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COST AND PROFIT OF GINNING COTTON IN TEXAS

W. E. PAULSON

Division of Farm and Ranch Economics

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T. O. WALTON, President

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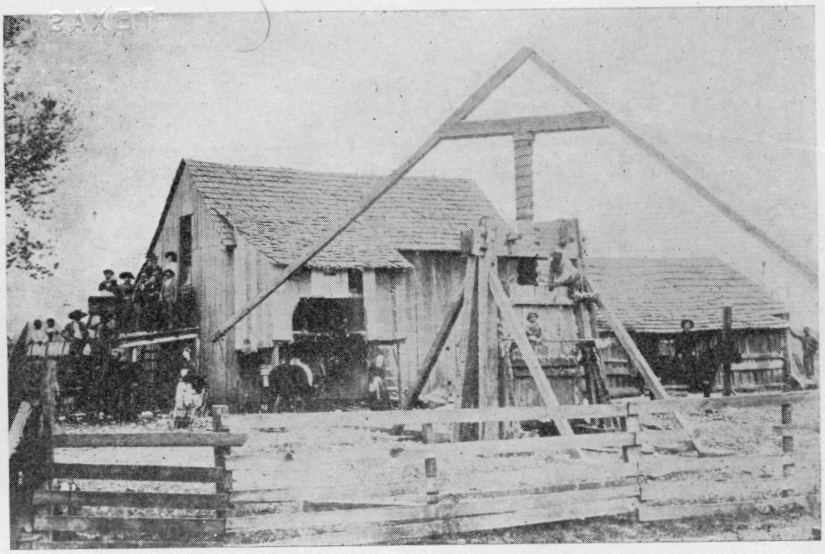

A Texas cotton gin of the yesterdays.
Courtesy of the Murray Gin Company.

A Texas cotton gin of today.

This bulletin presents a comprehensive analysis of the cotton ginning business in Texas, with especial emphasis on costs and profits. It has been prepared primarily for students of the ginning business. The controlling influence of volume of ginning and investment in the gin plant on the cost and profit of ginning is analyzed. The distinct parts played by fixed cost and by variable cost in the cost and profit of ginning are depicted. Factors underlying the success of an individual ginner are developed. The fundamental aspects of a successful ginning business in Texas are revealed.

A section has been prepared especially for persons primarily interested in the practical use of the cost and profit analysis. Simple and direct methods are provided for computing standard costs and profits by the tables of costs and of "break even" volumes in Appendix A. A ginner in comparing his actual cost and profit with his computed standard cost and profit may ascertain his own relative efficiency.

The profit outlook of the ginning enterprise and the valuation forming the basis of purchase and sale engage the attention of bankers financing the purchasers of gins. This bulletin provides a check on the profiit possibilities of the gin purchaser as well as on the validity of the valuation placed on the gin plant whether new or secondhand.

Ginning is a fundamental service required by cotton growers. Growers desire first class service at a reasonable cost. The profit status of the ginner is of concern both to the ginner and to cotton growers. Various tables are presented to serve as guides for evaluating the position of a ginner in the ginning industry in terms of (1) conditions in his section of the state, (2) type of power, (3) volume of ginning, (4) investment in the gin plant, and (5) gin income per bale.

The maintenance of the ginning industry, depending upon its continuous and profitable operation, is of concern to ginner, cotton grower, and the general public. Means are provided in this bulletin for appraising the ginning industry of Texas in terms of the present ginning capacity, investment in the gin plants, volume of cotton production, and gin income. This phase of the analysis is suggestive as to needed adjustments in the ginning industry to insure a stable and efficient ginning business in Texas.

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COST AND PROFIT OF GINNING COTTON IN TEXAS

W. E. Paulson[1]
Research Specialist in Marketing

The chief objective of this bulletin is to answer questions pertaining to the ginning business. Such questions relate to the various phases of the cost of ginning. Such questions also reach into the field of the profit of the ginning business.

The main part of this bulletin has been prepared for students of the ginning business. The fundamental factors influencing the cost and profit of ginning are revealed. The role of fixed and variable costs in the cost and profit of ginning is depicted. The relation of the volume of ginning and the investment in the gin plant to the cost and profit of ginning is analyzed. Means are provided for appraising both the profit status of the Texas gin industry under existing ginning capacity, volume of cotton production, and gin income per bale and the position in the gin industry of the individual ginner.

In Appendix A, tables for computing costs and profits of ginning have been especially prepared for ginners, and others, whose primary interests center in devices for computing costs and profits of ginning. These individuals are interested in the application of the results obtained through the analysis of costs and profits of ginning. The individual ginner who may wish to determine his relative position in the gin industry may find all the information and explanations required in computing standard costs and profits of ginning applying to his own situation as to section of the state, type of power, size of gin, volume of ginning, investment in the gin plant, and gin income per bale. Thus Appendix A is complete in itself in that no reference need be made to any other portion of this bulletin in order to carry out the specific purposes for which this section was developed.

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[1]Acknowledgments are made to:

The Cooperative Division of the Farm Credit Administration for assistance in obtaining and in editing of schedules on cooperative gins for the seasons 1932-33 to 1935-36.

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THE BEGINNING OF COMMERCIAL GINNING IN TEXAS

For a hundred years following the invention of the cotton gin, improvements in gin machinery made relatively little progress. The modern cotton gin is largely the development of the past 60 years. It seems that the United States Census made no reference to the Texas ginning industry before the Tenth Census of 1880. According to this report, the vast majority of the gins had from 40 to 50 saws. Most of these one-stand gins were operated by horse- or mule-power. In contrasting the relative merits of animal and steam power, the report stated: "On account of safety and cheaper insurance horse- or mule-power is preferable."[1] In those days the typical cotton plantation had its own gin plant. Commercial ginning was almost unknown. The cost of ginning to the cotton grower was the cost of operating the plantation gin.

The Census reports of 1880, 1890, and 1900, in commenting on the ginning industry called attention to a tendency towards consolidation into larger operating units. The following statement is from the Twelfth Census report: "The combintaion of the gin and the press afforded a wide field for inventors, and each decade during the nineteenth century has witnessed improvements over the preceding. These improvemnts have tended to consolidate the cotton-ginning industries, and instead of many small ginneries there are now large central ones. Cost of ginning has decreased, and small planters have found that the cost of keeping their ginneries in repair and the expense for labor and livestock necessary to operate them are greater than the fees of the large ginneries, which has led to the abandonment of small ginneries."[2] This statement is illuminating in several respects. It pictures a stage in the transition from the one-stand plantation gin to the larger custom gin. It indicates one way in which cotton growers of forty years ago lowered their cost of ginning service. It would appear that commercial ginning had its beginning 40 to 50 years ago.

INVESTMENT IN TEXAS GIN PLANTS

The total investment, exclusive of land, in all gins of Texas is approximately $62,800,000, or an average of $18,848 per gin. The investment in land adds about $3,660,000, or $1,098 per gin. Thus the total investment is $66,460,000, or $19,946 per gin. These estimates are based on the investments in the gins studied according to size and type of power applied to all gins according to size and type of power as reported by the Census Bureau for the year 1935.

In canvassing possibilities for improving the economic status of the cotton grower, attention needs to be given to the grower's cost of ginning service. Cost of ginning may have one of two meanings. The cost of ginning to a grower patronizing a commercial gin is his outlay for gin

[1]Cotton Production in Texas, Tenth Census, Volume 5, Part I, page 157.
[2]Agriculture, Twelfth Census, Volume VI, Part II, page 410.

tolls and bagging and ties; cost of ginning to the ginner is his cost of operating the gin plant. The weight of the ginning charge upon the grower is directly related to the price received for lint cotton. During the eight-year period, 1931-32 to 1938-39, cotton growers of West Texas paid an average of about $6.57 a bale for gin tolls and patterns. These charges absorb 26.3 per cent of the returns on five cent cotton; 13.1 per cent on 10 cent cotton; and 8.8 per cent on 15 cent cotton. Obviously, during periods of low cotton prices, growers are most concerned about reducing the cost of the ginning service.

Any consideration of the possibilities of reducing the cost of ginning service to growers must take into account the economic interests of the ginner. A reduction in the gross income cuts into the ginner's net income unless offset by other factors such as increased volume of ginning or increased efficiency in operations. The quality of the ginning service is of concern to the grower. First class service depends upon a fully equipped gin plant maintained in a high state of repair. A ginner operating at a loss over a period of years would not be in position to make the repairs and replacements essential to first class service.

PROBLEMS OF TEXAS GIN INDUSTRY

Texas ginners of today are passing through a most trying period. During the past ten to twenty years, changes have occurred affecting both the cost and the income of ginners. Charges for ginning service per bale have been declining. Reductions in cotton acreage resulting in declining production of cotton have decreased the ginner's volume. These changes have lowered his gin income and increased his cost of ginning per bale. There is an increasing tendency of growers to deliver seed cotton to the gin in greater than one bale lots late in the afternoon. This practice increases the ginner's cost of storing seed cotton and increases his cost of gin labor through the necessity of payment for overtime. Growers tend to gather their seed cotton rougher each year as the cleaning and extracting equipment is improved. This forces the ginner to install the lastest machinery, thus adding to his investment load with no proportionate compensation.

If the present low production of cotton be continued in Texas, ginners will be forced to make sharp adjustments. The Texas gin industry has never been static. It has continuously been making changes in the number of plants, the size of plants, the type of power, and the type of equipment installed in the gin plant.

The greatest number of gins ever reported in Texas was 4,833 for the season 1902, the first year Census ginning records were compiled. The number of gins receded to a low of 4,452 in 1909. Then followed an increase in numbers to a high of 4,695 in 1913. This was followed by a decrease in numbers to a low of 3,772 in 1922. The number of gins then increased to a high of 4,030 in 1929. The number of gins in Texas has steadily declined ever since reaching 3,332 in 1939.

The number of gins does not give a true picture of ginning capacity. The size of the gins must also be taken into consideration. Fortunately, the Census Bureau has made a number of special surveys of all gins pertaining to such factors as size and type of power. Changes as to the number of gins, average size, and relative capacity, based on the Census surveys, are shown in Table 1.

Table 1.—Ginning Facilities in Texas[1]

Year	Number of Gins		Average Saws Per Gin		Number of Gins 4/80 Equivalent[2]	
	Actual	Relative	Actual	Relative	Actual	Relative[3]
1906	4,532	100	204	100	2,889	100
1909	4,452	98	229	112	3,186	110
1914	4,694	104	271	133	3,975	138
1919	4,113	91	299	147	3,843	133
1935	3,564	79	337	165	3,753	130

[1]Department of Commerce, Bureau of the Census: Cotton Production and Distribution, Season of 1919-20, Bulletin 145, pages 36-43. Cotton Ginning Machinery and Equipment for Texas, 1935.
[2]Total saws of all gins divided by 320, the number of saws in a 4/80 gin.
[3]Number of gins, average number of saws per gin, and number of 4/80 equivalent gins for 1906 taken as 100 per cent.

As between 1906 and 1935, the number of gins in Texas decreased by 21 per cent. The average size of gins, as measured by the number of saws, increased by 65 per cent. On the assumption that the number of saws in a gin is a measure of its capacity, the number of 4/80 equivalents is an index on ginning capacity. In 1935 as contrasted with 1906, Texas had 968 less gins but an increased ginning capacity of 30 per cent.

The surveys of the Census Bureau on ginning facilities show the number of gins by types of power. Table 2 indicates the prevalence of the various types as percentages of the total number of gins.

Table 2.—Number of Gins in Texas with Various Types of Power Expressed as Percentages of Total Number[1]

Year	Number of Gins[2]	Type of Power							
		Steam	Water	Gasoline	Animal	Electric	Diesel	Gas	Total
1906	4,232	96.9	1.7	0.8	0.5	0.1	----	---	100.0
1909	4,057	96.0	1.3	2.1	0.3	0.3	----	---	100.0
1914	4,361	93.2	0.9	4.6	0.1	1.2	----	---	100.0
1919	3,582	88.5	0.5	6.8	0.1	4.1	----	---	100.0
1935	3,564	42.7	0.3	---	---	19.6	29.5	8.7	100.8[3]

[1]Department of Commerce, Bureau of the Census: Cotton Production and Distribution, Season of 1919-20, Bulletin 145, pages 36-43. Cotton Ginning Machinery and Equipment for Texas, 1935.
[2]Active gins, 1906, 1909, 1914, and 1919; all gins, 1935.
[3]Multiple battery gins with more than one type of power, counted for each type.

As between 1906 and 1935, the most striking changes in the relative importance of the various types of power were: the decided decrease of

steam power; the increase of electric power; and the introduction of Diesel and gas engines later than 1919.

PURPOSES SERVED BY ANALYSIS OF GINNING COSTS AND PROFITS

A careful analysis of the economic condition of the ginning industry should serve as a guide in the period of adjustment ahead. In such a study, an analysis of costs and profits of ginning should play a leading part. A comprehensive analysis of ginning costs and profits should be of service to ginners, cotton growers, and the general public in several ways.

1. A cost analysis makes possible the establishment of standards of performance. A ginner in comparing his costs with these standards may determine his own relative efficiency. The matter of costs of operation is particularly significant during a period of retrenchment. A ginner faced with the question whether or not he can continue in the ginning business may find the answer in comparing his costs, volume of ginning, and gin income with the general averages of all ginners.
2. The fairness of a given charge for ginning service may be judged only in terms of the cost of performing the service. The charge for ginning service may be a matter of conflict between grower and ginner. Especially during periods of low cotton prices, the grower may feel that the charge is too high. Likewise, during periods of low production, the ginner may feel that the charge is too low. With cost data at hand, an amicable adjustment of differences between cotton growers and ginners should be facilitated.
3. A knowledge of costs of ginning at various volumes and investments should be useful to an individual about to enter the ginning business. The probable net income can be estimated in terms of investment in the gin plant, the prospective volume of ginning, and the gin income per bale, provided the cost of ginning can be estimated at the given investment and volume of ginning. Cost data should prove useful in arriving at the value of a secondhand gin plant.
4. Notwithstanding the changes in type of power shown in Table 2, the question still remains as to the relative advantages of the various types of power under specific circumstances. A cost analysis on the basis of type of power should be suggestive to the ginner faced with the problem of making a decision in this matter.
5. An analysis of ginning costs is basic in a general evaluation of the effects on the ginning industry of a governmental program which either increases or decreases the volume of cotton production. In that volume of ginning is so critical in costs and net profits of ginning, whether the production in Texas be fixed, for instance, at 3,000,000 bales annually, or at 4,500,000 bales, is of vital concern to the Texas ginning industry.
6. In analyzing both costs and profits of ginning, an appraisal may be made of the relations of volume of ginning, cost, and gin income per bale to net profits of ginning. The net returns on the investments in gin plants reveal the general profit, or loss, status of the industry. A profit analysis should throw light on the number of gins the various volumes of cotton production can adequately support.

RECORDS OF GINNING COSTS

Cost records were procured on cooperative gins operating in Texas through extensive field trips in 1934 and 1936. This phase of the study was in cooperation with the Cotton Section of the Cooperative Division in the Farm Credit Administration. The Cotton Section also edited the schedules obtained. Later records on cooperative gins were acquired from the Houston Bank for Cooperatives on the gins financed by that institution. Cost records were also secured from eight private line ginners. In such instances, records were obtained at the main offices on

the gin units operated. No records were procured from single unit private gins. The task of contacting these gins in terms of records obtainable was too great to be undertaken.

The locations of the gins from which records were obtained are shown in Figure 9. The number of gins within the county is indicated without any particular effort to locate exactly each gin. Records on individual gins covered periods from one to seven ginning seasons, and in a few instances, for even a longer period. Cost records over a period of years should reflect a truer view of the conditions under which gins are operated than would be the case if all the cost records had been obtained for a single season. In the main, records were secured on the seasons 1930-31 to 1938-39. More than 1,200 records were collected, edited, and analyzed. This cost analysis is based on a total ginning volume of 1,840,000 bales. During the period 1933-34 to 1937-38, the counties in which these gins are located produced 71 per cent of the total Texas crop—60 per cent of the crop in the Blackland Area; 84 per cent in the High and Low Plains Area; and 73 per cent in the Gulf Coast Area.

In studying the factors affecting the cost of ginning, the greater the uniformity of the conditions under which the gins are operated the greater the reliability of the results obtained. The matter arises whether the state should be taken as a unit, or whether it should be divided into a number of sections. As among the various areas of Texas, fundamental differences occur in the ginning industry.

On about 20 per cent of the cost records obtained, information was secured as to the number of days, each season, these gins had a crew. According to this information, gins in the Gulf Coast Area operate around 70 days in a season; gins in the Blackland Area around 80 days; and gins in the High and Low Plains Area around 125 days. The number of days of ginning has a bearing on the necessary capacity. The fewer the days in which ginning service must be performed, the greater the capacity needed to gin a given volume.

A large percentage of the cotton is picked in the Blackland and Gulf Coast Areas while a large percentage of the crop is snapped in the High and Low Plains Area. Methods of harvesting are reflected in the weight of seed cotton per bale. Over a period of years, the average weights of seed cotton per bale were: Gulf Coast Area, 1,460 pounds; Blackland Area, 1,515 pounds; and High and Low Plains Area, 1,890 pounds. Gins in the Plains Area must be equipped with the latest cleaning and extracting equipment. This adds to the investment in the gin plant. More and more gins in the other two areas are being equipped to handle snapped seed cotton.

The gin income per bale is significant in the profits of the gin business. Gin income as defined in this discussion is the total of the gin toll and the profits on patterns and cottonseed. The gin toll per bale depends upon the gin rate per cwt. of seed cotton and the weight of seed cotton per bale; net profits on patterns and cottonseed depend upon the margins

between purchase and sales prices, and in the case of the latter, the pounds of cottonseed per bale left with the gin. The average gin incomes per bale, for the period 1930-31 to 1938-39 were as follows: the Blackland Area, $5.20; the Gulf Coast Area, $6.40; and the High and Low Plains Area, $6.85. For reasons enumerated above, and others, the state was divided into the three sections shown in Figure 9.

The logic of dividing the state into three sections and of segregating gins according to type of power may be verified graphically. Figure 1 shows total costs of ginning for Diesel Plants according to sections of

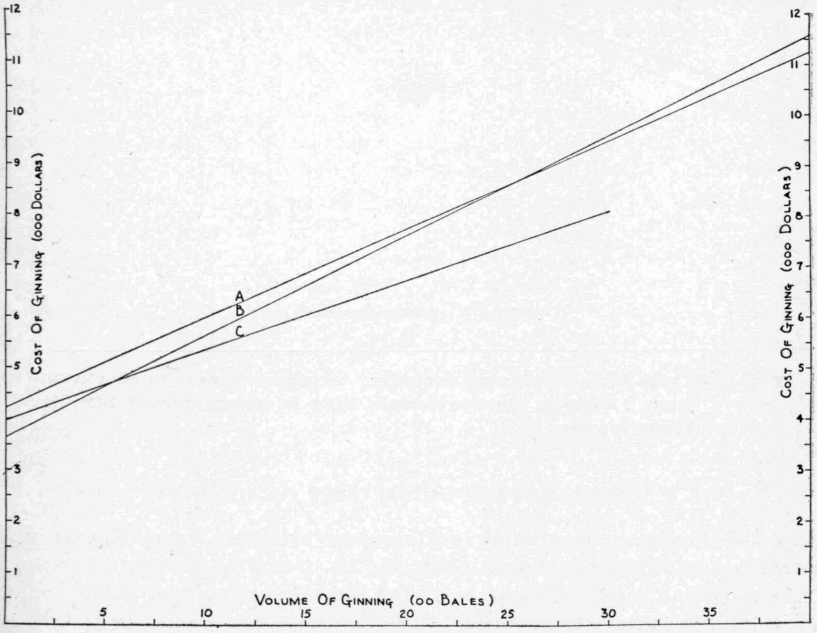

Fig. 1.—Total costs of ginning for Diesel plants according to section of the state. Line A, High and Low Plains Area; Line B, Gulf Coast Area; Line C, Blackland Area.

the state. These differences in cost seem great enough to warrant separate consideration by sections of the state. Figure 2 shows total costs of ginning according to type of power in the Blackland Area. These differences seem of sufficient importance to justify a cost analysis by type of power.

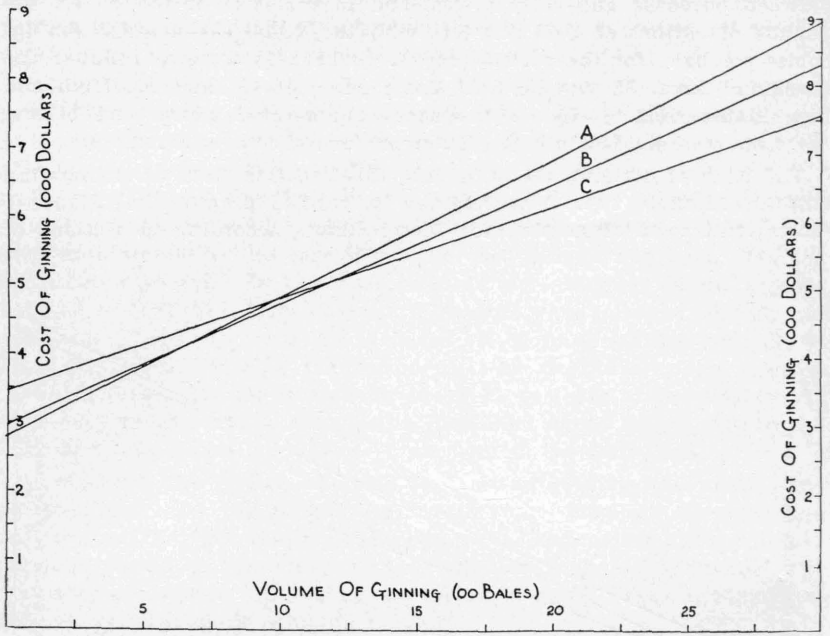

Fig. 2.—Total costs of ginning according to type of power in Blackland Area. Line A, electric power; Line B, steam power; Line C, Diesel power.

FACTORS INFLUENCING COST OF GINNING

In the analyses of ginning costs made by other investigators[1] the volume of ginning has been taken as the factor explaining variations in costs among gins. Volume is by far the most important single factor in explaining variations in costs. Still this does not preclude the testing of other factors which may supplement volume in more completely explaining variations in cost. The investment in the gin plant, for instance, is a second factor that may be considered. Since depreciation is included as an item of cost and since depreciation is computed at a standard rate, this cost is proportional to the investment in the gin plant. To the extent that both the risk covered by insurance and the assessed valuation for taxation are related to the investment in the gin plant, these costs are

[1]Hathcock, Practices and Costs of Cotton Gin Operation in a Selected Section of North Carolina, 1924-1925. January, 1927. Bureau of Agricultural Economics.
Hathcock, Development of Cooperative Cotton Gins in Northwest Texas. June, 1927. Bureau of Agricultural Economics.
Weaver and Herrmann, Cooperative Cotton Gins in Oklahoma, 1933-1934. April, 1937, Bulletin 12. Farm Credit Administration.
Burgess and Weaver, Expenses, Income and Dividends of Oklahoma and Texas Cooperative Cotton Gins. June, 1940, Bulletin 41, Farm Credit Administration.

influenced by the investment. Owners of gins with large investments tend to pay higher salaries to their managers in that properties of greater value require a superior type of management.

As a means of testing the influence of investment on costs of ginning, the Diesel plants of the High and Low Plains Area were divided into three groups according as investments were low, medium, and high. The average cost of each group was determined in terms of its volume of ginning. In Figure 3 Line B is the cost of the high investment group; Line C of the medium investment group; and Line D of the low investment group. The significance of investment on costs of ginning is obvious. The investments in these Diesel plans ranged from $14,000 to $54,000.

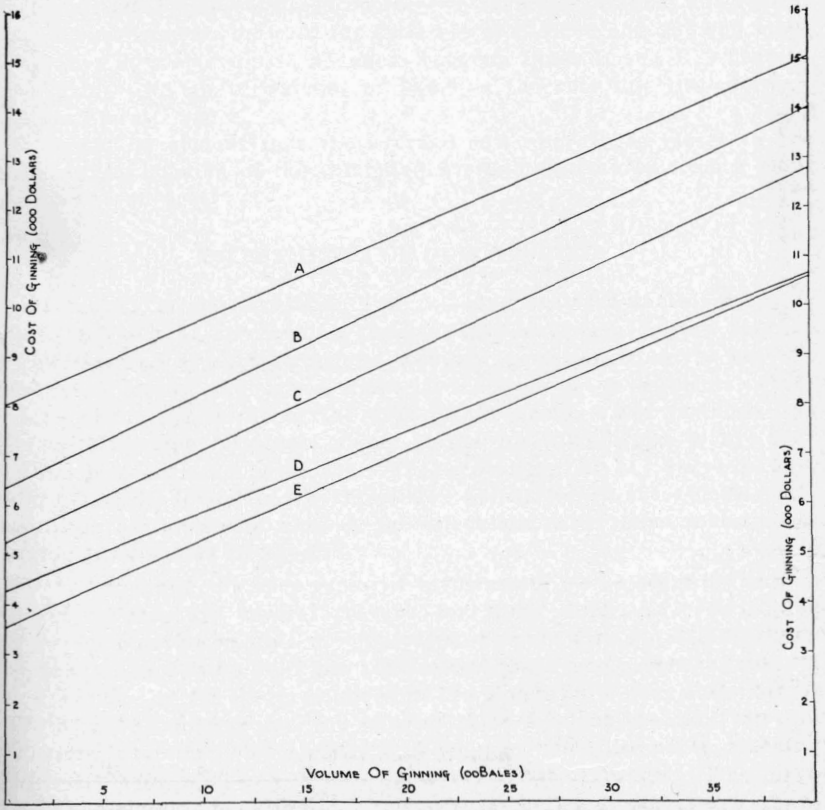

Fig. 3.—Total costs of ginning of Diesel plants in the High and Low Plains Area. Lines B, C, and D, ginning costs of plants with high, medium, and low investments according to the one variable, volume. Line A, ginning costs of plants with an investment of $54,000 according to the two variables, volume and investment. Line E, ginning costs of plants with an investment of $14,000 according to the two variables, volume and investment.

