3.37	$1.14	$5.59	$17.70	$5.40
				California Variable Costs					
<15	21,617	12.2	$3.37	$3.63	$6.36	$1.98	$6.95	$22.29	$6.90
15 - 25	33,776	20.9	$3.35	$3.07	$5.50	$1.36	$5.73	$19.01	$5.02
>25	55,600	32.1	$3.29	$3.30	$5.63	$1.62	$5.44	$19.29	$6.39
				Texas and Oklahoma Variable Costs					
<15	7,105	10.8	$3.59	$5.09	$3.92	$1.34	$10.18	$24.13	$8.48
15 - 25	17,031	18.8	$3.57	$3.88	$3.62	$1.25	$7.56	$19.88	$5.24
>25	31,960	33.4	$3.38	$5.64	$3.49	$1.13	$6.69	$20.33	$5.99
				Mid-South Variable Costs					
<15	14,489	13.5	$3.32	$5.62	$2.91	$1.46	$7.31	$20.61	$5.94
15 - 25	20,391	19.9	$3.20	$3.63	$3.03	$1.06	$6.99	$17.91	$4.34
>25	44,313	31.5	$3.11	$4.76	$2.63	$0.92	$4.57	$16.00	$4.96
				Southeast Variable Costs					
<15	13,061	13.7	$3.30	$3.78	$2.74	$1.17	$9.41	$20.40	$7.29
15 - 25	31,028	19.6	$3.18	$2.37	$2.15	$0.73	$5.95	$14.37	$3.80
>25	43,530	31.1	$3.11	$3.37	$2.24	$0.86	$4.92	$14.50	$4.48

*Not included in total variable cost.

Table 4. 2001 Regional Variable Cost Comparison.

Region	Avg. Bales Ginned	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)	Full-Time Labor* ($/bale)
California	34,810	$3.34	$3.34	$5.82	$1.64	$6.08	$20.23	$6.02
Texas/Ok	18,108	$3.50	$5.40	$3.68	$1.26	$8.26	$22.10	$6.84
Mid-South	29,090	$3.20	$4.55	$2.84	$1.09	$6.05	$17.72	$4.96
Southeast	33,526	$3.17	$2.96	$2.35	$0.94	$6.18	$15.61	$4.66

*Not included in the total variable cost.

Table 5. Regional Ginning Statistics.

Region	Count	Avg. Bales Ginned	Operational Period (weeks)	Ginning Rate (bale/hr)	Picked (%)	Stripped (%)	Seasonal Labor /10K bales	Full-Time Labor /10K bales
California	44	34,810	11.9	20.3	98.9	1.2	6.4	1.4
Texas/OK	67	18,108	11.3	20.0	12.0	88.0	13.7	2.4
Mid-South	31	29,090	10.8	23.5	98.0	2.0	10.1	2.0
Southeast	34	33,526	12.9	24.0	97.9	2.1	8.1	1.4

Table 6. 2001 California Saw and Roller Ginning Comparison of Variable Cost.

Gin Type	Count	Avg. Bales Ginned	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)
Roller	3	43,052	$3.03	$3.02	$6.30	$2.44	$6.42	$21.21
Saw	40	34,058	$3.33	$3.36	$5.79	$1.53	$6.04	$20.05

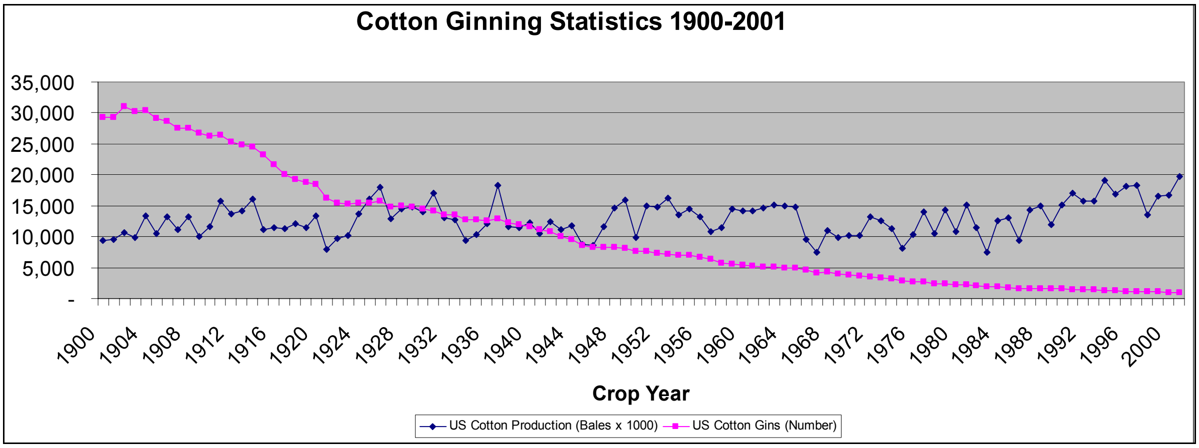
Table 7. 2001 Oklahoma Variable Ginning Costs.