The costs of gins with these investments were computed in terms of investment and volume. Line A in Figure 3 represents the costs of the $54,000 gin and Line E the costs of the $14,000 gin.

VARIOUS TYPES OF AVERAGES

A comparison of the various kinds of average total costs should be of interest. Three types of averages are pictured in Figure 4. The arithmetic average, or mean, as the standard cost is represented by a point. This standard does not recognize the effects of volume through its range and investment through its range. In using the mean as the

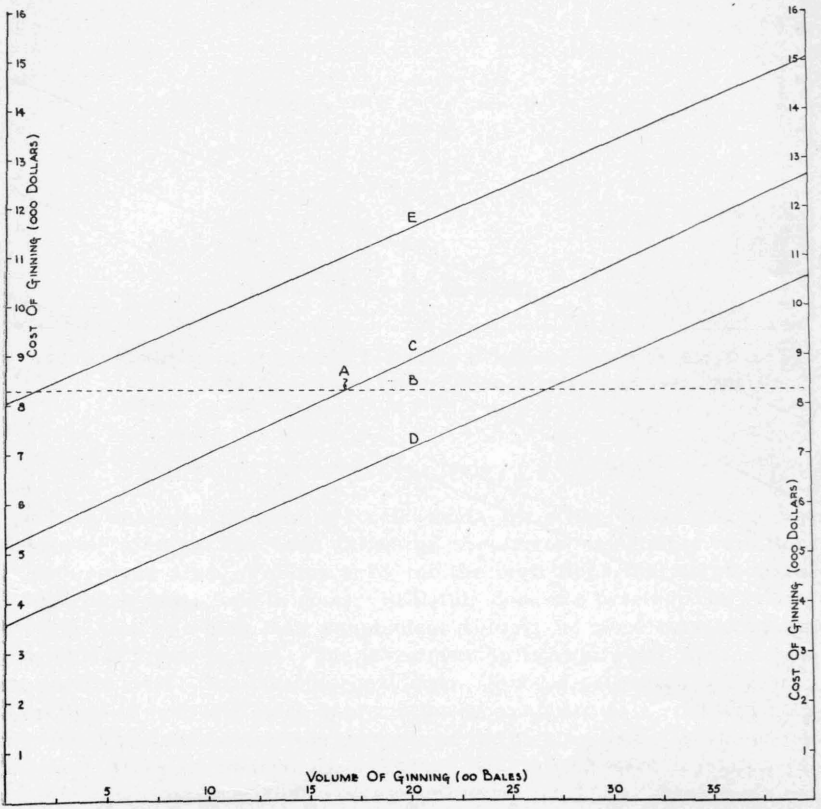

Fig. 4.—Various types of average costs of Diesel gins in the High and Low Plains Area. Point A, arithmetic average. Costs through the range of volume measured on Line B. Line C measures average costs based on the one variable of volume of ginning. Line E measures the average cost of a gin with an investment of $54,000 according to the two variables, volume of ginning and investment. Line D measures the average cost of a gin with an investment of $14,000 according to the two variables, volume of ginning and investment.

standard, costs as the volume of ginning changes are measured along Line B. It should be evident that these average costs are far too high at a low volume and far too low at a high volume of ginning. The mean may be satisfactory for gins of average volume and average investment. But as the volume and investment diverge farther and farther from the average, the mean becomes more and more inadequate as a standard.

Standard average costs based on the one variable, volume, move along Line C. In this instance, the effects of investment are averaged. It should be evident that the average costs to the extent that they are influenced by investment, are too high on gins with low investments and too low on gins with high investments.

Standard average costs based on the two variables, volume and investment, for investments between the extremes of $14,000 and $54,000 move along lines at proportionate distances between Lines D and E. That is, for a plant with an investment of $34,000, the cost line lies mid-way between Lines D and E.

It should be evident that the average cost approaches closer to the actual as the location of the computed average cost moves from a point to a line to an area.

INVESTMENTS OF GINS STUDIED

A summary of the investments of the gins analyzed in this study is found in Table 3. By adding the standard deviation to the average investment, and by subtracting the standard deviation from the average investment, upper and lower limits are placed on investments which include about two-thirds of the gins in the group. For instance, the average investment of steam plants in the Blackland Area is $14,587; the standard deviation is $6,136. The upper limit is $14,587 + $6,136, or $20,723; the lower limit is $14,587 — $6,136, or $8,451. Thus about two-thirds of the steam gins in the Blackland Area have investments ranging from $8,451 to $20,723.

At first thought, the wide range of investments would seem difficult to explain. There are several reasons for these differencs. From the manner of obtaining plants now operated, ginners may be classified into two groups: those who built new plants; and those who purchased secondhand plants. As for the investment in the plants built new, such factors have been of influence as: the general price level at the time of construction; the completeness of the machinery installed as to cleaning and drying equipment and the like; and the number and type of buildings. As for the investment in the plants bought secondhand, such factors have been of influence as: the age of the plant and its replacement value at the time of purchase; the cost of an alternative new plant; and the prospective volume of ginning as an index on probable net profits. Many of the secondhand plants with low investments reflect the capitalization of small profits resulting from low volumes of ginning.

Table 3.—Investment in Gin Plants Analyzed[1]

	Blackland Area			High and Low Plains Area				Gulf Coast Area		
	Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric	
Average Investment	$14,587	$16,225	$14,191	$26,476	$29,907	$27,489	$62,222	$25,838	$15,969	
Standard Deviation	6,136	6,262	4,403	8,728	10,272	3,616	17,269	11,230	4,779	
Investment (Dollars)				Number of Gins						Grand Total
Up to 10,000	12	6	4	------	------	1	------	6	2	31
10,001-15,000	17	13	10	2	------	1	------	6	3	52
15,001-20,000	8	11	6	12	13	5	1	10	3	69
20,001-25,000	2	6	1	20	8	5	------	10	3	55
25,001-30,000	1	5	1	18	5	3	------	8	------	41
30,001-35,000	2	2	------	8	7	2	2	6	1	30
35,001-40,000	------	------	------	5	6	1	3	5	------	20
40,001-45,000	------	------	------	3	1	------	3	1	------	8
45,001-50,000	------	------	------	------	2	1	------	2	------	5
50,001-60,000	------	------	------	4	2	------	------	1	------	7
60,001-70,000	------	------	------	------	------	------	4	------	------	4
70,001-80,000	------	------	------	------	------	------	4	------	------	4
80,001-90,000	------	------	------	------	------	------	------	------	------	----
90,001 & Over	------	------	------	------	------	------	2	------	------	2
Total	42	43	22	72	44	19	19	55	12	328

[1]Exclusive of investment in land of gin lot.

As will be developed more clearly later in this discussion, the cost of ginning rises with an increase in the investment. It would appear from this that a low investment in the gin plant would be a much desired advantage. On this point, several qualifications need to be made. If the gin with a low investment is not properly equipped so that ginning of a poor quality results, patrons may lose considerably from discounts on the price of their cotton. An increase in the investment to provide the necessary facilities to insure high quality ginning might pay large dividends both to patrons and ginner. This point may be illustrated by the experiences of Louisiana ginners installing mechanical driers. The Louisiana Extension Service[1] reported that patrons of gins with driers received a premium of $3.00 a bale for their cotton in the season of 1938-39. Thus a drier costing, say $3,000, would pay its entire cost of investment to the community the first year on a volume of 1,000 bales.

The gins of low investment do not possess all the cost advantages indicated in average costs. The average life of a secondhand gin is considerably shorter than that of a new plant. This means that replacements, on an average, must be made sooner in the secondhand plants than in new plants. Furthermore, since the same rate of depreciation was charged regardless of the investment, the depreciation reserves in the low investment plants may fall far short of taking care of replacements as needed. A ginner with a low investment in his plant would be following conservative business practice if he were to charge off depreciation at rates somewhat higher than the rates of the schedule used in this study.

VOLUME OF GINNING OF TEXAS GIN PLANTS

The factor of greatest significance in explaining differences in ginning costs is the volume of ginning. For the ginning industry as a whole, the average volume per gin from year to year is determined by the relation of ginning capacity to the volume of cotton production. The average volume per gin by sections of the state for the ten-year period 1928-29 to 1937-38 is shown in Table 4.

Another measure of volume of ginning is the number of 12-hour days required to gin the crop with all gins running at full capacity. The surveys of the Census Bureau on ginning facilities in 1919 and 1935 ascertained the number of bales each plant could gin in a 12-hour day running at full capacity. Using the 12-hour capacity for Texas gins as reported in 1935, the number of 12-hour days required each season to gin the crop for the period 1902 to 1938 was computed. On an average, the Texas crop could have been ginned in about 26 12-hour days per season.

The number of 12-hour days, per season, required to gin the crops of the Blackland, the High and Low Plains, and the Gulf Coast Areas

[1]Marketing Activities, Bureau of Agricultural Economics, February 16, 1938, p. 25.

Table 4.—Average Volume of Ginning by Sections of the State

Year	Blackland Area		High and Low Plains Area		Gulf Coast Area	
	No. of Gins	Average Volume	No. of Gins	Average Volume	No. of Gins	Average Volume
1928	2,228	1,258	916	1,432	811	1,185
1929	2,210	953	923	1,214	830	822
1930	2,144	951	905	913	833	1,376
1931	2,085	1,344	873	1,802	828	1,109
1932	2,008	971	912	2,125	817	729
1933	1,953	1,019	911	1,744	796	1,050
1934	1,919	701	896	487	774	791
1935	1,882	706	892	1,255	760	657
1936	1,908	823	894	1,025	778	563
1937	1,811	1,199	901	2,313	750	1,119
Average	2,015	998	902	1,431	798	944

and of all Texas, and of California for the period 1928-29 to 1937-38 is shown in Table 5.

Table 5 merits careful study. It should be evident from this table that the Texas gin industry is suffering from over-capacity. The average volume per gin in California is nearly three times as great as that in Texas. It does not follow that two-thirds of the gins in Texas should be eliminated. It may be that weather and harvesting conditions in Texas are such that ginning service must be performed in a shorter length of time than in California. If this be the case, the resulting lower volume in Texas makes the cost of ginning higher than in California. This increased cost of ginning, in the long run, must be borne by the Texas cotton growers.

A summary of the volume of ginning of the gins analyzed is given in Table 6. About two-thirds of the Diesel gins in the Blackland Area had volumes ranging from 657 to 1,833 bales. This is based on the limits

Table 5.—Number of 12-Hour Days Required to Gin the Crop for the Season, all Gins Running at Full Capacity

Year	Areas				California
	Blackland	High and Low Plains	Gulf Coast	All	
1928	27.7	31.5	26.1	31.2	51.0
1929	21.0	26.7	18.1	24.4	67.7
1930	20.9	20.1	30.3	25.3	70.0
1931	29.6	39.7	24.4	33.6	51.1
1932	21.4	46.8	15.9	29.1	44.8
1933	22.4	38.4	23.1	28.8	70.1
1934	15.4	10.7	17.4	16.6	79.8
1935	15.6	27.6	14.5	19.3	65.5
1936	18.1	22.6	12.4	19.5	54.7
1937	26.4	50.9	26.4	33.8	136.6
Average	22.0	31.5	20.9	26.3	72.6

Table 6.—Volume of Ginning Plants Analyzed

Number of Bales	Blackland Area			High and Low Plains Area				Gulf Coast Area		
	Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric	
Average Ginned	861	1,245	1,331	2,065	1,686	1,707	4,788	1,265	1,200	
Standard Deviation	423	588	511	1,376	1,062	1,140	3,136	757	754	
Bales Ginned	Number of Gin Records									Grand Total
Up to 500	34	14	1	22	26	9	1	24	6	137
501- 1,000	101	55	20	41	28	10	5	48	11	319
1,001- 1,500	57	51	29	36	26	8	7	47	6	267
1,501- 2,000	16	25	16	43	28	13	2	24	3	170
2,001- 2,500	6	16	8	29	16	3	7	17	3	105
2,501- 3,000	1	7	1	27	17	7	8	7	3	78
3,001- 3,500	---	1	1	11	5	4	3	3	---	28
3,501- 4,000	---	1	2	10	2	2	6	2	---	25
4,001- 4,500	---	---	---	10	3	---	5	---	---	18
4,501- 5,000	---	---	---	8	4	---	4	---	---	16
5,001- 6,000	---	2	---	3	1	1	9	---	---	16
6,001- 7,000	---	---	---	3	1	---	1	---	---	5
7,001- 8,000	---	---	---	1	1	---	3	---	---	5
8,001- 9,000	---	---	---	---	1	---	6	---	---	7
9,001-10,000	---	---	---	---	---	---	1	---	---	1
10,001 and Over	---	---	---	2	---	---	8	---	---	10
Total	215	172	78	246	159	57	76	172	32	1,207

set on volume by one standard deviation of volume being added to the average volume and one standard deviation being subtracted from the average volume. About two-thirds of the Diesel gins in the High and Low Plains Area had volumes ranging from 624 to 2,748 bales. It should be evident from this that fluctuations in volumes of ginning are far more violent in the High and Low Plains Area than in the Blackland Area.

The volume of a gin plant for a given year is important. But the average volume over a period of years is much more important. Local changes in the competitive situation and in the size of the cotton crop are factors explaining fluctuations in the volume of a plant from season to season. All gins on which records have been obtained for three seasons, or more, were segregated. The average volume of each gin was determined for the number of seasons represented. From these averages, Table 7 was compiled. As an indication of the volume status of the gins studied, Table 7 is much more significant than Table 6 It is to be noted that one steam plant in the Blackland Area had an average volume of less than 250 bales. Of all the gin plants, 15.3 per cent had an average volume of less than 750 bales; 22.7 per cent had an average volume of less than 1,000 bales. The average number of seasons per gin for the plants represented in Table 7 was as follows: Blackland Area, 5.5; High and Low Plains Area, 4.3; Gulf Coast Area, 3.9; and all Areas 4.6.

AVERAGE COSTS OF GINNING

In determining costs of ginning, the cost records were segregated according to section of the state, type of power, and size of gin whether one or multiple battery. Total costs were used in that the effects of changing volume and investment assume straight line relations to total costs. In each of the gin groups, the investments in the gin plants and the volumes of ginning were correlated with the total costs of ginning. This procedure yielded an equation for estimating the average cost of each group. This average cost is weighted for volume and investment. The equations for estimating average costs of ginning according to section of the state and type of power are given in Appendix B.

If this analysis should be used as the basis for establishing gin tolls to be charged by ginners, the average cost would be somewhat too low. That is, a gin toll satisfactory to the ginner of average cost would result in an unsatisfactory situation for about one-half the ginners. As the basis for establishing gin tolls, bulk costs would be much more satisfactory than average costs. Bulk costs of ginning were derived in this manner. All gins in each group with actual costs higher than the average were segregated. In each case volumes of ginning and investments in the gin plants were correlated with total costs. This procedure yielded estimating equations for the high cost half of the gins in each group. About three gins in every four have costs lower than the bulk cost. Gin tolls satisfactory to the ginner with bulk costs would be satisfactory to

Table 7.—Average Annual Volume of Gins for Periods of Three Seasons, or More

Volume in Number of Bales	Number of Gins									Grand Total
	Blackland Area			High and Low Plains Area				Gulf Coast Area		
	Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric	
Up to 250	1	---	---	---	---	---	---	---	---	1
251- 500	5	---	---	---	---	---	---	3	1	9
501- 750	7	5	1	4	1	1	---	6	---	25
751-1,000	6	6	1	1	2	2	---	5	4	27
1,001-1,250	10	4	2	6	7	2	---	7	1	39
1,251-1,500	3	4	3	3	5	---	---	5	---	23
1,501-1,750	1	6	4	8	6	---	---	7	1	33
1,751-2,000	---	2	---	6	3	2	---	2	---	15
2,001-2,500	---	2	1	6	1	2	3	1	---	16
2,501-3,000	---	1	2	6	3	2	2	---	1	17
3,001-3,500	---	1	---	5	1	---	2	---	---	9
3,501-4,000	---	---	---	2	1	---	1	---	---	4
4,001-4,500	---	---	---	1	---	---	3	---	---	4
4,501-5,000	---	---	---	2	---	---	---	---	---	2
5,001-6,000	---	---	---	---	---	---	1	---	---	1
6,001-7,000	---	---	---	---	---	---	2	---	---	2
7,001-8,000	---	---	---	---	---	---	1	---	---	1
8,001-9,000	---	---	---	---	---	---	1	---	---	1
Total	33	31	14	50	30	11	16	36	8	229

about 75 per cent of all ginners. The equations for estimating bulk costs of ginning according to section of the state and type of power are given in Appendix B.

Of interest regarding the estimating equations is the matter of the percentages of variations in costs among the gins accounted for by the variables in the equations. Table 8 shows the percentages of variations in costs accounted for by volume as a single variable, investment as a

Table 8.—Percentages of Variations in Total Costs Accounted For

Area	Type of Power	Single Variable		Two Variables		
		Volume	Investment	Influence of Each in Combination		Total Influence of Both Variables
				Volume	Investment	
Blackland	Steam	56.6	46.2	42.4	28.7	71.1
	Diesel	63.9	50.4	47.4	29.0	76.4
	Electric	72.6	34.8	64.2	11.0	75.2
High and Low Plains	Steam	74.6	12.2	71.5	4.9	76.4
	Diesel	53.6	25.0	50.4	21.1	71.5
	Electric	78.1	19.4	74.1	14.6	88.7
	Large Gins	70.4	16.0	66.7	10.4	77.1
Gulf Coast	Diesel	49.9	29.9	46.1	25.1	71.2
	Electric	85.9	46.2	75.3	12.9	88.2

single variable, and volume and investment combined. The data in Table 8 answer the question regarding the relative importance of volume and investment taken singly and combined in accounting for variations in costs among gins.

FACTORS IN ESTIMATING EQUATION

It would appear that the correlating of total costs with investments and volumes of ginning resolves costs into three distinct divisions: (1) that portion of the costs which is unrelated to both the investment and the volume of ginning; this may be designated as the residual cost; (2) that portion of the costs which is related to the investments in the gin plants; and (3) that portion of the costs which is related to the volume of ginning.

The meaning of the equation may be illustrated with the equation of steam gins in the Blackland Area. In relating total costs of ginning to the investments and volumes of ginning in the case of 189 cost records of this group, the relation is found to be positive for investments. That is, as investments increase, costs increase. The rate of increase is $0.0930 for each additional dollar invested. Likewise, the relation is found to be positive for volume of ginning. The rate of increase is $1.78 for each additional bale ginned. But after the costs related to investment and to volume of ginning are accounted for in total costs of ginning, a residual cost of $1,730 must be added to arrive at total estimated costs.

The estimating equation is a formula. The solution of the formula, or equation, calls for the substitution of the proper "unknowns." The ginner with a single battery steam plant in the Blackland Area may substitute for I in the equation his investment in the gin plant less the investment in land; in multiplying this investment by $0.0930 he determines his estimated investment cost. He may substitute for V the number of bales ginned; in multiplying the volume of ginning by $1.78 he determines his estimated variable cost. By adding $1,730 to the estimated investment and variable costs, he arrives at his estimated total cost of ginning.[1]

The Residual Cost

Volume of ginning and investment in the gin plant by no means exhaust the variables influencing the cost of ginning. For this reason the residual cost in the estimating equation with the variables volume and investment includes, in part, the influence of these other variables. As more variables are introduced into the estimating equation, the residual cost grows less. In the case of all cost records, the size of the gins in number of saws was known. In the case of 123 records of steam gins in the Blackland Area, the number of days each gin had a gin crew during the season was known. This made possible the use of various combinations of variables up to four in number in estimating equations for these 123 records. The following equations were derived:

$$\text{Cost} = \$2{,}142 + \$3.07V$$
$$\text{Cost} = \$1{,}992 + \$1.77V + \$0.0830I$$
$$\text{Cost} = \$1{,}587 + \$1.63V + \$0.0791I + \$10.43D$$
$$\text{Cost} = \$1{,}572 + \$1.74V + \$0.0756I + \$1.63S$$
$$\text{Cost} = \$1{,}004 + \$1{,}52V + \$0.0683I + \$2.28S + \$11.49D^{2}$$

In the equation with number of saws added as a third factor to volume and investment, the $1.63 means that costs are increased by that amount for each saw in the gin plant. This cost for a 5/70 is $1.63 × 350, or $571; and for a 5/80, $1.63 × 400, or $652. In the equation with number of days of ginning added as a third factor to volume and investment, the $10.43 means that costs are increased by that amount for each added day of ginning. This cost for a gin operating 60 days is $10.43 × 60, or $626; and for a gin operating 70 days, $10.43 × 70, or $730.

One could logically conclude from an examination of the equations above that as the number of variables is increased greater accuracy in the estimating of costs would be attained. Before drawing final conclusions, however, it would be well to note the percentages of variability accounted for with the various combinations of variables. This is shown

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[1]Tables 37, 38, 39, and 40 in Appendix A were compiled to facilitate the estimation of average total costs of ginning.

[2]V—Volume of ginning in bales; I—Investment in gin plant in dollars; D—Number of days with gin crew for season; S—Size of gin in number of saws.

in Table 9. A considerable gain in the percentage of variability accounted for is made by adding investment to volume of ginning. By adding number of days of ginning to these two, the percentage is increased by 1.0 per cent; by adding number of saws to investment and volume, the percentage is increased by 0.3 of one per cent; by adding number of saws and number of days of ginning to investment and volume of ginning, the percentage is increased by 1.4 per cent.

Table 9.—Percentages in Variations in Costs Accounted For—Steam Power—Blackland Area

Volume of Ginning	Investment in Gin Plant	Number of Saws	Number of Days Ginning	Total
59.9	----	----	----	59.9
44.5	27.7	----	----	72.2
41.0	26.4	----	5.8	73.2
43.9	25.3	3.3	----	72.5
39.8	22.8	4.7	6.3	73.6

It should be evident from Table 9 that the two variables, volume and investment, serve the purpose in estimating costs. The gain from adding number of saws in the gin plant and the number of days of ginning is too slight to justify the added complications of using four variables instead of two. Investment in the gin plant and the size of gin as measured by number of saws are closely correlated. Thus size is but another aspect of investment. Investment alone amply takes care of the situation. Volume of ginning and the number of days of operating the gin plant are correlated. Thus the number of days of ginning is an aspect of the volume of ginning. Consequently, volume alone takes care of the situation quite as well as volume and number of days of operation taken as separate variables.

RELATION OF ESTIMATED COSTS TO ACTUAL COSTS

The estimated cost for each gin analyzed was computed in terms of its volume and investment. The percentage relation between the estimated and the actual cost was then determined. Table 10 shows the variations of actual costs from estimated costs according to percentage classes.

Of the gins with actual costs from 5 per cent lower to 5 per cent higher than the estimated costs, the Diesel group of the Gulf Coast Area had the lowest percentage, 23.4; the electric group of the High and Low Plains Area had the highest percentage, 42.1; all groups of gins had a percentage of 28.4. Of the gins with actual costs from 15 per cent lower to 15 per cent higher than the estimated costs, the steam group of the Blackland Area had the lowest percentage, 56.7; the multiple battery gins of the High and Low Plains Area had the highest percentage, 73.8; all groups of gins had a percentage of 64.2. Of the gins with actual

Table 10.—Relations Between Actual and Estimated Average Total Costs (Percentages of Gins)

Actual to Estimated	Percentage Variation	Blackland Area			High and Low Plains Area				Gulf Coast Area		All
		Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric	
Lower	56-up	-----	-----	1.2	1.2	4.4	1.8	1.3	4.7	-----	1.7
	46-55	0.9	-----	-----	1.6	0.6	1.8	-----	0.5	-----	0.7
	36-45	2.8	0.6	3.8	3.3	3.8	-----	6.6	3.5	3.1	3.0
	26-35	5.1	4.1	2.5	4.1	6.9	5.3	1.3	2.3	6.2	4.2
	16-25	12.1	13.5	7.5	9.7	8.2	3.5	7.9	13.5	3.1	10.3
	6-15	15.3	21.2	20.0	17.5	19.5	14.0	14.5	16.4	21.9	17.7
	5- 5	26.1	31.8	30.0	27.2	27.1	42.1	36.9	23.4	25.0	28.4
Higher	6-15	15.3	17.6	18.7	19.5	15.7	15.7	22.4	19.9	21.9	18.1
	16-25	12.6	5.9	8.8	10.6	6.3	10.5	3.9	8.8	9.4	8.9
	26-35	6.1	2.9	2.5	3.3	3.1	3.5	3.9	4.1	9.4	4.0
	36-45	2.3	1.2	-----	1.2	2.5	-----	-----	-----	-----	1.2
	46-55	0.9	-----	3.8	0.4	1.3	1.8	1.3	1.8	-----	1.1
	56-up	0.5	1.2	1.2	0.4	0.6	-----	-----	1.1	-----	0.7
Total	----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of Gins		215	170	80	246	159	57	76	171	32	1,206

costs from 25 per cent lower to 25 per cent higher than the estimated costs, the Diesel group of the High and Low Plains Area had the lowest percentage, 76.8; the Diesel group of the Blackland Area had highest percentage, 90.0; all groups of gins had a percentage of 83.4.

FIXED COSTS

A decided advantage of an analysis of ginning costs in terms of total costs arises from the fact that this procedure facilitates a division of costs into fixed and variable. The total of residual and investment costs is the fixed cost. The relation between volume of ginning and the fixed cost is the clue to the effect of volume upon ginning costs. An analysis of ginning costs in terms of per bale costs does not permit of this division of costs. The total cost analysis does not preclude the use of per bale costs whenever that may be preferable in that total costs can readily be converted into per bale costs.

As a means of emphasizing the relation of fixed cost to volume of ginning, Table 11 has been prepared. In each instance, the fixed cost

Table 11.—Fixed Costs per Bale[1]

Bales Ginned	Blackland Area			High and Low Plains Area				Gulf Coast Area	
	Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric
500	$6.18	$7.27	$5.85	$9.92	$10.64	$8.91	$11.63	$8.37	$4.92
1,000	3.08	3.64	2.93	4.96	5.32	4.46	5.82	4.18	2.47
1,500	2.06	2.42	1.95	3.31	3.55	2.97	3.87	2.78	1.64
2,000	1.54	1.82	1.47	2.48	2.67	2.23	2.91	2.09	1.23
2,500	1.24	1.45	1.17	1.99	2.12	1.79	2.33	1.67	0.99
3,000	1.03	1.22	0.98	1.66	1.77	1.49	1.94	1.40	0.82
Variable Cost	$1.78	$1.37	$2.05	$2.25	$ 1.76	$2.42	$ 1.75	$1.99	$2.59

[1]Volume of the large gins (multiple battery) twice that listed in each instance.

assumed is that of the gins of average investment. This table shows fixed costs as per bale costs at the various volumes of ginning.

A careful study of Table 11 should result in an indelible impression of the relation of fixed costs to volume of ginning. As volumes increase, fixed costs seem to melt away. This results from the fact that fixed costs per bale vary inversely with the volume of ginning. In Table 11 the variable costs per bale listed, if added to the fixed costs give total costs of ginning per bale at the specific volumes of ginning.

ITEMS OF COST

A ginner in estimating his total cost may find his actual cost considerably out of line with the estimated. In a case of this kind, an estimate of total costs alone may be quite unsatisfactory. The ginner may wish to know why his costs are higher, or lower, than the estimated.

A further analysis may be needed in terms of the various items of cost making up the total.

An indication of the relative importance of the various items of cost may be gained from Table 12. For each group, costs of average volume and average investment are shown.

Table 12.—Means of Items of Cost Expressed as Percentages of Total Mean Costs, 1930-1938

Area of State	Type of Power	Means of Total Costs	Percentages of Total Mean Costs						
			Labor Of. Sal.	Power	Repairs	Ins. & Taxes	Depr.	Mgt.	Misc.
	Steam	$ 4,621	20.6	12.6	10.4	10.5	20.9	18.6	6.4
Black-	Diesel	5,337	23.4	7.8	9.2	12.5	19.6	21.4	6.1
land	Electric	5,657	19.9	19.3	7.5	11.4	16.2	19.9	5.8
High	Steam	9,605	28.1	7.4	15.5	9.3	16.9	13.4	9.4
and	Diesel	8,292	27.7	6.1	11.8	9.3	22.6	14.8	7.7
Low	Electric	8,738	24.2	16.9	7.3	10.1	19.3	15.6	6.6
Plains	Large	20,027	33.4	9.0	9.6	11.1	18.3	10.6	8.0
Gulf	Diesel	6,706	22.7	5.4	11.7	9.5	23.6	18.3	8.8
Coast	Electric	5,563	25.8	14.2	9.4	9.7	18.5	15.1	7.3

It is to be noted that seven times out of nine, gin labor and office salaries made up the highest percentage of total costs. The only other item to contest these two for top rank was the cost of depreciation. This cost was relatively important because of the low average volume of ginning of the groups of gins.

Standards for Items of Cost

In the same sense that a standard for total cost may be useful to the ginner, so standards for items of cost should be serviceable. An estimating equation may be derived for each item of cost in terms of the volume of ginning and the investment in the gin plant. But in case the one variable, or the other, may be unimportant in explaining differences in costs among the gins, little is to be gained by including such variable. For instance, the labor cost of steam gins in the Blackland Area correlated with volume and investment gives a factor for investment that is quite insignificant. The estimated labor costs on 1,000 and 2,000 bales computed from an equation with volume as the only variable are $1,041 and $1,661. In using an equation with the two variables, volume and investment, the estimated costs on these volumes for a gin with an investment of $10,000 are $1,023 and $1,623; and the estimated costs for a gin with an investment of $20,000 are $1,045 and $1,645. It would appear from these examples that the difference in the estimated labor costs, in this instance, whether the estimating equation be based on the one variable, volume, or on two variables, volume and investment, is

so slight that investment as a variable may well be disregarded. Likewise, with other items of cost, if investment, or volume, proved insignificant in estimating the cost, such variable was disregarded. In a few instances, the size of gin as measured by the number of saws was found to have a significant relation to items of cost. In such cases, size was included in the estimating equation. In several instances, none of the three variables was found having a significant relation to specific items of cost; hence the mean cost was accepted to represent the estimated cost.

A series of equations for estimating costs, average and bulk, of the various items of cost have been derived. These equations are given in Appendix C.[1] The correlations between volumes of ginning and costs, totals and items, and between investments in the gin plants and costs, totals and items, according to section of state and type of power are given in Appendix D. The standard errors and coefficients of determination of the equations for average cost by totals and by items are given in Appendix E.

Fixed Costs of Items of Cost

Volume of ginning and investment may be correlated with the total cost of each item. Thus the residual, investment, and variable costs of the equations of total costs are allocated according to the various items of cost. Table 13 lists fixed costs by items according to type of power, size of gin, and section of the state. The part of the fixed cost accounted for by investment cost was based on average investment in each group of gins.

Table 13.—Total Fixed Cost Allocated to Items of Cost[1] (1930-1938)

Cost Item[2]	Blackland Area			High and Low Plains Area				Gulf Coast Area	
	Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric
Labor	$ 433	$ 374	$ 107	$ 529	$ 508	$ 273	$ 999	$ 409	$ 180
Power	271	128	159	362	202	406	563	88	7
Repairs	353	367	165	448	545	96	629	328	48
Insurance	416	583	455	398	397	401	1,028	302	232
Taxes	----	----	----	324	254	310	932	248	162
Dep.	958	1,083	886	1,586	1,872	1,693	3,768	1,573	1,006
Managem't	519	1,017	991	985	988	1,191	1,907	953	838
Of. Sal	----	----	----	211	136	131	934	----	----
Misc.	136	169	166	116	421	111	869	284	—18
Total	3,087	3,721	2,929	4,959	5,323	4,612	11,629	4,185	2,455

[1]Average investment in gin plants. See Table 3.
[2]Insurance and taxes combined in Blackland Area; labor and office salaries combined in Blackland and Gulf Coast Areas.

[1]Tables 41 to 49 in Appendix A were compiled to facilitate the estimation of average costs of the various items of cost.

The data in Table 13 emphasize the fact that each item of ginning cost carries an element of fixed cost. This means that cost items may not be classified, in their entirety, as fixed or variable.

A gin which may stand idle for a season presumably would have no labor or power cost; perhaps it would have no repair or management cost. As these items of cost are eliminated, fixed costs would drop correspondingly. Thus to continue costs as a straight line to the 0-Bale Axis as in Figures 1, 2, 3, and 4 results in an estimated fixed cost for idle gins considerably above the actual. This estimated fixed cost on the 0-Bale Axis, however, should be considered as the fixed cost of gins through the normal range of volume rather than as the fixed cost of gins with no volume. Practically, these over-estimates of costs in the low range volumes are not significant. No ginner can long survive in the business with a volume much below 400 or 500 bales. An over-estimate of costs at these and lower volumes would mean that the length of the period of possible survival is somewhat longer than estimated costs would indicate.

Variability of Items of Cost

Costs of the various items, except depreciation, vary to a greater degree than is the case with total costs. A gin of average efficiency, for instance, may have several items higher in cost than the average; these costs, however, are counterbalanced by other items lower than the average. Some of the variations in items of cost result from lack of uniform standards in classifying items of cost. In some cases charges may be made to miscellaneous cost which properly belong to some other item. In borderline cases, it may be a matter of choice to which of two items a specific cost should be charged.

As a means of comparing variability of total costs with that of the items of cost, Table 14 was compiled. The number of all gins was ascertained with actual costs varying with estimated costs from 5 per cent below to 5 per cent above; from 10 per cent below to 10 per cent above; and so on. The number of gins within each percentage group was converted to percentages of all gins. The number of all gins was determined with actual costs of labor, power, repairs, and so on, varying from their estimated average costs from 5 per cent below to 5 per cent above; from 10 per cent below to 10 per cent above; and so on. The number of gins of each group was then reduced to an index of the number of gins with total costs within the same percentage limits.

Table 14 indicates that costs of labor are the least variable and costs of repair are the most variable in terms of total costs. For every 100 gins which have actual total costs within the range of 5 per cent below to 5 per cent above their estimated total costs, 63 gins have actual labor costs and 27 have actual repair costs within the range of 5 per cent below to 5 per cent above their estimated costs. For every 100 gins which have actual total costs within the range of 50 per cent below to 50 per cent above their estimated total costs, 87 gins have actual labor

Table 14.—Variations of Actual Costs, Total and and Items from Estimated Costs, Total and Items—All Gins

Variations[1]	Total Costs[2]	Index on Number of Gins[3]							
		Labor	Power	Repairs	Insurance	Taxes	Management	Office Salary	Miscellaneous
5- 5	28.4	63	47	27	38	34	59	50	28
10-10	47.8	62	49	27	43	38	56	42	30
15-15	64.2	62	50	27	47	41	58	42	32
20-20	75.4	65	54	29	50	45	61	42	35
25-25	83.4	70	56	33	53	49	65	46	38
30-30	89.0	73	59	35	57	54	68	49	41
35-35	91.6	78	64	38	61	57	70	53	44
40-40	94.0	81	67	41	64	60	73	56	48
45-45	95.8	84	70	44	67	64	76	59	52
50-50	96.9	87	72	46	71	67	77	61	55

[1]Percentage variations of actual costs, above and below, estimated average costs.
[2]Percentage of all gins with total costs within the percentage variations of actual costs, above and below, estimated average costs.
[3]As to total costs of all gins, 28.4 per cent have actual costs from 5 per cent below to 5 per cent above estimated average cost; for every 100 gins having total costs within this range, 63 have labor cost, 47 power cost, 27 repair cost, 38 insurance cost, 34 tax cost, 59 management cost, 50 office salary cost, and 28 miscellaneous cost within the 5-5 interval.

costs and 46 have actual repair costs within the range of 50 per cent below to 50 per cent above their estimated costs. In the matter of variability, this point needs to be stressed. Of the 54 gins with repair costs outside the 50-50 per cent limits of estimated costs for every 100 gins with total costs within these limits, about one-half have actual repair costs higher than the 50 per cent above estimated costs and about one-half have actual repair costs lower than the 50 per cent below estimated costs.

Cost of Gin Labor

Cost of gin labor has a peculiar relation to volume of ginning. The per bale costs of such items as taxes and depreciation are merely a matter of simple division—the costs divided by the number of bales. The day-to-day volume of ginning is of little consequence. The manager has no control over these costs other than through his influence over the total volume of ginning. On the run for the season, much the same statements may be made of labor costs. But the labor cost expressed in the total for the season covers up details of vital significance. The volume ginned from day to day during the course of the ginning season is of consequence in the results summarized in the total cost. The gin manager does have considerable control over the cost of gin labor through the possibilities afforded of adjusting the size of the crew in conformity with the volume to be ginned for the day.

A number of ginners from whom records were obtained made no distinction between gin laborers and office employees. The combining of the costs of these two groups presumably is on the theory that the office man in weighing the seed cotton and in making out the necessary papers for the patrons is virtually a member of the gin crew. This line of

reasoning does not necessarily hold good of the time the bookkeeper spends on compiling the various records of the business. In this section of the discussion, the designation gin labor cost includes the cost of office salaries. Office salaries are relatively less important than costs of gin labor being from one-seventh to one-fifth as great in amount.

Attention may be called to three important relationships of labor cost to total cost: the fixed cost of labor to total fixed cost; the variable cost of labor to total variable cost; and the total labor costs to total costs of ginning at various volumes of ginning. These relationships are shown in Table 15.

Table 15.—Relation of Labor Costs to Total Costs of Ginning

Area of State	Type of Power	Percentages							
		Cost[1]		Volumes of Ginning (Bales)[2]					
		Fixed	Variable	500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	14.0	34.8	18.7	21.6	23.7	25.2	26.3	27.2
	Diesel	7.6	60.6	16.0	22.1	26.8	30.4	33.3	35.8
	Electric	3.7	36.6	12.2	17.2	20.5	22.9	24.6	26.0
High and Low Plains	Steam	10.7	42.7	15.8	19.3	21.8	23.8	25.3	26.6
	Diesel	9.5	56.3	15.0	19.2	22.4	25.0	27.1	28.8
	Electric	5.9	41.3	11.8	15.7	18.4	20.5	22.0	23.3
	Large	8.6	54.3	14.6	19.2	22.8	25.8	28.2	30.3
Gulf Coast	Diesel	9.8	43.7	16.3	20.7	23.9	26.3	28.2	29.7
	Electric	9.5	39.4	18.8	24.8	27.8	29.8	31.2	32.2

[1]Relation between fixed cost of labor and total fixed cost at average investment; relation between variable cost of labor and total variable cost.
[2]Volume of large gins double that of single battery gins.

As the volume of ginning increases, wages of gin labor and salaries of office workers account for an increasing percentage of total costs of ginning. At a volume of 500 bales, the percentages of total costs absorbed by wages range from a low of 11.8 for electric gins of the High and Low Plains Area to a high of 18.8 for electric gins of the Gulf Coast Area; at a volume of 3,000 bales, the percentages of total costs absorbed by wages range from a low of 23.3 for electric gins of the High and Low Plains Area to a high of 35.8 for Diesel gins of the Blackland Area. This behavior of labor cost is a reminder of the optimism of Bastiat and Carey[1] who believed that the share going to labor increases both absolutely and relatively with improvements in methods of production. This increasing share to labor can be explained in terms of variable costs. As volume of ginning increases, the variable part of total costs accounts for a larger and larger portion. It is to be noted that the variable costs of labor constitute from one-third to three-fifths of the total variable costs of ginning. Fixed costs of labor range between a low of 3.7 per cent of total fixed costs to a high of 14.0 per cent.

[1]Bastiat (1801-1850) was a French economist; Carey (1793-1879) was one of the early American economists.

The dollar cost of gin labor is the result of two main factors: the rate of wages paid; and the relative efficiency with which labor is employed. Table 16 shows wages paid per 10-hour day by sections of

Table 16.—Wages Paid Texas Gin Labor

Year	Wages Per 10-Hour Day			Wage Index[1]		
	Black-land	Plains	Gulf Coast	Black-land	Plains	Gulf Coast
1929	$3.86	----	$3.85	134	----	134
1930	3.78	----	3.80	131	----	132
1931	2.96	----	3.00	102	----	104
1932	2.46	----	2.65	85	----	92
1933	2.75	----	2.77	95	----	96
1934	2.69	----	2.80	93	----	97
1935	2.63	$2.79	2.83	91	97	98
1936	2.73	2.82	2.95	94	98	102
1937	2.77	3.14	3.20	96	109	111

[1]Weighted average taken as 100.

the state. The data in this table are based on a relatively small sample in that this information was gained only in case a detailed labor record was obtained. The Blackland wage rates are based on 128 records; the High and Low Plains on 83; and the Gulf Coast on 38.

To express costs of gin labor in terms of dollars may raise a number of questions. A ginner with a high labor cost, for instance, may be paying high wages, or he may be using labor inefficiently. The answer to these points may be found through an analysis of physical, or hour, costs of labor. Efficiency of labor is a matter of the adaptability of the men to the task in hand and of the organization and direction of the crew by the gin manager.

According to a rather widely accepted practice, a gin laborer is entitled to a full day's wage by reporting for work in the morning even though circumstances may be such that no ginning is done during the day. Because of this, gins show crews for a number of days each season in which no volume is ginned. Days of no ginning, or of a low volume of ginning, may be due to the uncertainties during the opening and closing of the ginning season, to weather conditions, to break-downs in the gin plant, and to other circumstances. Besides attempting to keep down the size of the crew so as to economize on labor cost, the gin manager must keep in mind that his patrons as they bring in their loads of seed cotton demand quick service. A patron lost because of slow service may be a patron lost for the remainder of the season.

Seed cotton is non-perishable. This means that from the physical standpoint there is no pressing need to gin the product on the day of delivery. One purpose of the seed cotton house is to permit the accumulation of a stock during days of low delivery so as to have a sizeable volume to gin a few days later. Such accumulation, however, may

require the patron to wait for ginning service. There are several objections to this. In the first place, a competing ginner may stand ready to offer immediate service. In the second place, the patron may need to dispose of the lint and cottonseed at the earliest possible time because of his financial status.

Hour Costs of Gin Labor, Fixed and Variable

Cost of labor is usually viewed as an operating or variable cost. The analysis made of dollar costs of labor indicates that this cost is both fixed and variable. The question may be raised as to the reason for the fixed element in labor cost. The answer may be found through an analysis of hour costs of labor. Two situations have a bearing on fixed costs: the days a gin has a crew but does no ginning; the varying relations from day to day between the size of the crew and the number of bales ginned. Detailed labor records showing daily dollar and hour costs were obtained on 68 and 44 steam and Diesel gins in the Blackland Area, and on 52 and 31 steam and Diesel gins in the High and Low Plains Area.

Hour costs are in two categories: the total hours of the days of no ginning; and the total hours of the days of ginning. By correlating the volume of ginning with these hour costs, the following estimating equations were derived:

Blackland Area

Steam Power
- Total Hours of Labor = 1,677 Hours + 1.8HV[1]
- Hours of Ginning = 1,253 Hours + 1.5HV
- Hours of No Ginning = 424 Hours + 0.3HV

Diesel Power
- Total Hours of Labor = 794 Hours + 2.2HV
- Hours of Ginning = 368 Hours + 2.1HV
- Hours of No Ginning = 426 Hours + 0.1HV

High and Low Plains Area

Steam Power
- Total Hours of Labor = 2,225 Hours + 2.1HV
- Hours of Ginning = 1,296 Hours + 1.8HV
- Hours of No Ginning = 929 Hours + 0.3HV

Diesel Power
- Total Hours of Labor = 1,502 Hours + 2.6HV
- Hours of Ginning = 647 Hours + 2.1HV
- Hours of No Ginning = 855 Hours + 0.5HV

The fact of a small variable cost in the hours of no ginning means that the hours of no ginning increase slightly as the volume of ginning increases.

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[1]H—Hours; V—Volume of ginning; 1.8HV means 1.8 Hours times the number of bales ginned.

High and Low Hour Costs of Labor

On the basis of the relationship between actual hour costs and estimated hour costs, ten steam plants of high cost and ten steam plants of low cost in the High and Low Plains Area were selected. The hour costs per bale for the high and low cost gins and the total for both groups according to volume of ginning per day are given in Table 17.

Table 17.—Hour Costs of Gin Labor—Ten High Cost and Ten Low Cost Gins—Steam Plants—High and Low Plains Area

Bales Per Day	Hours Per Bale			Index of Hour Cost[1]		
	High Cost	Low Cost	All Gins	High Cost	Low Cost	All Gins
1-10	6.9	5.3	6.1	256	196	226
11-20	3.5	2.8	3.1	130	104	115
21-30	2.7	2.1	2.4	100	78	89
31-40	2.3	2.0	2.2	85	74	82
41-50	2.3	1.5	2.0	85	56	74
51-60	2.0	1.5	1.7	74	56	63
61-	1.7	1.2	1.4	63	44	52
Average	3.1	2.4	2.7	115	89	100

[1]Average hour cost of labor of all gins taken as 100.

It is evident from Table 17 that hour costs of labor per bale are very high for a volume of ginning of 10 bales, or less, per day. After a volume of 40 bales per day has been reached, increases in volume result in moderate decreases in the hour costs per bale. For the gins of high and low hour costs of labor, 22.3 and 29.6 per cent of the total hours of labor were accumulated on days of no ginning; 23.0 and 18.5 per cent of the total hours were accumulated on days when 10 bales, or less, were ginned.

Hour Costs Per Bale

The hour costs per bale of the days of no ginning, of the days of ginning, and of total time are significant indexes on labor cost. For each of the 20 gins summarized in Table 17 estimated hour costs per bale for days of ginning, no ginning, and total time were computed. The percentage relationships between actual and estimated costs were calculated. Each gin was then ranked on the three costs, No. 1 having the lowest cost and No. 10 the highest. The hour costs of the gins with labor cost below the average are shown in Table 18 and of the gins with labor cost above the average are shown in Table 19.

The gin with the lowest total labor cost in the low cost group ranked second on days of no ginning and first on days of ginning; the gin ranking second on total cost was first on days of no ginning and seventh on days of ginning. The gin with the lowest total labor cost in the high cost group ranked eighth on days of no ginning and first on days of ginning.

Table 18.—Hours of Labor Per Bale—Steam Gins of High and Low Plains Area Labor Cost Below Average

Gin Number	1	2	3	4	5	6	7	8	9	10
Bales Ginned	1,791	1,182	652	2,878	788	1,827	380	866	1,256	1,078
Actual Cost										
Days No Ginning	0.5	0.6	1.3	0.5	1.1	0.8	3.8	2.0	1.3	1.6
Days Ginning	1.8	2.4	2.9	1.8	3.0	2.1	4.5	3.1	2.8	2.6
Total Hours	2.3	3.0	4.2	2.3	4.1	2.9	8.3	5.1	4.1	4.2
Estimated Cost										
Days No Ginning	0.8	1.1	1.7	0.4	1.5	0.8	2.9	1.5	1.1	1.2
Days Ginning	2.5	2.9	3.8	2.5	3.4	2.5	6.2	3.9	3.2	3.2
Total Hours	3.3	4.0	5.5	2.9	4.9	3.3	9.1	5.4	4.3	4.4
Percentage Actual of Estimated										
Days No Ginning	63	55	76	125	73	100	131	133	118	133
Days Ginning	72	83	76	72	88	84	73	79	88	81
Total Hours	70	75	76	79	84	88	91	94	95	95
Ranking										
Days No Ginning	2	1	4	7	3	5	8	9	6	10
Days Ginning	1	7	4	1	10	8	3	5	9	6
Total Hours	1	2	3	4	5	6	7	8	9	10

Table 19.—Hours of Labor Per Bale—Steam Gins of High and Low Plains Area Labor Cost Above Average

Gin Number	1	2	3	4	5	6	7	8	9	10
Bales Ginned	248	2,938	1,002	1,298	1,353	1,639	1,580	1,135	246	1,302
Actual Cost										
Days No Ginning	4.8	0.6	0.7	0.7	0.9	0.6	1.0	1.1	6.2	1.2
Days Ginning	6.5	2.5	3.9	3.5	3.2	3.3	3.1	3.8	7.1	3.5
Total Hours	11.3	3.1	4.6	4.2	4.1	3.9	4.1	4.9	13.3	4.7
Estimated Cost										
Days No Ginning	4.0	0.6	1.2	1.0	1.0	0.9	0.9	1.1	4.1	1.0
Days Ginning	7.1	2.3	3.1	2.8	2.7	2.6	2.6	3.0	7.0	2.8
Total Hours	11.1	2.9	4.3	3.8	3.7	3.5	3.5	4.1	11.1	3.8
Percentage Actual of Estimated										
Days No Ginning	120	100	58	70	90	67	111	100	151	120
Days Ginning	92	109	126	125	119	127	119	127	101	125
Total Hours	102	107	107	111	111	111	117	120	120	124
Ranking										
Days No Ginning	8	5	1	3	4	2	7	5	10	8
Days Ginning	1	3	8	6	4	10	5	9	2	6
Total Hours	1	2	3	4	5	6	7	8	9	10

The manager in handling his gin crew seems to have two main problems: to keep as low as possible the hours of labor on days of no ginning; and to keep his gin crew to the lowest number of men on days of ginning consistent with prompt and effective service to patrons. Of the gins with labor cost below the average, the best record for cost on days of no ginning was 55 per cent of the average; for cost on days of ginning, 72 per cent of the average; and for total cost, 70 per cent of the average. The highest cost of days of no ginning in this group was 133 per cent

of the average; of days of ginning, 88 per cent of the average; and of total hours, 95 per cent of the average. Of the gins with labor cost above the average, the best record for days of no ginning was 58 per cent of the average; for days of ginning, 92 per cent of the average; and for total hours, 102 per cent of the average. The highest cost of days of no ginning in this group was 151 per cent of the average; of days of ginning, 127 per cent of the average; and for total hours, 124 per cent of the average.

Daily Gin Crews and Volume of Ginning

The size of the daily gin crew and the daily volume of ginning for the whole season are shown for the gin of second lowest labor cost of the low cost group in Table 20 and for the gin of third lowest labor cost of the high cost group in Table 21. The hour cost of labor of the second gin is 36 per cent higher than that of the first. As one scans the crew size in Table 20, the figure 4 is prominent; as one scans the crew size in Table 21, the figure 5 is prominent. The low cost gin had a four man crew for 53 days and a five man crew for 16 days out of a total of 106 days; the high cost gin had a four man crew for eight days and a five man crew for 62 days out of a total of 105 days. The low cost gin had 70 days of ginning and the high cost gin had 75.