Average	Bales Ginned	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)	Full-Time Labor* ($/bale)
Beltwide	27,196	$3.36	$4.26	$3.79	$1.26	$6.93	$19.59	$5.85
Oklahoma	16,194	$3.65	$5.29	$3.55	$1.35	$5.65	$19.50	$4.72

*Not included in the total variable cost.

Table 8. 2001 Texas and Oklahoma Picker v's Stripper Variable Costs.

Harvest Method	Bales Ginned	Bagging and Ties ($/bale)	Repairs ($/bale)	Elec. ($/bale)	Dryer Fuel ($/bale)	Seasonal Labor ($/bale)	Total Variable ($/bale)
Picker Gins	15,714	$3.71	$4.07	$3.62	$0.90	$7.33	$19.65
Stripper Gins	18,612	$3.45	$5.54	$3.78	$1.23	$6.73	$20.72



Source: USDA Agricultural Statistics

Figure 1. Cotton Ginning Statistics for 1900 to 2001.

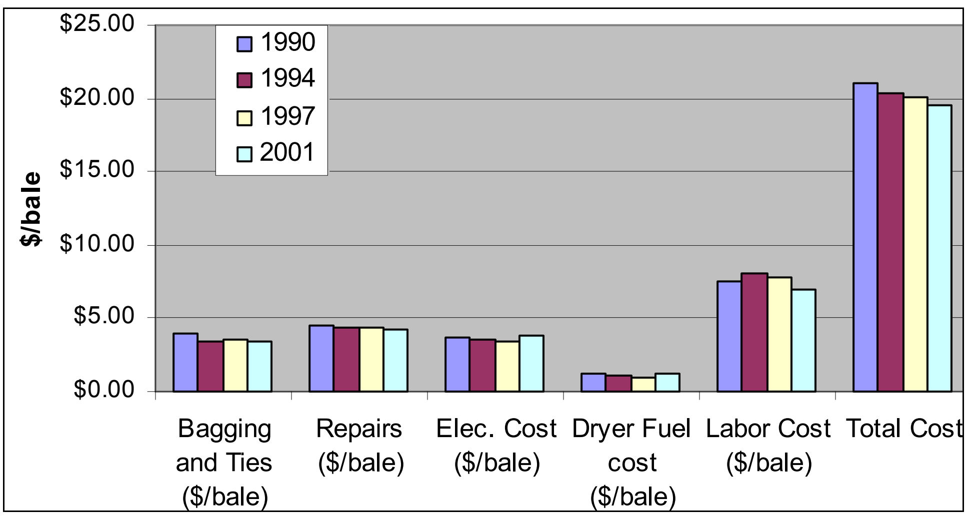


Figure 2. Comparison of variable ginning costs for the 1990, 1994, 1997 and 2001 seasons.