Table 20.—Gin Crew and Volume of Ginning by Days—Steam Gin with Low Labor Cost—High and Low Plains Area

Date	Size Crew	R/B Ginned	Date	Size Crew	R/B Ginned	Date	Size Crew	R/B Ginned	Date	Size Crew	R/B Ginned
Oct.			Nov.			Dec.			Jan.		
1	3	2	4	4	8	6	1	0	6	5	27
2	3	0	5	4	9	7	1	0	7	6	1
3	1	0	6	4	11	9	4	10	9	4	21
4	1	0	7	4	12	10	4	19	10	4	29
5	1	0	8	4	0	11	4	22	11	5	32
7	1	0	9	2	0	12	4	21	12	1	0
8	1	3	12	2	0	13	5	52	13	5	52
9	1	3	13	3	0	14	5	23	14	4	0
12	4	7	14	4	14	15	1	0	15	4	19
14	4	13	15	4	15	16	5	48	16	4	19
15	4	13	16	4	18	17	5	11	17	4	19
16	4	0	18	4	0	18	5	66	18	4	2
17	4	10	19	4	33	19	5	23	22	1	0
18	2	0	20	4	29	20	5	27	24	5	17
19	2	0	21	4	18	21	5	7	25	5	19
21	4	8	22	4	36	23	4	26	Feb.		
22	4	10	23	4	0	25	4	0	1	4	8
23	4	12	24	1	2	26	3	19	3	1	0
24	1	0	25	2	0	27	4	0	4	1	0
25	1	0	26	2	0	28	4	0	5	1	0
26	1	0	27	2	0	29	1	0	8	4	11
28	3	4	29	4	12	30	4	22	14	4	17
29	5	16	30	4	12	31	3	0	15	4	11
30	4	12	Dec.			Jan.			21	1	0
31	4	2	2	4	15	1	3	0	22	4	13
Nov.			3	4	15	2	4	8	29	4	10
1	4	3	4	4	10	3	5	27			
2	4	4	5	4	6	4	5	27			

Table 21.—Gin Crew and Volume of Ginning by Days—Steam Gin with High Labor Cost—High and Low Plains Area

Date	Size Crew	R/B Ginned	Date	Size Crew	R/B Ginned	Date	Size Crew	R/B Ginned	Date	Size Crew	R/B Ginned
Sept.			Oct.			Nov.			Dec.		
24	4	3	22	6	39	18	5	14	15	1	0
25	4	0	23	5	3	19	5	30	16	5	10
26	4	2	24	5	4	20	6	31	17	5	14
27	4	2	25	5	0	21	6	46	18	5	10
28	4	6	26	5	1	22	5	28	19	6	12
30	4	8	27	1	0	23	5	20	20	5	5
Oct.			28	5	12	24	2	0	21	5	3
1	5	10	29	6	28	25	5	0	22	1	0
2	5	11	30	5	36	26	5	0	23	3	0
3	5	10	31	5	32	27	5	9	24	4	5
4	5	10	Nov.			28	5	0	25	3	0
5	5	7	1	5	21	29	5	15	26	3	0
6	2	0	2	5	7	30	5	22	27	3	0
7	5	4	3	1	0	Dec.			28	3	2
8	5	19	4	5	15	1	1	0	Jan.		
9	5	19	5	5	21	2	5	6	3	2	0
10	6	24	6	5	26	3	5	19	4	4	8
11	6	26	7	5	12	4	5	6	14	3	6
12	5	18	8	5	13	5	5	1	16	4	2
13	2	0	9	5	9	6	5	0	25	3	2
14	5	15	10	1	0	7	5	0	Mar.		
15	5	30	11	5	0	8	1	0	3	2	0
16	6	27	12	5	5	9	5	4	6	1	0
17	6	10	13	5	2	10	5	11	7	3	0
18	5	11	14	5	8	11	5	15	8	1	0
19	5	8	15	5	4	12	5	9	14	3	3
20	2	0	16	5	13	13	5	13			
21	5	23	17	1	0	14	5	9			

A summary of volume of ginning in terms of the size of crew is given in Table 22. The hour costs per bale for the days of actual ginning are summarized in Table 23. The size of the daily crew of the ginner with the high labor cost, on an average, was larger by 0.9 of a man than that of the ginner with the low labor cost. This difference explains in large measure the relative labor costs of the two ginners.

Cost of Power

The designation Diesel power includes natural gas and oil engines and a very few gasoline engines. If a strict classification had been followed,

Table 22.—Volume of Ginning According to Size of Gin Crew

Size Crew (No. of Men)	Bales Ginned		Percentage Volume	
	Low Cost	High Cost	Low Cost	High Cost
1—3	33	13	2.8	1.3
4	674	34	57.0	3.4
5	474	712	40.1	71.1
6—	1	243	0.1	24.2
Total Volume	1,182	1,002	100.0	100.0

Table 23.—Hour Cost Per Bale According to Size of Gin Crew

Size Crew (No. of Men)	Days Ginning		Bales Ginned		Hour Cost Per Bale	
	Low Cost	High Cost	Low Cost	High Cost	Low Cost	High Cost
1	3	--	8	--	3.8	---
2	--	--	--	--	---	---
3	3	4	25	13	3.6	9.2
4	47	7	674	34	2.8	8.2
5	16	55	474	712	1.7	3.9
6	1	9	1	243	60.0	2.2

the number of gins in some of the groups would have been so small as to seriously affect the reliability of the results of the analysis. Type of power in the large, or multiple battery, gins is disregarded. In the first place, the number of cases in the sample is small. In the second place, many of these gins have more than one type of power. The managers of these gins do not keep separate records on batteries, or gins, according to types of power.

No attempt is made in this analysis to determine true power costs of ginning. There is a practical reason for this in that gin records are not kept in such a manner as to make such analysis possible. True power costs would involve allocation of such items as depreciation, repairs, and labor chargeable to the power plant in addition to the fuel and lubricants consumed by the power unit.

The power cost as used in this analysis includes such items as fuel, lubricating oil, packing, water, and light. Some of these items do not belong to power cost. A number of these items are of a nature not to be influenced by the type of power as, for instance, the lubricating oil used on gin machinery and water and light used in the office and the gin building. Other items are directly influenced by the type of power. The effect of varying investments in the power plant is reflected in the cost of depreciation and to some extent in costs of taxes and insurance. The differences in the gin crew because of the type of power are reflected in total costs of labor. Fuel costs reflect the full effect of the various types of power. Differences in costs of repairs according to type of power are included in total repairs for the plant. For these reasons, to measure the effect of type of power through such other items in total costs as labor, depreciation, and repairs as well as the item of power cost should prove quite satisfactory.

The relations between the fixed and variable costs of power to total fixed and variable costs and between total power costs at various volumes and total costs of ginning are shown in Table 24.

The variable part of power costs of the electric gins makes up a considerably higher percentage of total variable costs than is the case with other types of power. It must also be kept in mind that total variable costs of the electric gins are higher than the total variable costs of the other types of power. The relatively low power cost of steam plants

Table 24.—Relation of Power Costs to Total Costs of Ginning

Area of State	Type of Power	Percentages							
		Cost[1]		Volume of Ginning (Bales)[2]					
		Fixed	Variable	500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	8.8	20.2	11.3	13.0	14.1	14.9	15.5	16.0
	Diesel	3.5	18.2	5.9	7.6	8.9	9.9	10.7	11.4
	Electric	5.4	35.6	13.3	17.9	20.9	23.0	24.6	25.9
High and Low Plains	Steam	7.3	7.1	7.3	7.2	7.2	7.2	7.2	7.2
	Diesel	3.8	10.2	4.7	5.4	5.9	6.4	6.7	7.0
	Electric	8.8	26.4	12.5	14.9	16.6	17.8	18.8	19.6
	Large	4.8	14.9	6.2	7.2	8.0	8.6	9.1	9.6
Gulf Coast	Diesel	2.1	11.1	3.8	5.0	5.8	6.5	7.0	7.4
	Electric	3.7	22.4	10.1	13.3	15.1	16.4	17.2	18.0

[1]Relation between fixed cost of power and total fixed cost at average investment; relation between variable cost of power and total variable cost.
[2]Volume of ginning of large gins double that of single battery gins.

in the High and Low Plains Area is a reflection of the saving in fuel cost through the burning of burrs in the steam boiler. The high repair costs of these gins, however, must not be overlooked. The burning of burrs adds to the repair bill of the steam boilers.

In recent years, a change has been made in the charge for electric current to ginners by a power company in the Blackland Area. This change is not reflected in the costs of electric gins analyzed in this study. In Figure 5 Line A marks the cost of electric current under the former rate schedule and line B under the present rate schedule with consumption at 20.64 kilowatt hours per bale ginned, the average of 201 electric gins for the season 1939-40. The gin assumed is a 4/80, or a 5/70, with two motors of 10 and 75 horsepower. Under the present rate schedule, there is a minimum charge of $3.00 per horsepower. All current consumed is at the rate of 2.5 cents per kilowatt hour. The charge for current to the ginner under the present rate is considerably lower at volumes less than 600 bales than under the former rate. Savings per bale to the ginner under the present rate as compared with the former are: 13 cents at 1,000 bales; 18 cents at 1,500 bales; 16 cents at 2,000 bales; 14.8 cents at 2,500 bales; and 12.3 cents at 3,000 bales.

Line A′ marks the cost of current under the former schedule and Line B′ under the present schedule with consumption at 16 kilowatt hours per bale ginned. Under the former rate schedule, at a consumption of 20.64 kilowatt hours per bale, the cost of current was a fixed charge up to about 625 bales; at a consumption of 16 kilowatt hours per bale, the cost was a fixed charge up to about 850 bales.

Ginners manifest a live interest in the relative advantages of the different types of power. On this point, these general observations may be made. From the standpoint of the investment in the power unit of a single battery gin, for each dollar invested in an electric power unit, about $2.50 are invested in a steam power unit and about $3.85 are

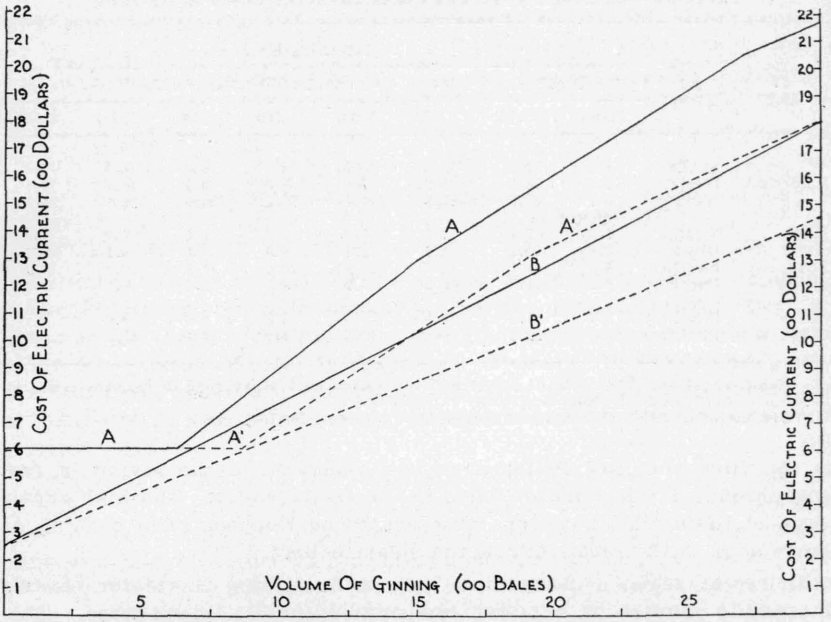

Fig. 5.—Effect of Changes in Electric Rate Schedules. Line A marks the cost under the old schedule and Line B under the new with consumption at the rate of 20.64 kilowatt hours per bale ginned. Lines A' and B' mark costs under the old and new schedules with consumption at the rate of 16 kilowatt hours per bale ginned.

invested in a Diesel power unit. Thus the electric gin has the advantage of the lowest cost of depreciation. The electric gin has the lowest labor cost. As a rule, the electric gin saves one man in the gin crew. For a gin with a low volume of ginning, this becomes significant. The electric gin has the lowest repair costs. The electric gin enjoys the lowest fixed cost. In general, for a ginner with a low volume of ginning, the cost advantage lies with electric power; steam power is next in line with Diesel power at the greatest cost disadvantage. For the ginner with a large volume of ginning, the cost advantage lies with Diesel power; steam power is next in line with electric power at the greatest cost advantage. At a high volume, the Diesel gin capitalizes on its low variable cost; the electric gin suffers from its high variable cost.

Cost of Repairs

Costs of repairs are influenced relatively little by volume of ginning in steam and Diesel gins of the Blackland Area. In all other instances of types of power, volume is rather a significant factor in repair costs. If costs of ginning be considered by single seasons one of the items of

greatest influence in the high cost gins is that of repair costs. For instance, in the case of the 53 high cost and 52 low cost steam gins in the Blackland Area, while total costs of the former were greater by 56 per cent, repair costs were greater by 217 per cent; for 38 high cost and 38 low cost Diesel gins, these percentages were 48 and 186; and for the 22 high cost and 22 low cost electric gins these percentages were 44 and 234.

Various reasons may be advanced for irregularities in repair costs. In the first place, there is no standard for measuring levels of repair. Some ginners keep their plant in a much better state of repair than other ginners. In the second place, a considerable part of repair work may be delayed from season to season. Thus during a period of years repair costs may run low while in the year when a thorough overhauling is made, the repair cost runs high. A line ginner with 20 gins, for instance, may select five gins this year for a thorough repair job; next season another group of five is selected and so on through the complete cycle. For a given gin, repair costs from year to year may be quite irregular. In the third place, repair cost the current season is related both to the volume ginned the preceding season and to the anticipated volume the coming season. If the volume the preceding year were high, the ginner may be forced to do considerable repair work. If the volume the preceding year were low, perhaps very little repair work will be needed. If a low volume of ginning be anticipated, the ginner keeps the repair bill at the lowest possible figure. In the fourth place, the difficult problem presents itself of drawing the line between repairs and replacements. Gin managers do not necessarily agree upon the division.

Furthermore, in some cases part of the repair cost may not be listed under repairs. For instance, some managers may do repairing with the gin crew on days of low ginning or no ginning. The cost of such labor would appear in cost of gin labor. In some instances, the manager may be employed for the whole year, or for a period longer than the ginning season. Such manager may spend part of the off season in doing repair work. In these instances, this portion of repair labor would appear as part of the cost of management.

The relations between the fixed and variable costs of repair to total fixed and variable costs and between total repair costs at various volumes and total costs of ginning are shown in Table 25.

Cost of Insurance and Taxes

Costs of insurance and taxes combined may be characterized as fixed to a much greater degree than variable. While volume is a factor in six cases out of nine, the costs per bale, with the exception of electric gins in the Gulf Coast Area, are so low as to have but a moderate effect on total costs of these items. In three cases out of nine, investment is a factor and in three cases out of nine, size is a factor.

Table 25.—Relation of Repair Costs to Total Costs of Ginning

Area of State	Type of Power	Percentages							
		Cost[1]		Volume of Ginning (Bales)[2]					
		Fixed	Variable	500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	9.9	11.2	10.2	10.4	10.5	10.6	10.7	10.8
	Diesel	8.8	10.2	9.1	9.2	9.3	9.4	9.5	9.6
	Electric	7.9	7.3	7.7	7.6	7.6	7.5	7.5	7.5
High and Low Plains	Steam	9.5	21.8	11.8	13.3	14.5	15.3	16.0	16.6
	Diesel	10.3	14.2	10.9	11.3	11.6	11.9	12.1	12.3
	Electric	1.7	13.6	4.2	5.8	7.0	7.8	8.5	9.0
	Large	14.5	15.4	14.6	14.7	14.8	14.9	14.9	15.0
Gulf Coast	Diesel	7.0	18.1	9.2	10.6	11.6	12.4	13.0	13.5
	Electric	----	18.5	5.4	8.8	10.8	12.1	13.0	13.7

[1]Relation between fixed costs of repair and total fixed costs at average investment; relation between variable costs of repair and total variable costs.

[2]Volume of ginning of large gins double that of single battery gins.

Cost of insurance varies according as the gin buildings are all wood, wood iron-clad, brick, or all steel. The available fire protection is also a factor whether the gin is located in the open country with no outside fire protection or within the city limits. Gins which have installed automatic sprinkler systems enjoy a considerable reduction in rates. The percentage of the investment protected by insurance is also a factor. Volume of ginning has a slight influence in that cotton and cottonseed are insured while on the gin premises in the process of ginning.

Taxes vary according to rates and bases of assessment. Rates usually are higher in the city than in the country. In many instances, the size of gin rather than its investment is made the basis of assessed valuation.

The relation between the fixed and variable costs of insurance and taxes to total fixed and variable costs and between total costs of insurance and taxes at various volumes and total costs of ginning is shown in Table 26.

Cost of Depreciation

There are, in the main, three ways in which ginners handle depreciation. The first group disregards this cost. At the end of the season after all out-of-pocket expenses have been paid, whatever is left over is considered as profit. The second group charges off depreciation in its balance sheet. No reserve against depreciation, however, is set aside. Thus total assets shrink from year to year. But the profit of operation is handled in much the same manner as in the first group. The third group not only charges off depreciation but also sets aside a reserve against depreciation.

Perhaps the greatest difficulty in this matter of depreciation follows from the fact that it does not represent an annual out-of-pocket expense. At the time the gin plant is acquired, its cost is very real. Ten, or fifteen,

Table 26.—Relation of Costs of Insurance and Taxes to Total Costs of Ginning

Area of State	Type of Power	Percentages							
		Cost[1]		Volume of Ginning (Bales)[2]					
		Fixed	Variable	500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	9.3	4.5	8.2	7.6	7.1	6.7	6.5	6.3
	Diesel	18.4	---	15.5	13.4	11.8	10.5	9.5	8.6
	Electric	22.0	---	16.3	12.9	10.7	9.1	8.0	7.1
High and Low Plains	Steam	14.7	3.6	12.6	11.2	10.2	9.4	8.8	8.3
	Diesel	12.3	3.4	11.0	10.1	9.3	8.7	8.3	7.9
	Electric	15.8	3.7	13.3	11.6	10.5	9.6	8.9	8.4
	Large	19.1	---	16.6	14.7	13.1	11.9	10.9	10.0
Gulf Coast	Diesel	13.0	3.5	11.2	10.0	9.1	8.4	7.9	7.4
	Electric	11.8	8.1	10.6	9.9	9.6	9.3	9.1	9.0

[1]Relation between fixed cost of insurance and taxes and total fixed cost at average investment; relation between variable cost of insurance and taxes and total variable cost.

[2]Volume of ginning of large gins double that of one-battery gins.

or twenty years later when extensive replacements of machinery have to be made, the cost of the replacements becomes very real. No one can deny the fact that in the long run, as machinery wears out, an out-of-pocket expense is involved. The theory of the yearly reserves set aside is that as replacements are needed, their cost may be met out of the reserve.

No one maintains that the rate of depreciation can be determined with absolute accuracy. At best, the rate applied is nothing more than an estimate. To make costs comparable, the same rate was applied to all gins whether depreciation was charged or not, or whether the rates were higher or lower than the uniform rate. The schedule of depreciation applied in this analysis is given in Appendix A.

The cost of depreciation is primarily fixed. The relation between the cost of depreciation at various volumes of ginning and total costs of ginning is shown in Table 27.

Table 27.—Relation of Depreciation to Total Costs of Ginning

Area of State	Type of Power	Percentages					
		Volume of Ginning (Bales)[1]					
		500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	24.2	19.9	16.9	14.7	13.1	11.7
	Diesel	24.8	21.2	18.4	16.2	14.4	13.0
	Electric	22.7	18.2	15.3	13.2	11.6	10.4
High and Low Plains	Steam	26.2	22.2	19.4	17.1	15.4	14.0
	Diesel	30.2	26.5	23.5	21.2	19.3	17.7
	Electric	29.1	24.0	20.5	17.8	15.8	14.2
	Large	28.0	24.6	22.0	19.8	18.0	16.5
Gulf Coast	Diesel	30.4	25.6	22.1	19.5	17.4	15.7
	Electric	27.9	21.0	16.9	14.2	12.2	10.8

[1]Volume of ginning of large gins double that of single battery gins.

Cost of Management

The cost of management is principally the manager's salary. Practically all the gins studied had salaried managers. These managers were employed for periods of time from the length of the ginning season to the whole year. In most instances the managers were paid a straight salary. In a few instances, the manager received a bonus after a certain volume was ginned or a certain profit earned. The cost of management also included such travelling expenses as were allowed the manager. If directors were allowed a fee for serving on the board, such expense was charged to management. In the case of the line gins, the cost of supervision from the central office was allocated against cost of management of the gin units.

In the case of average cost of management, volume is a factor five times out of nine. Size of gin is a factor two times out of nine; investment is a factor five times out of nine. In two cases none of the three variables was found to be significant so the mean was accepted as the estimated average cost.

The relation between the fixed and variable costs of management to total fixed and variable costs and between total cost of management at various volumes and total costs of ginning is shown in Table 28.

Table 28.—Relation of Cost of Management to Total Costs of Ginning

Area of State	Type of Power	Percentages							
		Cost[1]		Volume of Ginning (Bales)[2]					
		Fixed	Variable	500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	16.8	21.9	18.0	18.8	19.3	19.7	20.0	20.2
	Diesel	28.1	----	24.8	22.4	20.6	19.1	18.0	17.0
	Electric	33.8	----	26.4	22.0	19.1	17.0	15.5	14.3
High and Low Plains	Steam	19.9	6.7	17.4	15.7	14.4	13.5	12.8	12.2
	Diesel	18.6	8.0	17.1	16.0	15.1	14.4	13.9	13.4
	Electric	25.8	----	21.3	18.3	16.2	14.7	13.5	12.5
	Large	16.4	2.9	14.6	13.2	12.1	11.2	10.5	9.9
Gulf Coast	Diesel	22.7	11.1	20.5	18.9	17.8	17.0	16.3	15.8
	Electric	35.2	----	22.4	16.6	13.2	10.9	9.3	8.1

[1]Relation between fixed cost of management and total fixed cost at average investment; relation between variable cost of management and total variable cost.

[2]Volume of ginning of large gins double that of one-battery gins.

Miscellaneous Costs

Some of the gin managers carry expenses under 18 to 20 items. In such cases items like supplies and tools, auditing and legal, telephone and telegraph, office supplies, and advertising and donations were included in miscellaneous costs.

Difference in miscellaneous costs among ginners may be quite as much a reflection of the freedom with which they throw costs into this item as of relative efficiency with which they operate the gin plants.

The relation between the fixed and variable costs of the miscellaneous items to total fixed and variable costs and between total miscellaneous costs at various volumes and total costs of ginning is shown in Table 29.

Table 29.—Relation of Miscellaneous Costs to Total Costs of Ginning

Area of State	Type of Power	Percentages							
		Cost[1]		Volume of Ginning (Bales)[2]					
		Fixed	Variable	500	1,000	1,500	2,000	2,500	3,000
Blackland	Steam	4.4	10.1	5.7	6.6	7.1	7.6	7.9	8.2
	Diesel	5.1	8.0	5.6	5.9	6.2	6.4	6.6	6.7
	Electric	5.7	5.9	5.8	5.8	5.9	5.9	5.9	5.9
High and Low Plains	Steam	2.4	16.9	5.1	6.9	8.3	9.3	10.1	10.8
	Diesel	7.9	7.4	7.8	7.7	7.7	7.7	7.6	7.6
	Electric	2.4	11.2	4.2	5.4	6.3	6.9	7.4	7.8
	Large	7.5	8.6	7.6	7.8	7.9	8.0	8.0	8.1
Gulf Coast	Diesel	6.8	12.1	7 8	8.6	9.1	9.5	9.8	10.0
	Electric	---	13.5	5.5	8.6	10.4	11.6	12.4	13.1

[1]Relation between fixed cost of miscellaneous items and total fixed cost at average investment; relation between variable cost of miscellaneous items and total variable cost.

[2]Volume of ginning of large gins double that of one-battery gins.

NET PROFITS OF GINNING

The ginner is interested in earning a net profit. His cost of ginning is a barrier, so to speak, across his flow of gin income. The height and width of the barrier depend upon the ginner's relative efficiency of operation, investment in the gin plant, and volume of ginning. The volume of the flow of gin income depends upon the number of bales ginned and the gin income per bale. Only as the flow of gin income be great enough to overflow the barrier of cost is there any possibility of a net profit.

With implements for estimating costs at hand, one stands on the threshold of the realm of profits with the necessary equipment for exploring this phase of the ginning business. The transition from costs to profits may be made through the equation:

$$\text{Gin Income} = \text{Cost of Ginning} \pm \text{Profit}$$

The typical gin business has three kinds of costs and incomes. The costs are those of: the operation of the gin plant; the purchase of bagging and ties; and the purchase of cottonseed from the patrons. The incomes are those derived from: the gin toll; the sale of bagging and ties to patrons; and the sale of the cottonseed. Three terms need to be defined.

Ginning profit is the difference between the cost of operating the gin plant and the gin toll.

Gin income is the gin toll plus the net profits on bagging and ties and cottonseed. The gin income per bale is the total gin income divided by the number of bales ginned. Profit, or loss, on sideline business and on lint cotton purchased may be reduced to a per bale basis and the gin income per bale adjusted accordingly.

Net gin income is the difference between the gin income and the cost of operating the gin plant.

Ginning profit is very sensitive to volume of ginning. At a low volume heavy losses may result; as volume increases the losses diminish until the break-even point is reached; as volume increases beyond this point, profits increase markedly. Volume of ginning does not have this same effect on profits on patterns and cottonseed. The ginner may get some concession in price on patterns purchased in large lots; he may get a somewhat higher price from the oil mill for a large volume of cottonseed. But these differences are of minor importance in the net profit per pattern and per ton of cottonseed. If the profits of the gin business were computed from the gross incomes from tolls, patterns and cottonseed, then cost deductions would be the totals of the ginning cost and the costs of patterns and cottonseed. This approach is cumbersome. To avoid unnecessary complications, total gin income as defined in this discussion is the sum of the gin toll and the net profits on patterns and cottonseed.

The equation above may be reduced to workable form by applying it to a specific case as a Diesel gin with an investment of $20,000 in the Blackland Area. The average gin income per bale in that area over a period of years was $5.20. If V represents the volume of ginning, then $5.20V expresses the gin income. This may be substituted for Gin Income in the equation. The estimating equation for Diesel gins in the Blackland Area may be substituted for Cost of Ginning in the equation. Through these substitutions, the equation becomes:

$$\$5.20V = \$2,198 + (\$0.0887 \times 20,000) + \$1.37V \pm \text{Profit}$$

The equation in this form may be simplified to read:

$$\$5.20V = \$3,972 + \$1.37V \pm \text{Profit}$$

By subtracting $1.37V from both sides, the equation becomes:

$$\$3.83V = \$3,972 \pm \text{Profit}$$

In dividing both sides of the equation by $3.83, the equation takes this form:

$$V = \frac{\$3,972 \pm \text{Profit}}{\$3.83}$$

Since the $3,972 is the fixed cost of a Diesel gin with an investment of $20,000 in the Blackland Area, and since the $3.83 is the gin income per bale less the variable cost of Diesel gins in the area, the equation in its final form above may be stated thus:

$$\text{Volume of Ginning} = \frac{\text{Fixed Cost} \pm \text{Profit}}{\text{Gin Income Per Bale} - \text{Variable Cost Per Bale}}$$

That net profits have their origin in the part of the gin income remaining after the variable cost has been deducted is illustrated on a per bale basis in Figure 6. This figure is based on a steam gin with an investment of $25,000 in the High and Low Plains Area. The marked

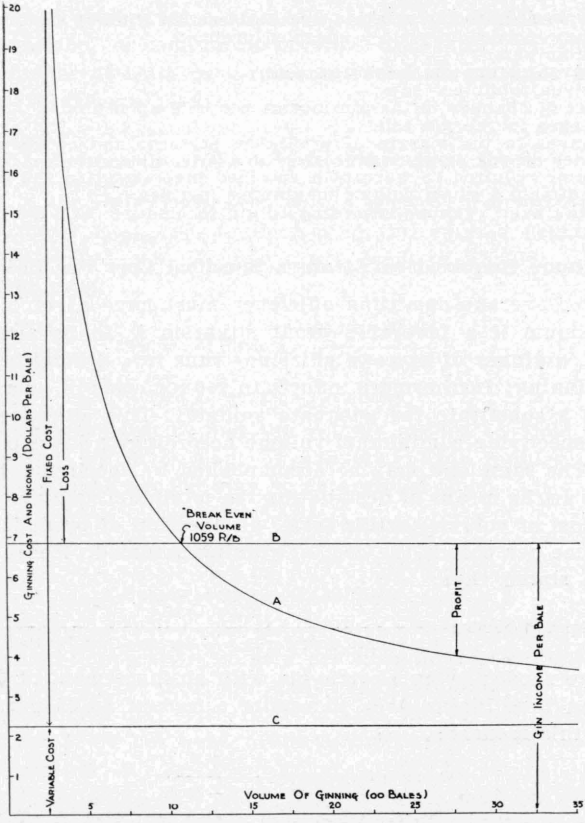

Fig. 6.—Cost and profit per bale. Curve A, cost of ginning. Line B, gin income. Line C, variable cost measured from O-Cost Income Axis. Area between Curve A and Line C measures fixed cost of ginning. Areas between Curve A and Line B measure loss at volume less than 1,059 bales, and net profit at volume greater than 1,059 bales.

decrease in fixed costs per bale through small increases in volume of ginning in the lower volume range is strikingly illustrated in this figure. It should be apparent from Figure 6 that profits occur only as the volume of ginning becomes great enough to reduce the fixed cost per bale to less than the remainder of the gin income per bale after the variable cost has been deducted.

The point was made earlier in this discussion that fixed costs were an aid in explaining the relation between volume and cost of ginning. The division of costs of ginning into fixed and variable is indispensable in explaining the relations among ginning cost, gin income, and net profit.

USES OF VOLUME EQUATION

The equation for determining volume of ginning given above is useful in solving many problems involving relations among cost, gin income, and profit. The more important of these problems are:

1. the volume required to attain a specified cost of ginning per bale;
2. the volume needed to yield a specified profit,
   a. a lump sum.
   b. a given return on the investment,
   c. a given profit per bale;
3. the effect of changes in the gin income per bale upon profits,
   a. changes in the gin toll,
   b. changes in the margin of profits on patterns and cottonseed,
   c. ginner buying of patrons' cotton at a price above the market;
4. the volume required to warrant a specified investment in the gin plant;
5. the investment a given volume of ginning justifies; and
6. the "break even" volume according to gin income per bale and investment in the gin plant.

Volume Required to Attain a Specified Cost Per Bale

A ginner of average operating efficiency must have a volume above a certain minimum if a favorable profit situation is to be attained. In other words, a ginner of average efficiency runs into difficulties at a low volume of ginning; furthermore, efforts to reduce costs of operation help but little as a substitute for adequate volume. This situation suggests the need of specifying a minimum volume according to investment in the gin plant. The same end may be accomplished by specifying a standard cost per bale as the means of designating the minimum volume of ginning.

In a problem of volume in this form, no question of profit is involved. The gin income per bale is the cost of ginning assumed. Hence the equation may be stated thus:

$$\text{Volume of Ginning} = \frac{\text{Fixed Cost}}{\text{Assumed Cost Per Bale} - \text{Variable Cost Per Bale}}$$

The volume needed by an electric gin with an investment of $27,500 in the High and Low Plains Area to realize a cost of $4.25 per bale may be found in this manner:

$$\text{Volume of Ginning} = \frac{\$4{,}613^{1}}{\$4.25 - \$2.42}$$

Volume of Ginning=2,521 Bales

Check

Type of Cost		Cost
Fixed ($27,000)	$4,557	
Investment ($500)	56	
Total		$ 4,613
Variable		
2,500 Bales	$6,050	
21 Bales	51	
Total		$ 6,101
Total		$10,714

$10,714 ÷ 2,521 = $4.25

It seems reasonable to assume that costs are satisfactory if the influences of volume of ginning and operating efficiency are such that costs per bale are $3.75, or less, in the Blackland Area; $4.25, or less, in the

[1]Fixed costs according to investments in gin plants may be found in Tables **37, 38, 39,** and **40.** Variable costs listed for 100 bales in these same tables may be reduced to variable costs per bale by pointing off two places.

High and Low Plains Area; and $4.00, or less, in the Gulf Coast Area. With the equation for volume of ginning, tables may be constructed to show the number of bales required at given costs per bale according to investments in the gin plants.

Volume Needed to Yield a Specified Profit

A ginner in the Gulf Coast Area with a Diesel gin involving an investment of $26,000 may wish to determine the volume needed at a gin income of $6.25 per bale to yield a net profit of $3,000. His problem may be solved thus:

$$\text{Volume of Ginning} = \frac{\$4{,}199 + \$3{,}000}{\$6.25 - \$1.99}$$

$$\text{Volume of Ginning} = 1{,}690 \text{ Bales}$$

This ginner may wish to find the volume needed to yield a return of 15 per cent on his investment of $26,000. This requires a profit of $3,900. The volume needed may be determined thus:

$$\text{Volume of Ginning} = \frac{\$4{,}199 + \$3{,}900}{\$6.25 - \$1.99}$$

$$\text{Volume of Ginning} = 1{,}901 \text{ Bales}$$

Private ginners are interested in profits as a yield on the investment in the gin plant. Cooperative ginners are also interested in this view of profits while paying for their gin plant out of profits.

This same ginner may wish to determine the volume needed to yield a net profit of $2.00 per bale. It should be evident that to earn a net profit of $2.00 per bale on a gin income of $6.25 per bale, the cost of ginning must be $4.25 per bale. This problem may be solved in this manner:

$$\text{Volume of Ginning} = \frac{\$4{,}199}{\$6.25 - (\$1.99 + \$2.00)}$$

$$\text{Volume of Ginning} = 1{,}858 \text{ Bales}$$

Cooperative ginners may be particularly interested in profits on a per bale basis when profits are available for distribution as patronage dividends.

Effect of Changes in Gin Income Per Bale

The gin income per bale may vary as a result of changes in the gin toll and changes in the net profits on patterns and cottonseed. A change of five cents per cwt. of seed cotton means a difference of about 76 cents per bale in the Blackland Area; about 95 cents in the High and Low Plains Area; and about 73 cents in the Gulf Coast Area. If ginners were to pay oil mill prices for cottonseed purchased from members and if they were to sell patterns at cost, the gin income per bale would be reduced as much as 50 cents to more than one dollar per bale.

The results of a reduction in the gin income per bale may be considered from two angles; (1) the effect on net profits with volume remaining the same; and (2) the increase in volume of ginning needed to maintain the same profits. If the ginner who earned a profit of $3,716 on 1,858 bales had reduced his gin income by $1.00 per bale, his net profit would have dropped to $1,858.

The second phase of the problem, the volume needed to earn the same profit, may be solved in this manner:

$$\text{Volume of Ginning} = \frac{\$4{,}199 + \$3{,}716}{\$6.25 - (\$1.99 + \$1.00)}$$

$$\text{Volume of Ginning} = 2{,}428 \text{ Bales}$$

Thus in reducing the gin income by $1.00 per bale, to earn the same net profit, this ginner would have to increase his volume of ginning from 1,858 to 2,428 bales, an increase of 31 per cent.

Ginner Buying of Cotton

Ginner buying of cotton has become so prevalent in many sections of Texas as to merit special attention. It seems that ginner buying was started as a means of increasing the volume of ginning by paying a price for the cotton above the market. The inducement bidding for greater patronage is the reduction in the ginning charge equivalent to the amount of the overpayment. The ginner thus surrenders a part of his gin income per bale. His reason for doing this is on the theory that the resulting increase in volume reduces the cost of ginning per bale sufficiently so as to afford, in the end, an increased profit.

If only one ginner in a community buys cotton above the market, he could, no doubt, increase his volume of ginning. His competitors would suffer a shrinkage in their volume of ginning. It can scarcely be expected that they would remain indifferent. In reality, these ginners would be faced with the alternative of either refusing to overpay for cotton or to overpay for cotton by about the same amount as the ginner who started the practice. These ginners would be called upon to weigh the effects of the probable drop in volume against the losses suffered in the attempt to maintain the normal volume.

A ginner in the High and Low Plains Area has a Diesel gin with an investment of $30,000. He has a normal volume of 2,000 bales which with a gin income of $6.75 per bale earns him a net profit of $4,646. He wishes to increase his volume by paying $1.50 per bale above the market for his patrons' cotton. The question is, How much must he raise his volume in order to increase his profits? The solution to his problem may be found thus:

$$\text{Volume of Ginning} = \frac{\$5{,}333 + \$4{,}646}{\$6.75 - (\$1.76 + \$1.50)}$$

$$\text{Volume of Ginning} = 2{,}859 \text{ Bales}$$

The volume of 2,859 bales is greater by 43 per cent than a volume of 2,000 bales. If this ginner overpays by $1.50 per bale in order to increase his volume so as to reduce the cost of ginning per bale, he suffers financial loss provided he does not increase his volume by 43 per cent or more.

The problem as to the necessary increase in volume to gain the same profit is shown graphically in Figure 7. In this case the overpayment of $1.50 per bale is considered as an out-of-pocket cost added to the total cost of ginning. The overpayment has two results: (1) The "break even" volume is increased by 459 bales (1,528 — 1,069). (2) The net profit on the "profit" volume is reduced by $1.50 per bale. Hence the number of "profit" bales must be increased by 400 bales (1,331 — 931) to yield the same net profit. These added bales, 459 and 400, account for the increase in volume from 2,000 to 2,859 bales.

Attention may now be given to the ginner who overpays by $1.50 per bale in order to maintain his volume at 2,000 bales. The question may be raised, what reduction in volume could this ginner take and still earn the same profit as at a volume of 2,000 bales maintained through overpaying by $1.50 per bale? At a volume of 2,000 bales, an overpayment of $1.50 a bale reduces the net profit by $3,000. Thus the net profit of $4,646 shrinks to $1,646. The number of bales required to earn this profit at the regular gin income and with no losses on cotton buying may be determined thus:

$$\text{Volume of Ginning} = \frac{\$5,333 + \$1,646}{\$6.75 - \$1.76}$$

$$\text{Volume of Ginning} = 1,399 \text{ Bales}$$

In refusing to overpay by $1.50 per bale, this ginner would earn greater profits provided he could maintain his ginning at a volume greater than 1,399 bales.

The effect on the gin industry in the community of overpaying for cotton remains to be discussed. For the sake of simplicity, let it be supposed that a gin point has two ginners, each with a Diesel plant with the same investment, $30,000, and each ginner with a normal volume of 2,000 bales. The gin income per bale assumed is $6.75. The one ginner in overpaying by $1.50 a bale attains a volume of 2,859 bales. His net profit would be $4,646. The other ginner would be restricted to a volume of 1,141 bales. At a gin income of $6.75 his net profit on this volume would be $361. If the ginner who did not overpay attained a volume of 1,399 bales, his net profit would be $1,646. The volume of the other ginner would be restricted to 2,601 bales. At this volume with a gin income of $6.75 per bale and an overpayment of $1.50 per bale this ginner would earn a net profit of $3,744. In either case, a most unstable situation would obtain. Under actual conditions, the chances are that both ginners would overpay by $1.50, thereby maintaining their

volumes at 2,000 bales. The net result to each ginner would be a reduction in net profit from $4,646 to $1,646. Cotton growers would get ginning service at $5.25 per bale instead of $6.75.

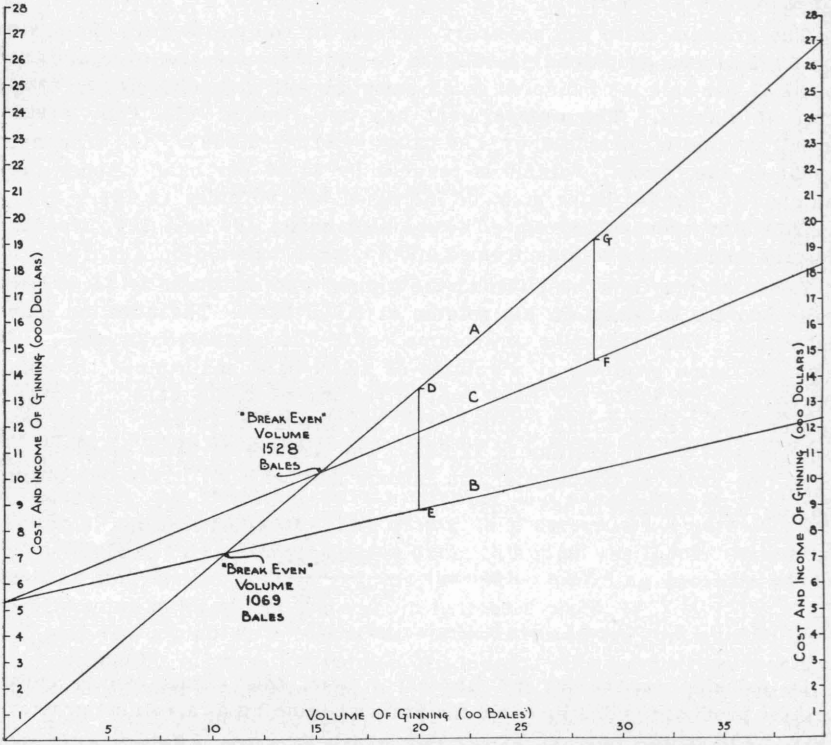

Fig. 7.—Effect of ginner buying of cotton at a price of $1.50 per bale above the market. Line A, total gin income at $6.75 per bale. Line B, total cost of ginning of a $30,000 Diesel gin in the High and Low Plains Area. Area within limits of Lines A and B, total net profit at volume greater than 1,069 bales, and total net loss at volume less than 1,069 bales. The "profit" volume of 2,000 bales is 2,000 — 1,069, or 931 bales. The profit per bale on the "profit" volume is $6.75 — $1.76, or $4.99. Thus the net profit DE is 931 × $4.99, or $4,646. Area within limits of Lines B and C, the total loss on cotton buying to the ginner who buys all the cotton ginned at a price of $1.50 per bale above the market. Hence any point on Line C measures the total of ginning cost and cotton loss at that specific volume of ginning. Area within the limits of Lines A and C, total net profit at a volume greater than 1,528 bales, and the total net loss at a volume less than 1,528 bales. The profit per bale of the "profit" volume of the ginner who overpays by $1.50 per bale is $6.75 — ($1.76 + $1.50), or $3.49. The number of bales needed to yield a net profit of $4,646 is 4,646 ÷ 3.49, or 1,331. Hence the volume needed by the ginner who overpays by $1.50 per bale to earn the net profit GF of $4,646 is 1,528 + 1,331, or 2,859. The additional bales are accounted for by an additional 459 bales (1,528 — 1,069) in the "break even" volume and an additional 400 bales (1,331 — 931) in the "profit" volume.

If the gin income of $6.75 per bale is too high, would it not be better for the ginners to make the necessary adjustments through a lowering of the gin toll or a narrowing of the margins on patterns and cottonseed rather than through overpaying for cotton? At a gin income of $6.75 per bale, these ginners would realize a return of 15.5 per cent on their investment; at a gin income of $5.25 per bale, they would realize a return of 5.5 per cent on their investments.

Ginners condemn the practice of buying cotton at a price above the market. According to the above analysis, the ginner's attitude is well founded. Ginner buying has an undesirable aspect from the standpoint of the cotton growers. It tends to accentuate the evils of "hog round" buying. Certainly, if a ginner buys cotton to increase, or to maintain, his volume of ginning, he is going to avoid losing patrons by paying a lower price for the poorer quality of cotton.

Volume Required to Warrant a Specified Investment

A ginner entering the ginning business in Texas today may have the choice of constructing a new plant or of buying a secondhand one. An almost chronic over-expansion of ginning facilities in Texas coupled with the reduction in cotton production of recent years has jeopardized the profits of the ginning business. Consequently, many ginners are discouraged and wish to quit the business. One about to enter the ginning business is likely to find many opportunities of buying secondhand plants. This point may be illustrated from the experiences of cooperative gin associations. Data on this phase of the cooperatives have been obtained from 246 associations. The numbers of new and secondhand plants, by periods, are shown in Table 30.

Table 30.—Numbers of Texas Cooperative Gin Associations Constructing New Plants or Buying Secondhand Plants

Period	New Plants	Secondhand Plants	Total Plants	Percentage Secondhand
—1927	14	13	27	48
1928—1933	16	29	45	64
1934—1939	5	169	174	97
All	35	211	246	86

It is to be noted that cooperative gin associations have turned more and more to the purchase of secondhand plants as the means of providing themselves with ginning facilities. While data are not available as to the extent to which private ginners, independent and line, build new or purchase secondhand, the assumption seems safe that they too enter the ginning business largely through the purchase of secondhand plants.

Interest in Secondhand Plant

As a rule, ginners require financing on entering the business. In the case of the secondhand plant, at least three parties are directly con-

cerned in the value forming the basis of sale and purchase: the seller; the buyer; and the financing agency furnishing the buyer with funds. Naturally, the seller desires the highest price possible. He measures the price he can obtain against the probable profits if he continues in the business. The prospective buyer of a specific secondhand plant has a number of choices: he may choose not to enter the business unless he can purchase the plant below a certain maximum price; he may have the opportunity of purchasing some other secondhand plant; he may build a new plant. The concern of the leading agency is in the profit prospect of the buyer as the measure of his ability to pay interest and principal according to schedule. Seller, buyer, and banker should all be interested in any means which would aid in guaging more accurately the value of the secondhand plant.

The buyer of the secondhand plant is confronted with a situation requiring careful study and analysis. An appraisal by a disinterested third party may be made of the secondhand plant to arrive at its replacement value. This focuses attention on a choice between building a new plant or purchasing the secondhand plant in question. But an exceedingly important factor enters into the choice. If a new plant be built, one more competing gin unit is established bidding for the patronage at a point in which too many gins may already be operating. The net effect of an added new plant would be to lower the value of all gin plants in the vicinity in that a further division of the available volume of ginning would impair the earning power of all plants.

Value of Secondhand Plant

It does not follow that the appraised value of the secondhand plant is what the plant may be worth to the buyer. The profit possibilities of the ginning business in the specific locality should not be overlooked.

To arrive at the valuation of a secondhand plant, several factors are involved. The probable volume of ginning together with the cost of ginning at that volume is significant. The total gin income in terms of the probable gin income per bale and the volume of ginning is basic in any estimate of net profit. These same factors are basic to the ginner building a new plant in that they serve in judging the soundness of the investment made.

The purchase of the secondhand plant involves capitalization both by seller and buyer. The seller has his past ginning experience to guide his estimates of value. The buyer may acquire a part or all the patronage of the seller. The buyer may have in prospect a larger volume of business than that of the seller; this may be particularly true in case the buyer is a cooperative gin association. Under the latter circumstance, the buyer would be most reluctant to capitalize to the full this anticipated volume of business.

With the investment and gin income per bale known, one more matter is needed before the desired volume may be computed. A decision must

be made as to the profit expected, whether considered as a return on the investment or as the profit needed to pay for the gin plant in a specified number of years. An electric plant in the Blackland Area may be purchased for $10,000. A return of 12 per cent on the investment may be considered reasonable. Thus the needed profit is $1,200. The gin income per bale is $5.20. The solution as to the number of bales required is as follows:

$$\text{Volume of Ginning} = \frac{\$2,681 + \$1,200}{\$5.20 - \$2.05}$$

$$\text{Volume of Ginning} = 1,232 \text{ Bales}$$

To facilitate the determination of the volume needed with investment and gin income per bale given, a series of tables have been prepared. In Table 50, the gin incomes per bale less variable costs per bale are listed for gins according to section of the state and type of power. Gin incomes per bale are shown by 25-cent intervals from $4.00 to $8.00. With the gin income per bale, type of power, and section of the state known, the gin income per bale less the variable cost may be read directly in Table 50. Adjustments for gin incomes between the 25-cent intervals should occasion no difficulty.

Table 31 shows the profits needed to pay for gin plants according to investments in periods from five to ten years. Interest on the indebtedness was computed at the rate of 6 per cent. These payments, or needed profits, were not calculated on an amortization plan. To do so would be straining for accuracy in a situation which at best is based on estimates with possibilities of rather wide variations. The interest was computed in this manner. It was assumed that the loan has run for six months by the end of the first ginning season. It was further assumed that at the end of each season, including the first, proportionate payments are made on the principal sum. If interest rates be other than 6 per cent, adjustments may be made from the figures listed under "Interest at 1%" to the right in Table 31. If the interest be 8 per cent, the rate is 2 per cent higher than that used in the table. If the investment be $30,000, the additional sum, or profit, needed is 2 x $150, or $300.

Table 32 shows the rate of return needed on the investment to pay for the gin plant out of profits of operation from 3 to 15 years with interest on the indebtedness from 4 to 8 per cent.

Tables 37, 38, 39, and 40 give fixed costs according to section of the state, type of power, and investments in the gin plants. These fixed costs include both the investment and the residual costs. The adjustment costs given at the foot of the tables are investment costs only. Hence they may be added to or subtracted from the fixed costs listed in the table.

The use of these tables may be illustrated in this manner. A ginner may purchase a Diesel gin in the Blackland Area for $14,500. He applies

Table 31.—Profits Needed to Pay Principal and Interest According to Investment and Number of Years—Interest on Indebtedness at Rate of 6 Per Cent

Investment	Number of Years to Pay Out						Interest at 1 Per Cent
	5	6	7	8	9	10	
$ 250	$ 58	$ 49	$ 43	$ 39	$ 35	$ 33	----
500	115	98	86	78	71	65	----
750	173	148	130	116	106	98	----
1,000	230	197	173	155	141	130	5
2,000	460	393	346	310	282	260	10
3,000	690	590	519	465	423	390	15
4,000	920	787	692	620	564	520	20
5,000	1,150	983	864	775	706	650	25
6,000	1,380	1,180	1,037	930	847	780	30
7,000	1,610	1,377	1,210	1,085	988	910	35
8,000	1,840	1,573	1,383	1,240	1,129	1,040	40
9,000	2,070	1,770	1,556	1,395	1,270	1,170	45
10,000	2,300	1,967	1,728	1,550	1,411	1,300	50
11,000	2,530	2,163	1,901	1,705	1,552	1,430	55
12,000	2,760	2,360	2,074	1,860	1,693	1,560	60
13,000	2,990	2,557	2,247	2,015	1,834	1,690	65
14,000	3,220	2,753	2,420	2,170	1,976	1,820	70
15,000	3,450	2,950	2,593	2,325	2,117	1,950	75
16,000	3,680	3,147	2,766	2,480	2,258	2,080	80
17,000	3,910	3,343	2,939	2,635	2,399	2,210	85
18,000	4,140	3,540	3,111	2,790	2,540	2,340	90
19,000	4,370	3,737	3,284	2,945	2,681	2,470	95
20,000	4,600	3,933	3,457	3,100	2,822	2,600	100
21,000	4,830	4,130	3,630	3,255	2,963	2,730	105
22,000	5,060	4,327	3,803	3,410	3,104	2,860	110
23,000	5,290	4,523	3,976	3,565	3,246	2,990	115
24,000	5,520	4,720	4,149	3,720	3,387	3,120	120
25,000	5,750	4,917	4,322	3,875	3,528	3,250	125
26,000	5,980	5,113	4,494	4,030	3,669	3,380	130
27,000	6,210	5,310	4,667	4,185	3,810	3,510	135
28,000	6,440	5,507	4,840	4,340	3,951	3,640	140
29,000	6,670	5,703	5,013	4,495	4,092	3,770	145
30,000	6,900	5,900	5,186	4,650	4,233	3,900	150
31,000	7,130	6,057	5,359	4,805	4,374	4,030	155
32,000	7,360	6,293	5,532	4,960	4,516	4,160	160
33,000	7,590	6,490	5,705	5,115	4,657	4,290	165
34,000	7,820	6,687	5,877	5,270	4,798	4,420	170
35,000	8,050	6,883	6,050	5,425	4,939	4,550	175
36,000	8,280	7,080	6,223	5,580	5,080	4,680	180
37,000	8,510	7,277	6,396	5,735	5,221	4,810	185
38,000	8,740	7,473	6,569	5,890	5,362	4,940	190
39,000	8,970	7,670	6,472	6,045	5,503	5,070	195
40,000	9,200	7,867	6,915	6,200	5,644	5,200	200
50,000	11,500	9,834	8,642	7,750	7,056	6,500	250
60,000	13,800	11,800	10,371	9,300	8,469	7,800	300
70,000	16,100	13,767	12,100	10,850	9,882	9,100	350
80,000	18,400	15,733	13,818	12,400	11,294	10,400	400
90,000	20,700	17,700	15,557	13,950	12,707	11,700	450
100,000	23,000	19,667	17,284	15,500	14,112	13,000	500

for a loan. The banker wishes to know his profit prospects. The gin income per bale is $5.25 in the area. The banker proposes to charge 8 per cent on the loan. In order to determine the needed volume, three factors must be ascertained: the fixed cost; the profit needed; and the gin income less the variable cost per bale.

The fixed cost may be found in Table 37. The fixed cost on $14,000 is $3,440; the investment cost on $500 is $44; thus the total fixed cost is $3,484.