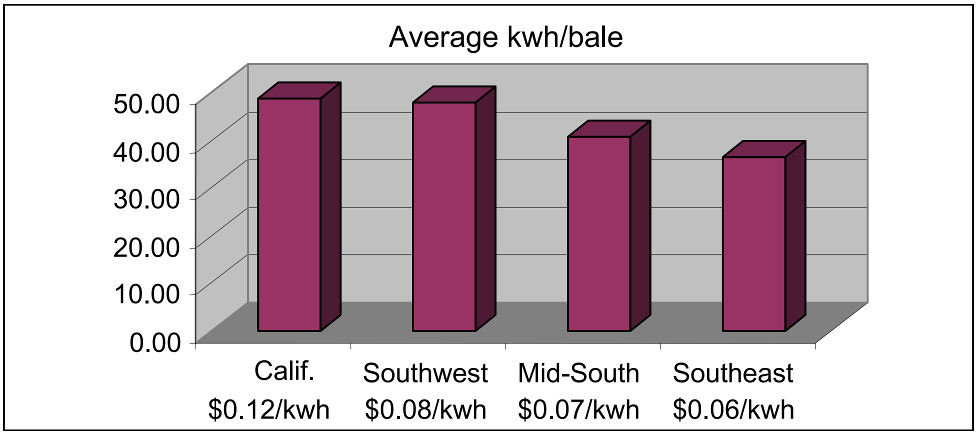


Figure 3. Cotton Ginning Electrical Energy Usage and Costs from 2001 survey data.

1. Gin Value (include initial investment and capital improvements).
____________ (*Ex. $3,500,000*)

2. Expected Gin Life
____________ (*Ex. 20 year*)

3. Annual (use multiyear average) and Total Bale Volume over expected life
a. ____________ (*Ex. 27,196 bale/year*)
b. ____________ (*Ex. 543,920 bales*)

4. Loan Value and Interest Rate
a. $____________ (*Ex. $3,500,000*)
b. ____________% (*Ex. 8.0%*)

	$/bale	Beltwide Avg.* ($/bale)
5. Depreciation Calculation { **Entry 1.** x .9 / **Entry 3b.** } (*Ex. 3,500,000 x .9 / 543,920*)	________	($5.79)
6. Interest on Investment Calculation** { **Entry 4a.** x **Entry 4b**. x 0.005 / **Entry 3a**.} (*Ex. 3,500,000 x 8.0 x 0 .005 / 27,196*)	________	($5.15)
7. Taxes and Insurance Calculation { **Entry 1**. x 0.01 / **Entry 3a**.} (*Ex. 3,500,000 x 0.01 / 27,196*)	________	($1.29)
8. Management Cost per Bale (Use actual expenses or Table 3 average)	________	($5.85)
9. Variable Cost From Table 2 or 3 (Energy, seasonal labor, bale wrap, repairs)	________	($19.59)
10. Miscellaneous Cost per Bale (Association fees, utilities, etc)	________	($3.00)
Total Costs	________	($40.67)

** Total ginning costs include variable and management costs from Table 2, $3.5 million initial investment at 8 percent interest and a 20 year expected life.*
*** A simplified method of calculating interest recovery cost (Shaw, 1985).*

Figure 4. Simplified Ginning Costs Worksheet

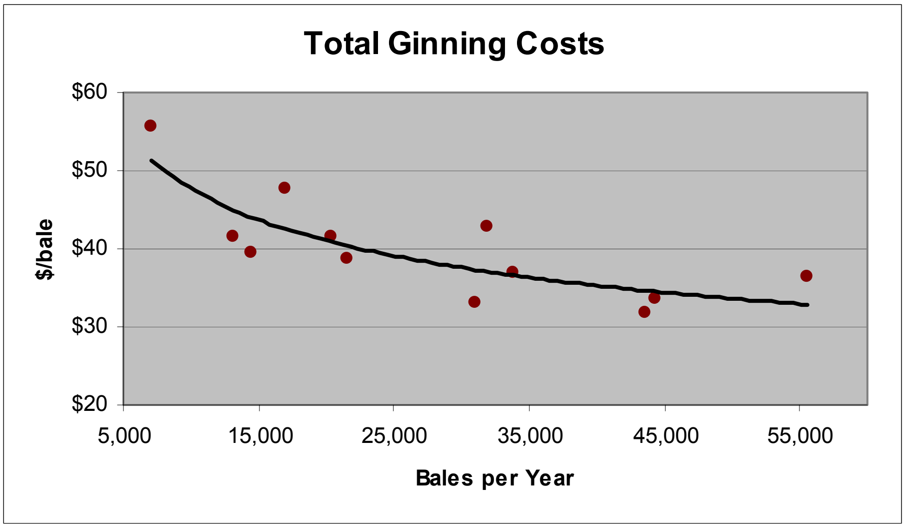


Figure 5. Total ginning cost based on annual bale volume.