Table 32.—Rate of Returns on Investment in Gin Plant as Related to Number of Years in Paying Out Investment and Rate of Interest on Indebtedness

Number of Years	Rate of Interest				
	4	5	6	7	8
3	35.3%	35.8%	36.3%	36.8%	37.3%
4	27.0	27.5	28.0	28.5	29.0
5	22.0	22.5	23.0	23.5	24.0
6	18.7	19.2	19.7	20.2	20.7
7	16.3	16.8	17.3	17.8	18.3
8	14.5	15.0	15.5	16.0	16.5
9	13.1	13.6	14.1	14.6	15.1
10	12.0	12.5	13.0	13.5	14.0
11	11.1	11.6	12.1	12.6	13.1
12	10.3	10.8	11.3	11.8	12.3
13	9.7	10.2	10.7	11.2	11.7
14	9.1	9.6	10.1	10.6	11.1
15	8.7	9.2	9.7	10.2	10.7

The profit needed to pay out in eight years may be found in Table 31. The profit may be tabulated thus:

Investment	Profit
$14,000	$2,170
500	78
2% Interest	
$14,000	140
500	5
Total Profit	$2,393

The gin income per bale less the variable cost is found in Table 50. This item it $3.88.

The volume needed is computed thus:

$$\text{Volume of Ginning} = \frac{\$3,484 + \$2,393}{\$3.88}$$

$$\text{Volume of Ginning} = 1,515 \text{ Bales}$$

If this ginner is conservative as to the outlook of the future, he may wish to examine the effects of a drop in the gin income per bale. A drop of 50 cents a bale would have this effect on the volume of ginning needed:

$$\text{Volume of Ginning} = \frac{\$3,484 + \$2,393}{\$3.38}$$

$$\text{Volume of Ginning} = 1,739 \text{ Bales}$$

Investment a Given Volume of Ginning Justifies

A ginner in the Blackland Area has the assurance of 1,800 bales. He wishes to know what he can afford to pay for a steam plant. The gin income per bale is $5.20. According to Table 50, this income less the variable cost is $3.42. The equation for volume of ginning gives this result:

$$1,800 = \frac{\text{Fixed Cost} + \text{Profit}}{\$3.42}$$

$$\$6,156 = \text{Fixed Cost} + \text{Profit}$$

As a means of disentangling this combination of fixed cost and profit, Table 33 has been prepared. In this table the fixed cost of a $6,000

Table 33.—Totals of Profits According to the Number of Years to Pay Out With Interest at 6 Per Cent and Fixed Costs According to Investments Steam Power—Blackland Area, 1930-1938

Investment	Number of Years to Pay Out						Investment
	5	6	7	8	9	10	
$ 6,000	$ 3,668	$ 3,468	$3,325	$3,218	$3,135	$3,068	$6,000
7,000	3,991	3,758	3,591	3,466	3,369	3,291	7,000
8,000	4,314	4,047	3,857	3,714	3,603	3,514	8,000
9,000	4,637	4,337	4,123	3,962	3,837	3,737	9,000
10,000	4,960	4,627	4,389	4,210	4,071	3,960	10,000
11,000	5,283	4,916	4,654	4,458	4,305	4,183	11,000
12,000	5,605	5,206	4,920	4,706	4,539	4,406	12,000
13,000	5,929	5,496	5,186	4,954	4,774	4,629	13,000
14,000	6,252	5,785	5,452	5,202	5,008	4,852	14,000
15,000	6,575	6,075	5,718	5,450	5,242	5,075	15,000
16,000	6,898	6,365	5,984	5,698	5,476	5,298	16,000
17,000	7,221	6,654	6,250	5,946	5,710	5,521	17,000
18,000	7,544	6,944	6,516	6,194	5,944	5,744	18,000
19,000	7,867	7,234	6,781	6,442	6,178	5,967	19,000
20,000	8,190	7,523	7,047	6,690	6,412	6,190	20,000
21,000	8,513	7,813	7,313	6,938	6,646	6,413	21,000
22,000	8,836	8,103	7,579	7,186	6,880	6,636	22,000
23,000	9,159	8,392	7,845	7,434	7,114	6,859	23,000
24,000	9,482	8,682	8,111	7,682	7,348	7,082	24,000
25,000	9,805	8,972	8,377	7,930	7,583	7,305	25,000
26,000	10,128	9,261	8,643	8,178	7,817	7,528	26,000
27,000	10,451	9,551	8,908	8,426	8,051	7,751	27,000
28,000	10,774	9,841	9,174	8,674	8,285	7,974	28,000
29,000	11,097	10,130	9,440	8,922	8,519	8,197	29,000
30,000	11,420	10,420	9,706	9,170	8,753	8,420	30,000
100	32	29	27	25	23	22	100
200	65	58	53	50	47	45	200
300	97	87	80	74	70	67	300
400	129	116	106	99	94	89	400
500	162	145	133	124	117	112	500
600	194	174	160	149	140	134	600
700	226	203	186	174	164	156	700
800	258	232	213	198	187	178	800
900	291	261	239	223	211	201	900
1,000	323	290	266	248	234	223	1,000

steam gin in the Blackland Area was added to the annual profits needed to pay out $6,000 in 5 to 10 years, with interest on the indebtedness at the rate of 6 per cent. This was also done for investments greater than $6,000 by $1,000 intervals up to $30,000. At the bottom of the table are given the totals of profits and fixed costs for investments by $100 intervals from $100 to $1,000. These totals facilitate adjustments for investments between the $1,000 intervals.

Attention may now be directed to the equation above. According to Table 33, a total of fixed cost and profit of $6,156 indicates an investment somewhat greater than $13,000 if to be paid out in 5 years. The difference between $6,156 and $5,929, the total of fixed cost and profit at $13,000, is $227. According to the adjustment values at the bottom of the table, this indicates an added investment of about $700. Thus the total investment indicated is about $13,700. If the investment is to

be paid out in six years, an investment somewhat greater than $15,000 is indicated. The difference between $6,156 and $6,075 is $81. This indicates an added investment of about $300. Thus the total investment to be paid out in 6 years is about $15,300. If the investment is to be paid out in ten years, an investment greater than $19,000 is indicated. The difference between $6,156 and $5,967 is $189. This indicates an added investment of about $800. Thus the total investment to be paid out in ten years is about $19,800.

Net profits of steam gins in the Blackland Area with a volume of 1,800 bales, a gin income of $5.20 per bale, and investments of $13,700, $15,300, and $19,800 are $3,152, $3,003 and $2,585. According to Table 31, the profit needed to pay out an investment of $13,700 in five years is $3,151; to pay out $15,300 in six years, $3,009; and to pay out $19,800 in ten years, $2,574.

Bankers and ginners interested in this aspect of ginning profits can construct tables similar to Table 33 for the other groups of gins according to type of power and section of the state.

"Break Even" Volume According to Gin Income and Investment

At the "break even" volume, gin income and cost of ginning are identical. Hence in determining this volume, the gin income per bale and the cost of ginning are involved. There is no question of profit.

The volume needed to break even by an electric gin with an investment of $12,000 in the Blackland Area and a gin income of $5.20 per bale may be ascertained thus:

$$\text{Volume of Ginning} = \frac{\$2{,}799}{\$5.20 - \$2.05}$$

$$\text{Volume of Ginning} = 889 \text{ Bales}$$

The example above illustrates the manner in which Tables 51 to 59 were compiled. In each instance, the fixed cost according to section of the state, type of power, and investment was divided by the gin income per bale less the appropriate variable cost per bale.

"Break Even" and "Profit" Volumes

The volume of a gin operating at a profit may be divided into two units—the "break even" volume and the "profit" volume. The "break even" volume takes care of all the fixed cost of ginning and of all the variable cost on this volume. Consequently, the gin income on the "profit" volume is divided two ways between the variable cost and profit. The behavior of the "break even" and "profit" volumes on a per bale basis is illustrated in Figure 8.

A study of Figure 8 may raise the question: Might it not be expedient for a ginner, from the profit standpoint, to lower his ginning charge after

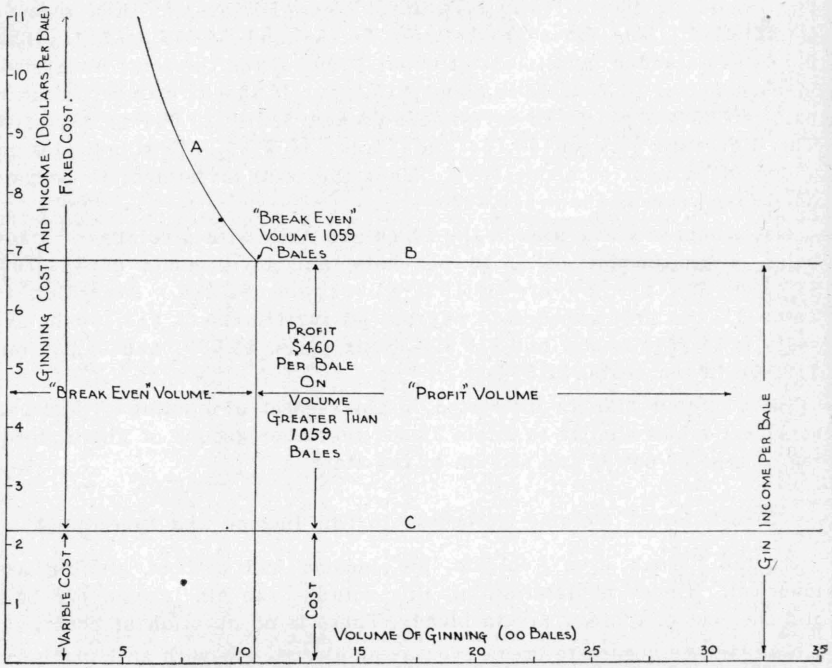

Fig. 8.—Graphical Representation of "Break Even" and "Profit" Volume on a Per Bale Basis.

Curve A, cost of ginning per bale on the "break even" volume. Line B, gin income of $6.85 per bale. Line C, variable cost of $2.25 per bale. At the "break even" volume of 1,059 bales, the fixed cost per bale is $6.85 — $2.25, or $4.60. Thus the total fixed cost is 1,059 × $4.60, or $4,871. This is the fixed cost of a $25,000 steam gin in the High and Low Plains Area. At the "break even" volume, the total variable cost is 1,059 $2.25, or $2,383. The total of the fixed and variable costs is $7,254. This is the total cost of ginning 1,059 bales of a $25,000 steam gin in the High and Low Plains Area.

Thus if the "break even" volume be considered as a unit of ginning and the "profit" volume as a second unit, the added cost on the "profit" unit is the variable cost. Thus it should be clear on the "profit" unit that the gin income per bale is divided between the variable cost per bale and net profit per bale.

the "break even" volume had been ginned in order to attract a larger volume of "profit" bales? Suppose there are two steam plants at a gin point in the High and Low Plains Area. Each gin represents an investment of $25,000 and each ginner has a volume of 1,500 bales. The gin income per bale is $6.85. Assuming that these gins operate at average efficiency, this volume would yield each ginner a net profit of $2,028.

One of the ginners, after he had a volume of 1,000 bales, is convinced that he can increase his volume to 1,750 bales by reducing the gin charge

by one dollar per bale. Three questions present themselves. What volume must this ginner attain to make the same profit in reducing the gin charge by $1.00 per bale at a volume above 1,000 bales as on 1,500 bales without a reduction in the gin charge? How much would he gain if he attained a volume of 1,750 bales? How would the profits of the second ginner be affected?

A volume of 1,000 bales leaves a loss of $272. The profit per bale of the "profit" volume, with the reduction of $1.00 per bale, would be $3.60. The volume above 1,000 bales would have to earn a profit of $2,028 + $272, or $2,300, to yield the same profit as the 1,500 bales without a reduction in the gin charge per bale. The added bales needed may be found thus:

$$2,300 \div 3.60 = 639$$

Thus the necessary volume is 1,000 + 639, or 1,639 bales.

Check

Type of Cost	Cost	Gin Income	
Fixed (Investment, $25,000)	$4,872	1,000 Bales @ $6.85	$ 6,850
Variable (Volume, 1,639 Bales)	3,688	639 Bales @ $5.85	3,738
Total	$8,560	Total Gin Income	$10,588

The net profit is $10,588 less $8,560, or $2,028.

If this ginner attained a volume of 1,639 bales, his profit would remain the same. The second ginner, however, would have lost 139 "profit" bales, or a loss of $639. Thus his net profit would shrink from $2,028 to $1,389.

If the first ginner attained a volume of 1,750 bales, the volume beyond 1,639 bales would earn an added profit of $3.60 × 111, or $400. His total net profit would be $2,028 + $400, or $2,428. Under such circumstances, the normal "profit" volume of 441 bales of the second ginner would shrink by 250 bales to 191 bales. His net profit would be $4.60 × 191, or $879.

Under circumstances obtaining at the local gin points, there is not the slightest likelihood that a ginner may use the "two price" system while his competitor maintains regular charges. The gin patrons are many in numbers. Usually no one patron has a large volume in terms of the volume requirements of a successful gin. The first ginner in approaching the patrons of the second ginner with the proposal of a dollar cut in gin charges as the inducement to win their patronage could not possibly prevent the other ginner from learning about the price cutting.. The chances are that the second ginner would retaliate with a similar price cut. Then the two ginners would dissipate the profits of their "profit" volumes.

PROFIT STATUS OF GIN INDUSTRY IN TEXAS

An analysis of costs and profits of ginning in Texas should make possible an evaluation of the present profit status of the industry. To reduce cost and profit of ginning to the basis of an average gin for the

state is a case of over-simplification. But such an average viewed as an index on general conditions may serve useful purposes.

From the equations for estimating average total costs of ginning according to section of the state and type of power, a weighted equation was derived for the state as a whole. This equation is:

$$\text{Average State Cost} = \$2{,}035 + \$0.0879I + \$1.91V$$

The average gin income for the state for the period 1930-31 to 1938-39 was about $5.95 per bale. The average investment of gin plants in machinery, buildings, office equipment, and other fixed assets, excepting land, is about $18,848. Cotton production in Texas was 2,858,525 bales in 1939 and the number of gins was 3,332. Hence the average volume per gin that year was 858 bales. If the liberty be taken of speaking of the average gin in Texas, this was the way it fared in 1939:

Gin Income $5.95×858			$5,105
Cost			
Fixed			
Residual	$2,035		
Investment $0.0879×18,848	1,657		
Total		$3,692	
Variable $1.91×858		1,639	
Total			5,331
Net Loss			$ 226

It seems safe to assume that no industry can continue, without considerable adjustment, with more than one-half the business concerns operating at a loss. The general profit status of the industry is of great significance in any policy which may be adopted for the purpose of improving the ginning business.

It may be of interest to consider the effects on the Texas gin industry of an average crop of 3,000,000 bales per season and of an average crop of 4,500,000 bales. For the number of gins in 1939, these crops would give average volumes of 900 and 1,350 bales. For the average gin, the costs of ginning, gin incomes, and net profits would be as follows:

	3,000,000 Bale Crop		4,500,000 Bale Crop	
Gin Incomes	$5.95×900	$5,355	$5.95×1,350	$8,033
Costs				
Fixed	$3,692		$3,692	
Variable	1,719		2,579	
Total		5,411		6,271
Net	Loss	$ 56	Profit	$1,762

On the larger crop, an average return of 9.3 per cent would be earned on the gin investment. It seems clear that the Texas gin capacity has been adjusted to a crop considerably larger than 3,000,000 bales.

If it be granted that 10 per cent is a fair return on gin investments, this return would yield an average profit of $1,885. The gin income per bale required to earn this profit on a volume of 900 bales may be determined thus:

$$900 = \frac{\$3,692 + \$1,885}{\text{Gin Income Per Bale} - \$1.91}$$

$$900\ (\text{Gin Income Per Bale} - \$1.91) = \$5,577$$

$$\text{Gin Income Per Bale} - \$1.91 = \$6.20$$

$$\text{Gin Income Per Bale} = \$6.20 + \$1.91, \text{ or } \$8.11$$

This would mean an increase in the cost of ginning service to cotton growers of more than 36 per cent over the present cost. This would not be pleasing to the cotton growers.

The volume needed to earn 10 per cent on the investment at the present gin income per bale may be found in this manner:

$$\text{Volume of Ginning} = \frac{\$3,692 + \$1,885}{\$5.95 - \$1.91}$$

$$\text{Volume of Ginning} = 1,380 \text{ Bales}$$

This average volume for a 3,000,000 bale crop would require about 2,174 gins in Texas. This would mean a reduction of about one-third in the number of Texas gins as of 1939.

Another approach to this problem of volume of ginning is from the standpoint of that needed to break even by a gin of bulk cost. At this volume only about one-fourth the gins would be operated at a loss. This should be a much more satisfactory condition than that in which one-half the gins be operated at a loss. The weighted bulk cost for the state as a whole is:

$$\text{Bulk State Cost} = \$2,211 + \$0.09121I + \$2.10V$$

The fixed cost of a gin with bulk cost and with average investment is:

Residual	$2,111
Investment $0.0912 × 18,848	1,719
Total	$3,930

The volume needed by a bulk cost gin to break even is found from the following equation:

$$\text{Volume of Ginning} = \frac{\$3,930}{\$5.95 - \$2.10}$$

$$\text{Volume of Ginning} = 1,021 \text{ Bales}$$

At a volume of 1,021 bales, the gin of average cost would earn a net return of about 2.3 per cent on its investment. At this volume per gin, a crop of 3,000,000 bales would require about 2,940 gins.

If it be granted that 10 per cent is a fair return on the gin investment of the bulk cost gin, the volume needed to earn this return may be determined thus:

$$\text{Volume of Ginning} = \frac{\$3,930 + \$1,885}{\$5.95 - \$2.10}$$

$$\text{Volume of Ginning} = 1,510 \text{ Bales}$$

At a volume of 1,510 bales per gin, a crop of 3,000,000 bales would require slightly under 2,000 gins. At this volume and a gin income of $5.95 per bale, a gin of average cost would earn about 12.8 per cent on its investment.

It should be added that average costs include a cost of depreciation of about $1,200 and a cost of management slightly over $1,200. The ginner operating his own plant would not have an out-of-pocket cost of management. The fact that many ginners do not include costs of depreciation and management in their calculations of total costs may help explain the reason the number of gins in Texas continues at such a relatively high level in terms of the available volume of ginning.

The reduction in cotton production in Texas during recent years has by no means been evenly distributed. In certain sections of the state, a retreat in cotton production was on before the government program got under way. Eight counties of low production in 1939 were selected and analyzed for production in terms of ginning capacity as shown in Table 34. As may be surmised through a careful study of this table,

Table 34.—Adjustments in Numbers of Gins in Eight Texas Counties of Low and Decreasing Cotton Production

County	Average Annual Volume Per Gin			Percentage of Gins Active			Average Number of Gins in County			Relative Size Gins[1]
	1925–29	1930–34	1935–39	1925–29	1930–34	1935–39	1925–29	1930–34	1935–39	
A	252	201	70	91	97	72	7.0	7.0	6.4	64
B	736	537	211	90	84	85	12.2	9.8	9.4	93
C	291	238	64	95	78	77	17.4	14.8	10.0	80
D	585	491	315	94	90	100	7.0	5.8	5.4	85
E	623	245	174	93	70	90	6.0	6.0	4.0	75
F	713	695	286	100	97	100	7.6	6.2	5.8	75
G	113	207	133	56	82	94	6.4	4.4	3.2	--[2]
H	634	506	323	100	96	92	7.0	4.8	5.0	90
All	462	377	182	91	85	86	8.8	7.4	6.4	81

[1]Relative to 337 saws, the average size of Texas gins in 1935.
[2]Data on size not available.

a contraction of ginning capacity is a painful matter. The cotton growers in these counties have interests at stake. At the present rate of extremely low volumes, these ginners cannot keep their gins in proper repair. This means poor ginning service. Eventually, a large percentage of these gins will cease to operate if the present low production be continued. As the number of gins are further reduced, the distance that some of the growers will have to haul their seed cotton will be greatly increased.

In the field of agricultural machinery, tractors, combines, and other equipment have been adjusted in size to meet the requirements of the small farmer. The question may be raised, whether or not there may be possibilities in developing a small gin of two or three stands for the more or less isolated areas of cotton production.

Another possibility from the standpoint of the growers is that of using large trucks carrying three to five bales of seed cotton to be transported to a distant gin. This would reduce the cost of the local haul as against single bale loads.

A ginner with an uneconomic volume of ginning cannot extricate himself from his difficulties merely through the lowering of his ginning costs. For instance, a ginner in the Blackland Area with a $15,000 steam gin and a gin income of $5.20 per bale has a volume of 400 bales. At this volume to break even he would have to reduce his ginning cost to 54 per cent of the average cost. Under ordinary circumstances this would be a feat most difficult to perform. If this ginner succeeded in this reduction of his ginning costs, he still would have no returns on his investment.

The needed improvement in the profit status of the Texas gin industry can be accomplished, in the main, only through a material increase in the volume of ginning per gin. The adjustment cannot be made "on an average" but must be made in specific cases. A considerable number of ginners under present circumstances have an economic volume of ginning. The degree of overcapacity of ginning facilities differs from gin point to gin point. In formulating a program to rehabilitate the Texas gin industry, attention may be called to three specific questions that must be taken into account.

1. What is a fair gin charge to be paid by the grower? This involves the gin toll, and the margins the ginner realizes on patterns sold to the patron and on the cottonseed purchased from the patron.
2. What is an economic volume of ginning? This question may be approached from the standpoint of the cost of ginning per bale. Table 35 shows the volume needed according to investment in the gin plant to attain costs of $3.75, $4.00, and $4.25 per bale for steam plants in the Blackland Area.
3. What is a fair return on the gin investment? Should the ginner earn 5 per cent, 10 per cent, or 25 per cent on his investment?

All three questions are intimately related to each other. The volume of ginning determines the cost and the net profit at a given gin income. The difference between the gin income per bale and the cost per bale determines the net profit or loss. A given return on the investment calls for definite combinations of gin income per bale and volume of ginning.

Table 36 brings to focus the interrelations of costs per bale, gin incomes per bale, and return on the investment for steam gins in the Blackland Area. The percentage returns indicated were ascertained in this manner. The net profit per bale at a gin income of $4.75 and a cost of $3.75 is $1.00. The volume of a $6,000 gin at a cost of $3.75 (Table 35) is 1,161 bales. Thus the net profit is $1,161. This is a return of 19.4 per cent on $6,000. The volume of a $30,000 gin at a cost of $3.75 per bale is 2,294 bales. Thus the net profit is $2,294. This is a return of 7.6 per cent on $30,000.

Whatever choice is made as to the ideal gin income per bale, cost per bale, and return on the investment, a table of the type of Table 36

Table 35.—Volume Required According to Cost of Ginning Per Bale—Steam Power—Blackland Area

Investment	Cost Per Bale		
	$3.75	$4.00	$4.25
$ 6,000	1,161	1,031	926
7,000	1,209	1,073	964
8,000	1,256	1,114	1,002
9,000	1,303	1,156	1,039
10,000	1,350	1,198	1,077
11,000	1,397	1,240	1,115
12,000	1,445	1,282	1,152
13,000	1,492	1,324	1,190
14,000	1,539	1,366	1,228
15,000	1,586	1,408	1,265
16,000	1,634	1,450	1,303
17,000	1,681	1,491	1,340
18,000	1,728	1,533	1,378
19,000	1,775	1,575	1,416
20,000	1,822	1,617	1,453
21,000	1,870	1,659	1,491
22,000	1,917	1,701	1,529
23,000	1,964	1,743	1,566
24,000	2,011	1,785	1,604
25,000	2,058	1,827	1,642
26,000	2,106	1,868	1,679
27,000	2,153	1,910	1,717
28,000	2,200	1,952	1,755
29,000	2,247	1,994	1,792
30,000	2,294	2,036	1,830

Table 36.—Percentage Return on the Investment According to Gin Income Per Bale and Cost of Ginning Per Bale—Steam Power—Blackland Area

Investment	Gin Income Per Bale								
	$4.75			$5.00			$5.25		
	Cost Per Bale			Cost Per Bale			Cost Per Bale		
	$3.75	$4.00	$4.25	$3.75	$4.00	$4.25	$3.75	$4.00	$4.25
$ 6,000	19.4	12.9	7.7	24.2	17.2	11.6	29.0	21.5	15.4
7,000	17.3	11.5	6.9	21.6	15.3	10.3	25.9	19.2	13.8
8,000	15.7	10.5	6.3	19.6	13.9	9.4	23.6	17.4	12.5
9,000	14.5	9.6	5.8	18.1	12.8	8.7	21.7	16.1	11.5
10,000	13.5	9.0	5.4	16.9	12.0	8.1	20.3	15.0	10.8
11,000	12.7	8.5	5.1	15.9	11.3	7.6	19.1	14.1	10.1
12,000	12.0	8.0	4.8	15.1	10.7	7.2	18.1	13.4	9.6
13,000	11.5	7.6	4.6	14.3	10.2	6.9	17.2	12.7	9.2
14,000	11.0	7.3	4.4	13.7	9.8	6.6	16.5	12.2	8.8
15,000	10.6	7.0	4.2	13.2	9.4	6.3	15.9	11.7	8.4
16,000	10.2	6.8	4.1	12.8	9.1	6.1	15.3	11.3	8.1
17,000	9.9	6.6	3.9	12.4	8.8	5.9	14.8	11.0	7.9
18,000	9.6	6.4	3.8	12.0	8.5	5.7	14.4	10.6	7.7
19,000	9.2	6.2	3.7	11.5	8.3	5.6	13.9	10.4	7.5
20,000	9.1	6.1	3.6	11.4	8.1	5.5	13.7	10.1	7.3
21,000	8.9	5.9	3.6	11.1	7.9	5.3	13.4	9.9	7.1
22,000	8.7	5.8	3.5	10.9	7.7	5.2	13.1	9.7	7.0
23,000	8.5	5.7	3.4	10.7	7.6	5.1	12.8	9.5	6.8
24,000	8.4	5.6	3.3	10.5	7.4	5.0	12.6	9.3	6.7
25,000	8.2	5.5	3.3	10.3	7.3	4.9	12.3	9.1	6.6
26,000	8.1	5.4	3.2	10.1	7.2	4.8	12.2	9.0	6.5
27,000	8.0	5.3	3.2	10.1	7.1	4.8	12.0	8.8	6.4
28,000	7.9	5.2	3.1	9.8	7.0	4.7	11.8	8.7	6.3
29,000	7.7	5.2	3.1	9.7	6.9	4.6	11.6	8.6	6.2
30,000	7.6	5.1	3.1	9.6	6.8	4.6	11.5	8.5	6.1

should be of great assistance in formulating the details of a working program. Table 36 is merely suggestive of other combinations of gin incomes, costs, and returns on the investment which may be considered. Such tables, too, may be compiled for all types of power in all sections of Texas.

SUMMARY

Appendix A of this bulletin, **(Tables for computing Costs and Profits of Ginning)**, was prepared for the individual who may be interested in the practical application of the results of this study but who may have no special concern about the manner in which the cost and profit analysis was made.

The main part of this bulletin was prepared for the individual who may be interested in the broader aspects of the economics of the ginning industry.

The cotton grower requires first class ginning service at a reasonable cost. In order to keep his gin plant in proper repair so as to be in position to offer first class service, the ginner must earn a fair return on his investment.

During the past 20 years the income per bale of ginners has been declining. The decreased cotton production of recent years has resulted in a sharp decline in volume of ginning. Reductions both in the income per bale and the volume per gin have affected adversely the net income of ginners.

Between 1906 and 1935 the number of gins in Texas was reduced by 21 per cent; the size of gins as measured in average number of saws was increased by 65 per cent; and ginning capacity was increased by 30 per cent.

An analysis of ginning costs and profits should serve the gin industry in establishing standards of ginning costs; should guide an individual about to enter the ginning business; should aid a ginner in making a decision as to the best type of power under given circumstances; and should assist the gin industry in appraising its general profit status.

To facilitate the greatest possible uniformity of conditions under which gins are operated, the state has been divided into three sections. For the sake of convenience, these sections are designated as: the Blackland Area; the High and Low Plains Area; and the Gulf Coast Area.

More than 1,200 cost records have been collected, edited, and analyzed. In the main, cost records were secured on the seasons 1930-31 to 1938-39. The plants studied ginned a total of 1,840,000 bales. During the period 1933-34 to 1937-38, the counties in which these gins are located produced 71 per cent of the total Texas crop.

The total investment in the gin industry in Texas today is about 66 millions of dollars. The average investment per gin is about $19,946 of which $18,848 is in gin machinery and buildings and $1,098 in the gin site.

Investments in gin plants vary widely. Single battery Diesel plants, for instance, have investments varying from $5,526 to $31,055 in the Blackland Area; from $14,114 to $53,530 in the High and Low Plains Area; and from $5,521 to $53,257 in the Gulf Coast Area. The main factors in explaining these variations are: the size of gin as a single battery plants vary from three to five stands in the Blackland Area and from four to six stands in the other areas; the number and types of buildings; the completeness of the machinery installed; the price level at the time the gin plant was built; and whether present operators built their plants new or bought secondhand.

According to the 12-hour capacity of gin plants as reported by the Census Bureau in 1935, the average numbers of 12-hour days required to gin the crop of the seasons for the ten-year period, 1928-29 to 1937-38 were as follows: the Blackland Area, 22.0; the High and Low Plains Area, 31.5; the Gulf Coast Area, 20.9; all Texas, 26.3; and California, 72.6. The relative overcapacity of ginning facilities in Texas is evident.

Two-thirds of the Diesel gins in the Blackland Area have volumes ranging from 657 to 1,833 bales; two-thirds of the Diesel gins in the High and Low Plains Area have volumes ranging from 624 to 2,748 bales. Thus fluctuations in volume are more violent in the High and Low Plains Area than in the Blackland Area.

In establishing standards of cost, volumes and investments were correlated with total costs of ginning. In this manner, estimating equations were derived for each group of gins. These equations contain three distinct parts: the part unrelated to either volume or investment; the part showing the effect of the investment; and the part showing the effect of the volume of ginning.

A ginner by selecting the estimating equations according to his section of the state and type of power may estimate his own costs. The operations needed in each case are: (1) to multiply the investment cost per dollar by his own investment; (2) to multiply the variable cost per bale by his own volume of ginning; and (3) to find the sum of these two costs and the residual cost.

Of all gins analyzed, regardless of section of state and type of power, 66 per cent, 84 per cent, and 93 per cent have costs as high as 5 per cent above the estimated cost, or less; as high as 15 per cent above the estimated cost, or less; and as high as 25 per cent above the estimated cost, or less.

Fixed costs explain, in a large measure, the influence that volume of ginning has upon the cost of ginning. For instance, the fixed cost per bale at a volume of 500 bales for a Diesel plant of average investment in the Blackland Area is $7.27; the fixed cost per bale at a volume of 3,000 bales is $1.22. The fixed cost per bale varies inversely with the volume of ginning.

A ginner may be quite as much interested in estimates of his items of cost as of total cost. Hence, equations have been derived for items of cost according to section of the state and type of power.

As the volume of ginning increases, the percentage of total costs going to gin labor increases. These percentages range from a low of 11.8 for electric gins with a volume of 500 bales in the High and Low Plains Area to a high of 35.8 for Diesel gins with a volume of 3,000 bales in the Blackland Area.

The volume of ginning per day during the progress of the ginning season has an important bearing on the cost of gin labor. If the gin manager assembles a gin crew on too many days of no ginning and too large a crew in terms of the volume on days of ginning, labor costs become relatively high.

Hour costs of gin labor are very high on days when 10 bales or less are ginned. After a volume of about 40 bales per day has been reached, increases in volume of ginning per day result in but moderate reductions in hour costs per bale.

At average investments in the gin plants, electric gins in the Blackland Area have lower costs than Diesel plants at volumes less than about 1,041 bales; at volumes greater than this, Diesel gins have the lower costs. In the High and Low Plains Area, electric gins have lower costs than Diesel gins at volumes less than about 1,073 bales; at volumes greater than this, Diesel gins have the lower costs. In the low volume range and in the high volume range, costs of steam gins are between those of electric and Diesel gins.

The transition from costs to profits may be made through the equation:

$$\text{Gin Income} = \text{Cost of Ginning} \pm \text{Profit}$$

Through proper substitutions, this equation may be transformed into the following equation for volume:

$$\text{Volume of Ginning} = \frac{\text{Fixed Cost} \pm \text{Profit}}{\text{Gin Income Per Bale} - \text{Variable Cost Per Bale}}$$

This equation for calculating the volume of ginning may be used to determine:

1. the volume required to attain a specified cost of ginning per bale;
2. the volume needed to yield a specified profit;
3. the effect of changes in the gin income per bale upon profit;
4. the volume required to warrant a specified investment in the gin plant;
5. the investment a given volume of ginning justifies;
6. the "break even" volume according to gin income per bale and investment in the gin plant.

It seems reasonable to assume that costs are satisfactory if the influences of volume of ginning and operating efficiency are such that costs per bale are $3.75 or less in the Blackland Area; $4.25 or less in the High and Low Plains Area; and $4.00 or less in the Gulf Coast Area.

Since Texas has too many gins, one about to enter the ginning business should consider carefully the possibilities of buying a secondhand plant rather than building a new plant.

Cooperative associations entering the ginning business are turning more and more to the purchasing of secondhand plants. Of 27, 45, and 174

associations organized during the periods, prior to and including 1927, 1928-1933, and 1934-1939, 48, 64, and 97 per cent purchased secondhand gin plants.

Usually, three parties are interested in the sales price of a secondhand gin: the seller; the buyer; and the banker financing the buyer. The sales price of a secondhand plant may be based on an appraisal of the replacement value. But the buyer also needs to take into consideration the profit possibilities of the ginning business he is entering.

With the present number of gins in Texas and an average crop of 3,000,000 bales, about one-half the gins operate with a profit and the other half with a loss. A reduction of about one-third of the present number of gins would place the Texas gin industry in a relatively favorable position.

Any program for adjusting the Texas gin industry must be based on the answers to the following questions:

1. What is a fair gin charge to be paid by cotton growers?
2. What is an economic volume of ginning?
3. What is a fair return on the investment in the gin plant?

APPENDIX A—TABLES FOR COMPUTING COSTS AND PROFITS OF GINNING

To insure the highest attainable uniformity of investment in the gin plant, of gin income per bale, of harvesting methods, and of length of the ginning season, the state has been divided into three sections. These sections, for the sake of convenience, have been designated as: the Blackland Area; the High and Low Plains Area; and the Gulf Coast Area. El Paso County is included with the Gulf Coast Area. The boundaries of the sections are shown in Figure 9. The locations, by counties, of the gins from which cost records were obtained are also shown in Figure 9.

The gins were segregated on the basis of type of power into three groups—steam, Diesel, and electric. With the Diesel group were included all other internal combustion engines such as natural gas, oil, and gasoline.

The gins were divided into two groups as to size. The one group includes the gins with a single battery; most of these gins have four or five gin stands; a very few have three stands; and a somewhat greater number have six stands. Most of the stands have 70 or 80 saws. The other group includes the gins with two or more batteries, or the multiple battery plants.

Two factors were found of paramount importance in explaining differences in costs of ginning among the gins. They are the volume of ginning and the investment in the gin plant.

Items of Cost

The total cost of ginning is the sum of the various items of cost involved in operating a gin plant. A ginner bent on reducing his total

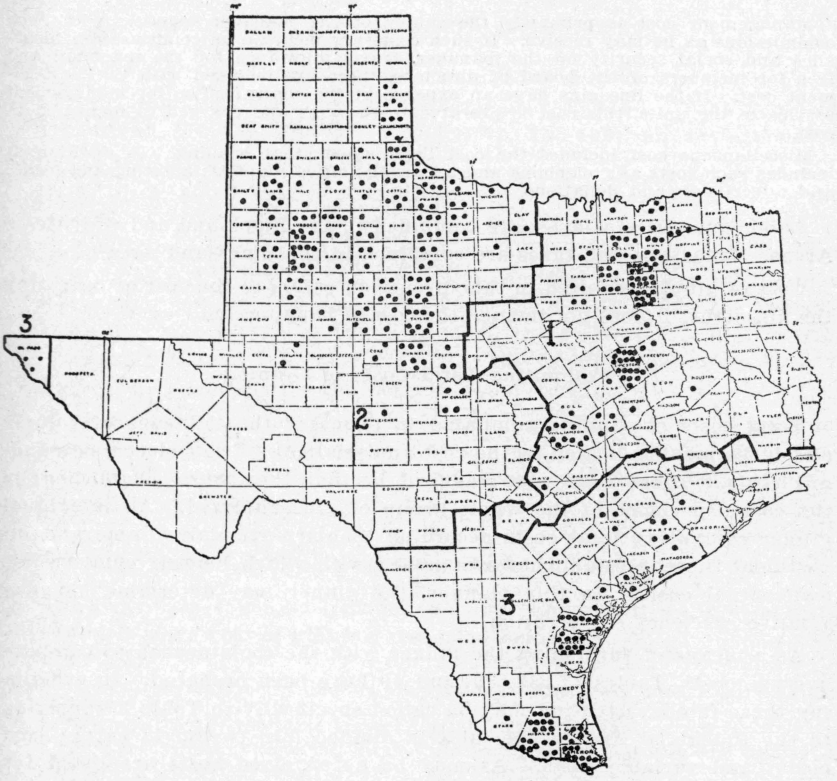

Fig. 9.—Sections of the State. 1. Blackland Area. 2. High and Low Plains Area. 3. Gulf Coast Area.
Each dot represents a gin within the county from which cost records were obtained.

cost of ginning can do so only through control of the various items of cost. The ginner who classifies his costs under the fewest items determines the breakdown which may be made of total costs. The classification of items made in this study needs a brief explanation. Several of the items are self-explanatory:

Labor cost includes wages of gin labor, and compensation insurance and social security paid on gin labor.

Power cost is composed of the costs of fuel, light and water, lubricating oil, grease, and packing.

Repair cost includes wages of repair labor, compensation insurance and social security paid on repair labor, and repair parts and materials.

Depreciation cost is charged, annually, according to the following rate schedule:

Gin machinery, including power unit	6 2/3 per cent
Office furniture and fixtures	10
Automobiles and trucks	25
Buildings	
All-steel	3 1/3
Frame, iron-clad	4
All-wood	5

Management cost is primarily the salary of the manager together with such commissions as he may receive. If such costs are incurred as compensation insurance and social security on the manager, travel allowance for the manager, and fees for members of the board of directors, these are included with the management cost. If the line gins have an expense at the central office for management service to the units, this cost is prorated to the gins and charged to management cost.

Miscellaneous cost includes the cost listed under that heading. In addition, it includes such costs as: telephone and telegraph; office supplies; auditing and legal; and advertising and donations.

Labor and office salaries are combined in the Blackland and Gulf Coast Areas. Insurance and taxes are combined in the Blackland Area.

Cost of ginning as used in this discussion refers to the cost of operating the gin plant; it does not include the cost of bagging and ties.

Computing Total Costs of Ginning

Total costs of ginning computed in terms of the influence of volume and investment indicated in the cost analysis may be considered as standard costs. These costs are standard in that they were established by the cost experience of the whole group of gins analyzed. An individual ginner computing total costs according to his particular volume and investment thereby establishes a standard with which he may compare his own actual costs. In this manner, the ginner may determine his own relative efficiency of operation.

As a means of furnishing the ginner with the tools needed to compute average costs, Tables 37, 38, 39, and 40 have been prepared. In explaining these tables, attention may be called specifically to Table 37 applying to the Blackland Area. The table is divided into two main parts: fixed costs; and variable costs. As may be noted, fixed costs are listed for investments by $1,000 intervals from $6,000 to $30,000 for steam and Diesel gins and from $6,000 to $26,000 for electric gins. These fixed costs are the totals of the investment costs according to the investments in the gin plants and the portion of total costs unrelated to volume and investment.

The investment costs listed at the bottom of the fixed cost section may serve two purposes. They may be used in determining fixed costs for gins with investments lower or higher than those listed. For instance, the fixed cost of a $5,000 steam gin is $2,288, the fixed cost of a $6,000 gin, less $93, the investment cost on $1,000, or $2,195. The fixed cost of a $35,000 steam gin is $4,520, the fixed cost of a $30,000 gin, plus $465, the investment cost on $5,000, or $4,985. These investment costs may also be used in making adjustments for investments falling within the $1,000 intervals. Investment costs for hundreds of dollars from $100 to $900, may readily be ascertained from investment costs for thousands of dollars from $1,000 to $9,000 by pointing off one place and rounding to the nearest dollar. The investment cost on $1,000 in a Diesel gin is $89; the investment cost on $100 is $8.90 which rounded to the nearest dollar is $9.

A ginner in computing his investment cost may attain sufficient accuracy by rounding his investment to the nearest $100. That is, an investment of $15,447 may be rounded to $15,400; an investment of $15,453 may be rounded to $15,500.

It is to be noted that variable costs are listed by 100 bale intervals from 100 to 3,000 bales. Variable costs for tens of bales from 10 to 90 may readily be ascertained from variable costs for hundreds of bales from 100 to 900 by pointing off one place and rounding to the nearest dollar. The variable cost on 100 bales of an electric gin is $205; the variable cost on 10 bales is $20.50 which rounded to the nearest dollar is $21. The variable cost on 500 bales is $1,025; the variable cost on 50 bales is $102.50 which rounded to the nearest dollar is $103.

A ginner in computing his variable cost may attain sufficient accuracy by rounding his volume of ginning to the nearest 10 bales. That is, a volume of 1,234 may be rounded to 1,230 bales; a volume of 1,236 may be rounded to 1,240 bales.

How to Use Tables of Computed Total Costs

The steps to be taken by a ginner in using Tables 37 to 40 in computing his total average cost of ginning are listed below.

1. Select the table according to his section of the state (See Figure 9) and size of gin.
2. Use the part of the table applying to his particular type of power.
3. Round out his investment to the nearest $100; round out his volume of ginning to the nearest 10 bales.
4. Tabulate costs as follows:
   a. Fixed Cost
      According to investment to full $1,000 interval.
      Adjust for added hundreds of dollars of investment.
   b. Variable Cost
      According to full 100 bale interval.
      Adjust for added tens of bales.
   c. Find the total of the fixed and variable costs.
5. Divide his actual total cost of ginning by the computed total cost of ginning.
   a. If the result is a percentage less than 100, subtract from 100. The remainder gives the percentage of efficiency greater than average efficiency.
   b. If the result is a percentage greater than 100, subtract 100 from it. The remainder gives the percentage of efficiency less than average efficiency.
6. Divide total computed cost by the number of bales ginned to reduce the cost to a per bale basis.

A ginner with an investment of $17,475 in a Diesel plant in the Blackland Area has a volume of 1,477. His total actual cost of ginning is $5,525. He wishes to determine his own relative efficiency.

The investment of $17,475 may be rounded to $17,500. The volume of 1,477 bales may be rounded to 1,480 bales. The fixed cost according to investment and the variable cost according to volume of ginning of this ginner may be read in Table 37. His total computed costs may be tabulated thus:

Type of Cost		Cost	
Fixed Cost			
$17,000	$3,706		
500	44		
$17,500		$3,750	
Variable Cost			
1,400 Bales	$1,918		
80	110		
1,480 Bales		2,028	
Total Computed Cost			$5,788

In that the computed cost is accepted as the standard cost, the computed cost logically represents 100 per cent. The relative efficiency of this ginner may be determined by dividing his actual cost, $5,525, by his computed cost, $5,778, which gives 95.6 per cent. Thus this ginner is more efficient than the average ginner by 4.4 per cent.

The tables of computed costs for the Blackland and Gulf Coast Areas do not include large, or multiple battery, gins. If a ginner with a double battery plant in the Blackland Area, or Gulf Coast Area, will divide his investment by two and his volume of ginning by two, he may proceed to compute his costs as though he had a single battery plant.

The table of computed costs for the Gulf Coast Area does not include steam power. It is suggested that a ginner with steam power in that area compute his cost according to steam power in the Blackland Area as given in Table 37.

Table 37.—Computed Total Costs of Ginning—Blackland Area, 1930-1938

Fixed Costs				Variable Costs			
Investment	Steam	Diesel	Electric	Bales Ginned	Steam	Diesel	Electric
$ 6,000	$2,288	$2,730	$2,444	100	$ 178	$ 137	$ 205
7,000	2,381	2,819	2,503	200	356	274	410
8,000	2,474	2,908	2,563	300	534	411	615
9,000	2,567	2,996	2,622	400	712	548	820
10,000	2,660	3,085	2,681	500	890	685	1,025
11,000	2,753	3,174	2,740	600	1,068	822	1,230
12,000	2,846	3,262	2,799	700	1,246	959	1,435
13,000	2,939	3,351	2,859	800	1,424	1,096	1,640
14,000	3,032	3,440	2,918	900	1,602	1,233	1,845
15,000	3,125	3,529	2,977	1,000	1,780	1,370	2,050
16,000	3,218	3,617	3,036	1,100	1,958	1,507	2,255
17,000	3,311	3,706	3,095	1,200	2,136	1,644	2,460
18,000	3,404	3,795	3,155	1,300	2,314	1,781	2,665
19,000	3,497	3,883	3,214	1,400	2,492	1,918	2,870
20,000	3,590	3,972	3,273	1,500	2,670	2,055	3,075
21,000	3,683	4,061	3,332	1,600	2,848	2,192	3,280
22,000	3,776	4,149	3,391	1,700	3,026	2,329	3,485
23,000	3,869	4,238	3,451	1,800	3,204	2,466	3,690
24,000	3,962	4,327	3,510	1,900	3,382	2,603	3,895
25,000	4,055	4,416	3,569	2,000	3,560	2,740	4,100
26,000	4,148	4,504	3,628	2,100	3,738	2,877	4,305
27,000	4,241	4,593	------	2,200	3,916	3,014	4,510
28,000	4,334	4,682	------	2,300	4,094	3,151	4,715
29,000	4,427	4,770	------	2,400	4,272	3,288	4,920
30,000	4,520	4,859	------	2,500	4,450	3,425	5,125
				2,600	4,628	3,562	5,330
	Investment Costs			2,700	4,806	3,699	5,535
$ 1,000	93	89	59	2,800	4,984	3,836	5,740
2,000	186	177	118	2,900	5,162	3,973	5,945
3,000	279	266	178	3,000	5,340	4,110	6,150
4,000	372	355	237				
5,000	465	444	296				
6,000	558	532	355				
7,000	651	621	414				
8,000	744	710	474				
9,000	837	798	533				
10,000	930	887	592				

Table 38.—Computed Total Costs of Ginning—High and Low Plains Area, 1930-1938

Fixed Costs				Variable Costs			
Investment	Steam	Diesel	Electric	Bales Ginned	Steam	Diesel	Electric
$15,000	$4,280	$3,653	$3,211	100	$ 225	$ 176	$ 242
16,000	4,339	3,765	3,323	200	450	352	484
17,000	4,398	3,877	3,435	300	675	528	726
18,000	4,458	3,989	3,548	400	900	704	968
19,000	4,517	4,101	3,660	500	1,125	880	1,210
20,000	4,576	4,213	3,772	600	1,350	1,056	1,452
21,000	4,635	4,325	3,884	700	1,575	1,232	1,694
22,000	4,694	4,437	3,996	800	1,800	1,408	1,936
23,000	4,754	4,549	4,109	900	2,025	1,584	2,178
24,000	4,813	4,661	4,221	1,000	2,250	1,760	2,420
25,000	4,872	4,773	4,333	1,100	2,475	1,936	2,662
26,000	4,931	4,885	4,445	1,200	2,700	2,112	2,904
27,000	4,990	4,997	4,557	1,300	2,925	2,288	3,146
28,000	5,050	5,109	4,670	1,400	3,150	2,464	3,388
29,000	5,109	5,221	4,782	1,500	3,375	2,640	3,630
30,000	5,168	5,333	4,894	1,600	3,600	2,816	3,872
31,000	5,227	5,445	5,006	1,700	3,825	2,992	4,114
32,000	5,286	5,557	5,118	1,800	4,050	3,168	4,356
33,000	5,346	5,669	5,231	1,900	4,275	3,344	4,598
34,000	5,405	5,781	5,343	2,000	4,500	3,520	4,840
35,000	5,464	5,893	5,455	2,100	4,725	3,696	5,082
36,000	5,523	6,005	5,567	2,200	4,950	3,872	5,324
37,000	5,582	6,117	5,679	2,300	5,175	4,048	5,566
38,000	5,642	6,229	5,792	2,400	5,400	4,224	5,808
39,000	5,701	6,341	5,904	2,500	5,625	4,400	6,050
40,000	5,760	6,453	6,016	2,600	5,850	4,576	6,292
41,000	5,819	6,565	6,128	2,700	6,075	4,752	6,534
42,000	5,878	6,677	6,240	2,800	6,300	4,928	6,776
43,000	5,938	6,789	6,353	2,900	6,525	5,104	7,018
44,000	5,997	6,901	6,465	3,000	6,750	5,280	7,260
45,000	6,056	7,013	6,577	3,100	6,975	5,456	7,502
				3,200	7,200	5,632	7,744
				3,300	7,425	5,808	7,986
				3,400	7,650	5,984	8,228
Investment Costs				3,500	7,875	6,160	8,470
1,000	59	112	112	3,600	8,100	6,336	8,712
2,000	118	224	224	3,700	8,325	6,512	8,954
3,000	178	336	337	3,800	8,550	6,688	9,196
4,000	237	448	449	3,900	8,775	6,864	9,438
5,000	296	560	561	4,000	9,000	7,040	9,680
6,000	355	672	673	4,100	9,225	7,216	-----
7,000	414	784	785	4,200	9,450	7,392	-----
8,000	474	896	898	4,300	9,675	7,568	-----
9,000	533	1,008	1,010	4,400	9,900	7,744	-----
10,000	592	1,120	1,122	4,500	10,125	7,920	-----

Table 39.—Computed Total Costs of Ginning—Large Gins—High and Low Plains Area, 1930-1938

Fixed Costs				Variable Costs			
Investment	Costs	Investment	Costs	Bales Ginned	Costs	Bales Ginned	Costs
$20,000	$ 7,184	$60,000	$11,392	100	$ 175	2,900	$ 5,075
22,000	7,394	62,000	11,602	200	350	3,000	5,250
24,000	7,605	64,000	11,813	300	525	3,100	5,425
26,000	7,815	66,000	12,023	400	700	3,200	5,600
28,000	8,026	68,000	12,234	500	875	3,300	5,775
30,000	8,236	70,000	12,444	600	1,050	3,400	5,950
32,000	8,446	72,000	12,654	700	1,225	3,500	6,125
34,000	8,657	74,000	12,865	800	1,400	3,600	6,300
36,000	8,867	76,000	13,075	900	1,575	3,700	6,475
38,000	9,078	78,000	13,286	1,000	1,750	3,800	6,650
40,000	9,288	80,000	13,496	1,100	1,925	3,900	6,825
42,000	9,498	82,000	13,706	1,200	2,100	4,000	7,000
44,000	9,709	84,000	13,917	1,300	2,275	4,100	7,175
46,000	9,919	86,000	14,127	1,400	2,450	4,200	7,350
48,000	10,130	88,000	14,338	1,500	2,625	4,300	7,525
50,000	10,340	90,000	14,548	1,600	2,800	4,400	7,700
52,000	10,550	------	------	1,700	2,975	4,500	7,875
54,000	10,761	------	------	1,800	3,150	4,600	8,050
56,000	10,971	------	------	1,900	3,325	4,700	8,225
58,000	11,182	------	------	2,000	3,500	4,800	8,400
				2,100	3,675	4,900	8,575
Investment Costs				2,200	3,850	5,000	8,750
1,000	105	------	------	2,300	4,025	6,000	10,500
2,000	210	------	------	2,400	4,200	7,000	12,250
3,000	316	------	------	2,500	4,375	8,000	14,000
4,000	421	------	------	2,600	4,550	9,000	15,750
5,000	526	------	------	2,700	4,725	10,000	17,500
6,000	631	------	------	2,800	4,900	------	------
7,000	736	------	------				
8,000	842	------	------				
9,000	947	------	------				
10,000	1,052	------	------				

Table 40.—Computed Total Costs of Ginning—Gulf Coast Area, 1930-1938

Fixed Costs			Variable Costs		
Investment	Diesel	Electric	Bales Ginned	Diesel	Electric
$10,000	$2,668	$1,891	100	$ 199	$ 259
11,000	2,764	1,986	200	398	518
12,000	2,859	2,082	300	597	777
13,000	2,955	2,177	400	796	1,036
14,000	3,051	2,272	500	995	1,295
15,000	3,147	2,368	600	1,194	1,554
16,000	3,242	2,463	700	1,393	1,813
17,000	3,338	2,558	800	1,592	2,072
18,000	3,434	2,653	900	1,791	2,331
19,000	3,529	2,749	1,000	1,990	2,590
20,000	3,625	2,844	1,100	2,189	2,849
21,000	3,721	2,939	1,200	2,388	3,108
22,000	3,816	3,035	1,300	2,587	3,367
23,000	3,912	-----	1,400	2,786	3,626
24,000	4,008	-----	1,500	2,985	3,885
25,000	4,104	-----	1,600	3,184	4,144
26,000	4,199	-----	1,700	3,383	4,403
27,000	4,295	-----	1,800	3,582	4,662
28,000	4,391	-----	1,900	3,781	4,921
29,000	4,486	-----	2,000	3,980	5,180
30,000	4,582	-----	2,100	4,179	5,439
31,000	4,678	-----	2,200	4,378	5,698
32,000	4,773	-----	2,300	4,577	5,957
33,000	4,869	-----	2,400	4,776	6,216
34,000	4,965	-----	2,500	4,975	6,475
35,000	5,061	-----	2,600	5,174	6,734
36,000	5,156	-----	2,700	5,373	6,993
37,000	5,252	-----	2,800	5,572	7,252
38,000	5,348	-----	2,900	5,771	7,511
39,000	5,443	-----	3,000	5,970	7,770
40,000	5,539	-----	3,100	6,169	-----
			3,200	6,368	-----
Investment Costs			3,300	6,567	-----
1,000	96	95	3,400	6,766	-----
2,000	191	191	3,500	6,965	-----
3,000	287	286			
4,000	383	381			
5,000	479	477			
6,000	574	572			
7,000	670	667			
8,000	766	762			
9,000	861	858			
10,000	957	953			

Computing Items of Cost

A ginner may be quite as interested in comparing his costs of specific items with their standards for his area as in comparing his total cost with its standard. The explanation for total cost which may be higher or lower than the standard is to be found in the behavior of the various items of cost.

The influence of volume of ginning, investment in the gin plant, and size of gin was tested for each item of cost. Only as a variable had a significant influence was it considered in computing standard costs. In a few instances, none of the three variables was significant. In these cases, the arithmetic average was accepted as the standard cost.

How to Use Tables of Computed Items of Cost

The steps to be taken by a ginner in using Tables 41 to 49 in computing his items of cost are listed as follows:

1. Select the table according to his section of the State (See Figure 9) and type of power.
2. If investment is involved, round to the nearest $100; if volume of ginning is involved, round to the nearest 10 bales.
3. Tabulate costs as follows:
   a. Fixed Cost whether related to—
      Investment,
      Size of Gin, or
      Unrelated to Investment and Size.
   b. Variable Cost
      According to full 100 bale interval.
      Adjust for added tens of bales.
   c. Find total cost of each item.
4. Divide each actual item of cost by its computed cost.
   a. If the result is a percentage less than 100, subtract from 100. The remainder gives the percentage of efficiency greater than average efficiency.
   b. If the result is a percentage greater than 100, subtract 100 from it. The remainder gives the percentage of efficiency less than average efficiency.
5. Divide each computed item of cost by the number of bales ginned to reduce costs to a per bale basis.

A ginner with an electric plant in the Blackland Area has an investment of $14,600 and a volume of 1,650 bales. His items of cost are as follows: labor, $1,425; power, $1,250; repairs, $425; insurance and taxes, $725; management, $1,200; and miscellaneous, $290. This ginner wishes to determine his relative efficiency with respect to his items of cost. Table 43 is the one to be used in solving this ginner's problem.

It is to be noted that only three items are influenced by the volume of ginning. The computed cost of these items may be tabulated thus:

	Labor	Power	Repairs
Fixed Cost	$ 133	$ 120	$230
Variable Cost			
1,600 Bales	1,200	1,168	240
50 Bales	38	37	8
Total Computed Cost	$1,371	$1,325	$478
Total Actual Cost	$1,425	$1,250	$425
Relative Cost	103.9	94.3	88.9

Thus this ginner has a labor cost 3.9 per cent higher, a power cost 5.7 per cent lower, and a repair cost 11.1 per cent lower than those of a gin of average efficiency.

The variable affecting the cost of insurance and taxes is the investment in the gin plant. These costs may be computed thus:

Investment	Cost of Ins. & Taxes
$14,000 (Fixed)	$635
600 (Investment)	24
Total Computed Cost	$659
Total Actual Cost	$725
Relative Cost	110.0

This ginner has a cost of insurance and taxes that is 10.0 per cent higher than that of a gin of average efficiency.

In the case of management and miscellaneous costs, the arithmetic

averages are accepted as the standard costs. Relative efficiency as to these two costs may be determined thus:

	Management	Miscel.
Standard Cost (Arithmetic Average)	$1,125	$329
Actual Cost	$1,200	$290
Relative Cost	106.6	88.1

This ginner has a cost of management 6.6 per cent higher, and a miscellaneous cost 11.9 per cent lower than those of a gin of average efficiency.

In computing standard costs for the various items, cost of depreciation may be ignored. In each instance, depreciation was calculated at a standard rate. The only difference in the rate per dollar invested arises from a difference in the proportionate investment in the various types of fixed assets. The difference between the average rate of depreciation of an area and the rate of a given gin is not significant.

Table 41.—Computed Items of Cost—Steam Power—Blackland Area 1930-1938

Fixed Costs		Variable Costs						
No. of Saws	Management	Bales Ginned	Labor	Power	Repairs	Ins. & Taxes	Misc.	Management
240	$363	100	$ 62	$ 36	$ 20	$ 8	$ 19	$ 33
280	449	200	124	72	40	16	38	66
320	535	300	186	108	60	24	57	99
350	600	400	248	144	80	32	76	132
400	707	500	310	180	100	40	95	165
		600	372	216	120	48	114	198
Size Costs		700	434	252	140	56	133	231
70	$151	800	496	288	160	64	152	264
80	172	900	558	324	180	72	171	297
		1,000	620	360	200	80	190	330
		1,100	682	396	220	88	209	363
Labor	$421	1,200	744	432	240	96	228	396
		1,300	806	468	260	104	247	429
Power	272	1,400	868	504	280	112	266	462
		1,500	930	540	300	120	285	495
Repairs	307	1,600	992	576	320	128	304	528
		1,700	1,054	612	340	136	323	561
Ins. & Taxes	288	1,800	1,116	648	360	144	342	594
		1,900	1,178	684	380	152	361	627
Misc.	130	2,000	1,240	720	400	160	380	660
		2,100	1,302	756	420	168	399	693
		2,200	1,364	792	440	176	418	726
		2,300	1,426	828	460	184	437	759
		2,400	1,488	864	480	192	456	792
		2,500	1,550	900	500	200	475	825
		2,600	1,612	936	520	208	494	858
		2,700	1,674	972	540	216	513	891
		2,800	1,736	1,008	560	224	532	924
		2,900	1,798	1,044	580	232	551	957
		3,000	1,860	1,080	600	240	570	990

In the example given above, the size of gin did not appear as one of the factors influencing costs. Costs of insurance and taxes and of management on Diesel gins in the Blackland Area are influenced by the size of gin. The cost of insurance and taxes (Table 42) of a 6/70 gin may be determined thus:

Fixed Cost (350 Saws)	$667
Size Cost (70 Saws)	85
Total Computed Cost	$752

The management cost of a 6/80 gin may be determined thus:

Fixed Cost (400 Saws)	$1,305
Size Cost (80 Saws)	248
Total Computed Cost	$1,553

Table 42.—Computed Items of Cost—Diesel Power—Blackland Area 1930-1938

Fixed Costs			Variable Costs				
No. of Saws	Ins. & Taxes	Management	Bales Ginned	Labor	Power	Repairs	Misc.
240	$533	$ 809	100	$ 83	$ 25	$ 14	$ 13
280	582	933	200	166	50	28	26
320	630	1,057	300	249	75	42	39
350	667	1,150	400	332	100	56	52
400	727	1,305	500	415	125	70	65
			600	498	150	84	78
	Size Costs		700	581	175	98	91
70	$ 85	$ 217	800	664	200	112	104
80	97	248	900	747	225	126	117
			1,000	830	250	140	130
			1,100	913	275	154	143
Labor	$210		1,200	996	300	168	156
Power	105		1,300	1,079	325	182	169
Repairs	320		1,400	1,162	350	196	182
Misc.	156		1,500	1,245	375	210	195
			1,600	1,328	400	224	208
			1,700	1,411	425	238	221
			1,800	1,494	450	252	234
			1,900	1,577	475	266	247
			2,000	1,660	500	280	260
			2,100	1,743	525	294	273
			2,200	1,826	550	308	286
			2,300	1,909	575	322	299
			2,400	1,992	600	336	312
			2,500	2,075	625	350	325
			2,600	2,158	650	364	338
			2,700	2,241	675	378	351
			2,800	2,324	700	392	364
			2,900	2,407	725	406	377
			3,000	2,490	750	420	390

Table 43.—Computed Items of Cost—Electric Power—Blackland Area 1930-1938

Fixed Costs			Variable Costs			
Investment	Ins. & Taxes		Bales Ginned	Labor	Power	Repairs
$ 6,000	$ 315		100	$ 75	$ 73	$ 15
7,000	355		200	150	146	30
8,000	395		300	225	219	45
9,000	435	Labor-----$133	400	300	292	60
10,000	475		500	375	365	75
11,000	515	Power----- 120	600	450	438	90
12,000	555		700	525	511	105
13,000	595	Repairs---- 230	800	600	584	120
14,000	635		900	675	657	135
15,000	675		1,000	750	730	150
16,000	714		1,100	825	803	165
17,000	754		1,200	900	876	180
18,000	794		1,300	975	949	195
19,000	834		1,400	1,050	1,022	210
20,000	874		1,500	1,125	1,095	225
21,000	914		1,600	1,200	1,168	240
22,000	954		1,700	1,275	1,241	255
23,000	994		1,800	1,350	1,314	270
24,000	1,034		1,900	1,425	1,387	285
25,000	1,074		2,000	1,500	1,460	300
26,000	1,113		2,100	1,575	1,533	315
			2,200	1,650	1,606	330
Investment Costs			2,300	1,725	1,679	345
200	$ 8		2,400	1,800	1,752	360
400	16		2,500	1,875	1,852	375
600	24		2,600	1,950	1,898	390
800	32		2,700	2,025	1,971	405
1,000	40		2,800	2,100	2,044	420
			2,900	2,175	2,117	435
			3,000	2,250	2,190	450

Arithmetic Average

Management ----------$1,125
Miscellaneous---------- 329

Table 44.—Computed Items of Cost—Steam Power—High and Low Plains Area 1930-1938

Fixed Costs			Variable Costs							
Investment	Taxes	Management	Bales Ginned	Labor	Power	Repairs	Ins.	Management.	Of. Sal.	Misc.
$15,000	$288	$ 856	100	$ 86	$ 16	$ 49	$ 8	$ 15	$ 10	$ 35
16,000	292	867	200	172	32	98	16	30	20	70
17,000	297	878	300	258	48	147	24	45	30	105
18,000	302	889	400	344	64	196	32	60	40	140
19,000	306	901	500	430	80	245	40	75	50	175
20,000	311	912	600	516	96	294	48	90	60	210
21,000	316	923	700	602	112	343	56	105	70	245
22,000	320	935	800	688	128	392	64	120	80	280
23,000	325	946	900	774	144	441	72	135	90	315
24,000	330	957	1,000	860	160	490	80	150	100	350
25,000	335	969	1,100	946	176	539	88	165	110	385
26,000	339	980	1,200	1,032	192	588	96	180	120	420
27,000	344	991	1,300	1,118	208	637	104	195	130	455
28,000	349	1,002	1,400	1,204	224	686	112	210	140	490
29,000	353	1,014	1,500	1,290	240	735	120	225	150	525
30,000	358	1,025	1,600	1,376	256	784	128	240	160	560
31,000	363	1,036	1,700	1,462	272	833	136	255	170	595
32,000	367	1,048	1,800	1,548	288	882	144	270	180	630
33,000	372	1,059	1,900	1,634	304	931	152	285	190	665
34,000	377	1,070	2,000	1,720	320	980	160	300	200	700
35,000	382	1,082	2,100	1,806	336	1,029	168	315	210	735
36,000	386	1,093	2,200	1,892	352	1,078	176	330	220	770
37,000	391	1,104	2,300	1,978	368	1,127	184	345	230	805
38,000	396	1,115	2,400	2,064	384	1,176	192	360	240	840
39,000	400	1,127	2,500	2,150	400	1,225	200	375	250	875
40,000	405	1,138	2,600	2,236	416	1,274	208	390	260	910
41,000	410	1,149	2,700	2,322	432	1,323	216	405	270	945
42,000	414	1,161	2,800	2,408	448	1,372	224	420	280	980
43,000	419	1,172	2,900	2,494	464	1,421	232	435	290	1,015
44,000	424	1,183	3,000	2,580	480	1,470	240	450	300	1,050
45,000	429	1,195	3,100	2,666	496	1,519	248	465	310	1,085
			3,200	2,752	512	1,568	256	480	320	1,120
			3,300	2,838	528	1,617	264	495	330	1,155
			3,400	2,924	544	1,666	272	510	340	1,190
			3,500	3,010	560	1,715	280	525	350	1,225
			3,600	3,096	576	1,764	288	540	360	1,260
			3,700	3,182	592	1,813	296	555	370	1,295
			3,800	3,268	608	1,862	304	570	380	1,330
			3,900	3,354	624	1,911	312	585	390	1,365
			4,000	3,440	640	1,960	320	600	400	1,400

Labor	$503
Power	374
Repairs	470
Insurance	386
Of. Salaries	204
Miscellaneous	183

Table 45.—Computed Items of Cost—Diesel Power—High and Low Plains Area, 1930-1938

Fixed Costs					Variable Costs							
Investment	Labor	Power	Taxes	Management	Bales Ginned	Labor	Power	Repairs	Ins.	Mgt.	Of. Sal.	Misc.
$15,000	$263	$ 83	$211	$ 800	100	$ 85	$ 18	$ 25	$ 6	$ 14	$ 14	$ 13
16,000	279	91	217	813	200	170	36	50	12	28	28	26
17,000	296	99	223	825	300	255	54	75	18	42	42	39
18,000	312	107	229	838	400	340	72	100	24	56	56	52
19,000	329	115	236	850	500	425	90	125	30	70	70	65
20,000	345	123	242	863	600	510	108	150	36	84	84	78
21,000	362	131	248	876	700	595	126	175	42	98	98	91
22,000	378	139	255	888	800	680	144	200	48	112	112	104
23,000	395	147	261	901	900	765	162	225	54	126	126	117
24,000	411	155	267	913	1,000	850	180	250	60	140	140	130
25,000	428	163	274	926	1,100	935	198	275	66	154	154	143
26,000	444	171	280	939	1,200	1,020	216	300	72	168	168	156
27,000	461	179	286	951	1,300	1,105	234	325	78	182	182	169
28,000	477	187	292	964	1,400	1,190	252	350	84	196	196	182
29,000	494	195	299	976	1,500	1,275	270	375	90	210	210	195
30,000	510	203	305	989	1,600	1,360	288	400	96	224	224	208
31,000	527	211	311	1,002	1,700	1,445	306	425	102	238	238	221
32,000	543	219	318	1,014	1,800	1,530	324	450	108	252	252	234
33,000	560	227	324	1,027	1,900	1,615	342	475	114	266	266	247
34,000	576	235	330	1,039	2,000	1,700	360	500	120	280	280	260
35,000	593	243	337	1,052	2,100	1,785	378	525	126	294	294	273
36,000	609	251	343	1,065	2,200	1,870	396	550	132	308	308	286
37,000	626	259	349	1,077	2,300	1,955	414	575	138	322	322	299
38,000	642	267	355	1,090	2,400	2,040	432	600	144	336	336	312
39,000	659	275	362	1,102	2,500	2,125	450	625	150	350	350	325
40,000	675	283	368	1,115	2,600	2,210	468	650	156	364	364	338
41,000	692	291	374	1,128	2,700	2,295	486	675	162	378	378	351
42,000	708	299	381	1,140	2,800	2,380	504	700	168	392	392	364
43,000	725	307	387	1,153	2,900	2,465	522	725	174	406	406	377
44,000	741	315	393	1,165	3,000	2,550	540	750	180	420	420	390
45,000	758	323	400	1,178	3,100	2,635	558	775	186	434	434	403
					3,200	2,720	576	800	192	448	448	416
Investment Costs					3,300	2,805	594	825	198	462	462	429
$ 500	$ 8	$ 4	$ 3	$ 6	3,400	2,890	612	850	204	476	476	442
1,000	17	8	6	13	3,500	2,975	630	875	210	490	490	455
					3,600	3,060	648	900	216	504	504	468
					3,700	3,145	666	925	222	518	518	481
					3,800	3,230	684	950	228	532	532	494
					3,900	3,315	702	975	234	546	546	507
					4,000	3,400	720	1,000	240	560	560	520

Repairs	$550
Insurance	392
Of. Salaries	118
Miscellaneous	413

Table 46.—Computed Items of Cost—Electric Power—High and Low Plains Area 1930-1938

Fixed Costs			Variable Costs						
Investment	Taxes	Management	Bales Ginned	Labor	Power	Repairs	Ins.	Of. Sal.	Misc.
$15,000	$141	$1,132	100	$ 83	$ 64	$ 33	$ 9	$ 17	$ 28
16,000	156	1,150	200	166	128	66	18	34	56
17,000	171	1,168	300	249	192	99	27	51	84
18,000	186	1,186	400	332	256	132	36	68	112
19,000	202	1,205	500	415	320	165	45	85	140
20,000	217	1,223	600	498	384	198	54	102	168
21,000	232	1,241	700	581	448	231	63	119	196
22,000	248	1,260	800	664	512	264	72	136	224
23,000	263	1,278	900	747	576	297	81	153	252
24,000	278	1,296	1,000	830	640	330	90	170	280
25,000	294	1,315	1,100	913	704	363	99	187	308
26,000	309	1,333	1,200	996	768	396	108	204	336
27,000	324	1,351	1,300	1,079	832	429	117	221	364
28,000	339	1,369	1,400	1,162	896	462	126	238	392
29,000	355	1,388	1,500	1,245	960	495	135	255	420
30,000	370	1,406	1,600	1,328	1,024	528	144	272	448
31,000	385	1,424	1,700	1,411	1,088	561	153	289	476
32,000	401	1,443	1,800	1,494	1,152	594	162	306	504
33,000	416	1,461	1,900	1,577	1,216	627	171	323	532
34,000	431	1,479	2,000	1,660	1,280	660	180	340	560
35,000	447	1,498	2,100	1,743	1,344	693	189	357	588
36,000	462	1,516	2,200	1,826	1,408	726	198	374	616
37,000	477	1,534	2,300	1,909	1,472	759	207	391	644
38,000	492	1,552	2,400	1,992	1,536	792	216	408	672
39,000	508	1,571	2,500	2,075	1,600	825	225	425	700
40,000	523	1,589	2,600	2,158	1,664	858	234	442	728
			2,700	2,241	1,728	891	243	459	756
Investment Costs			2,800	2,324	1,792	924	252	476	784
200	$ 3	$ 4	2,900	2,407	1,856	957	261	493	812
400	6	7	3,000	2,490	1,920	990	270	510	840
600	9	11	3,100	2,573	1,984	1,023	279	527	868
800	12	15	3,200	2,656	2,048	1,056	288	544	896
1,000	15	18	3,300	2,739	2,112	1,089	297	561	924
			3,400	2,822	2,176	1,122	306	578	952
Labor		$288	3,500	2,905	2,240	1,155	315	595	980
Power		383	3,600	2,988	2,304	1,188	324	612	1,008
Repairs		79	3,700	3,071	2,368	1,221	333	629	1,036
Insurance		395	3,800	3,154	2,432	1,254	342	646	1,064
Of. Salaries		131	3,900	3,237	2,496	1,287	351	663	1,092
Miscellaneous		102	4,000	3,320	2,560	1,320	360	680	1,120

Table 47.—Computed Items of Cost—Large Gins—High and Low Plains Area 1930-1938

Fixed Costs						Variable Costs				
No. Saws	Ins.	Taxes	Of. Sal.	Invest-ment	Manage-ment	Bales Ginned	Labor	Power	Re-pairs	Misc.
700	$ 993	$ 740	$ 590	$20,000	$1,276	100	$ 95	$ 26	$ 27	$ 16
750	1,063	844	795	22,000	1,316	200	190	52	54	32
800	1,133	947	1,000	24,000	1,356	300	285	78	81	48
1,050	1,483	1,465	2,025	26,000	1,397	400	380	104	108	64
1,200	1,693	1,775	2,640	28,000	1,437	500	475	130	135	80
				30,000	1,477	600	570	156	162	96
Size Costs				32,000	1,517	700	665	182	189	112
70	$ 98	$ 145	$ 287	34,000	1,557	800	760	208	216	128
80	112	166	328	36,000	1,598	900	855	234	243	144
				38,000	1,638	1,000	950	260	270	160
				40,000	1,678	1,100	1,045	286	297	176
Labor			$ 992	42,000	1,718	1,200	1,140	312	324	192
				44,000	1,758	1,300	1,235	338	351	208
Power			569	46,000	1,799	1,400	1,330	364	378	224
				48,000	1,839	1,500	1,425	390	405	240
Repairs			1,689	50,000	1,879	1,600	1,520	416	432	256
				52,000	1,919	1,700	1,615	442	459	272
Miscellaneous			839	54,000	1,959	1,800	1,710	468	486	288
				56,000	2,000	1,900	1,805	494	513	304
				58,000	2,040	2,000	1,900	520	540	320
				60,000	2,080	2,100	1,995	546	567	336
				62,000	2,120	2,200	2,090	572	594	352
				64,000	2,160	2,300	2,185	598	621	368
				66,000	2,201	2,400	2,280	624	648	384
				68,000	2,241	2,500	2,375	650	675	400
				70,000	2,281	2,600	2,470	676	702	416
				72,000	2,321	2,700	2,565	702	729	432
				74,000	2,361	2,800	2,660	728	756	448
				76,000	2,402	2,900	2,755	754	783	464
				78,000	2,442	3,000	2,850	780	810	480
				80,000	2,482	3,100	2,945	806	837	496
				82,000	2,522	3,200	3,040	832	864	512
				84,000	2,562	3,300	3,135	858	891	528
				86,000	2,603	3,400	3,230	884	918	544
				88,000	2,643	3,500	3,325	910	945	560
				90,000	2,683	3,600	3,420	936	972	576
						3,700	3,515	962	999	592
				Inv. Costs		3,800	3,610	988	1,026	608
				$ 500	$ 10	3,900	3,705	1,014	1,053	624
				1,000	20	4,000	3,800	1,040	1,080	640
						5,000	4,750	1,300	1,350	800
						6,000	5,700	1,560	1,620	960
						7,000	6,650	1,820	1,890	1,120
						8,000	7,600	2,080	2,160	1,280

Table 48.—Computed Items of Cost—Diesel Power—Gulf Coast Area 1930-1938

Fixed Costs			Variable Costs						
Investment	Repairs	Management	Bales Ginned	Labor	Power	Repairs	Ins.	Management	Misc.
$10,000	$146	$ 604	100	$ 87	$ 22	$ 36	$ 7	$ 22	$ 25
11,000	158	626	200	174	44	72	14	44	50
12,000	169	648	300	261	66	108	21	66	75
13,000	181	670	400	348	88	144	28	88	100
14,000	192	692	500	435	110	180	35	110	125
15,000	204	714	600	522	132	216	42	132	150
16,000	215	736	700	609	154	252	49	154	175
17,000	227	758	800	696	176	288	56	176	200
18,000	238	780	900	783	198	324	63	198	225
19,000	250	802	1,000	870	220	360	70	220	250
20,000	261	824	1,100	957	242	396	77	242	275
21,000	273	846	1,200	1,044	264	432	84	264	300
22,000	284	868	1,300	1,131	286	468	91	286	325
23,000	296	890	1,400	1,218	308	504	98	308	350
24,000	307	912	1,500	1,305	330	540	105	330	375
25,000	319	934	1,600	1,392	352	576	112	352	400
26,000	330	956	1,700	1,479	374	612	119	374	425
27,000	342	978	1,800	1,566	396	648	126	396	450
28,000	353	1,000	1,900	1,653	418	684	133	418	475
29,000	365	1,022	2,000	1,740	440	720	140	440	500
30,000	376	1,044	2,100	1,827	462	756	147	462	525
31,000	388	1,066	2,200	1,914	484	792	154	484	550
32,000	399	1,088	2,300	2,001	506	828	161	506	575
33,000	411	1,110	2,400	2,088	528	864	168	528	600
34,000	422	1,132	2,500	2,175	550	900	175	550	625
35,000	434	1,154	2,600	2,262	572	936	182	572	650
36,000	445	1,176	2,700	2,349	594	972	189	594	675
37,000	457	1,198	2,800	2,436	616	1,008	196	616	700
38,000	468	1,220	2,900	2,523	638	1,044	203	638	725
39,000	480	1,242	3,000	2,610	660	1,080	210	660	750
40,000	491	1,264	3,100	2,697	682	1,116	217	682	775
			3,200	2,784	704	1,152	224	704	800
			3,300	2,871	726	1,188	231	726	825
			3,400	2,958	748	1,224	238	748	850
			3,500	3,045	770	1,260	245	770	875

Investment Costs		
$ 500	$ 6	$ 11
1,000	12	22

Labor	$425
Power	86
Insurance	294
Miscellaneous	275

Arithmetic Average
Taxes $251

Table 49.—Computed Items of Cost—Electric Power—Gulf Coast Area 1930-1938

Fixed Costs	Variable Costs						
	Bales Ginned	Labor	Power	Re-pairs	Ins.	Taxes	Misc.
	100	$ 102	$ 58	$ 48	$ 11	$ 10	$ 34
Labor $235	200	204	116	96	22	20	68
	300	306	174	144	33	30	102
Power 90	400	408	232	192	44	40	136
	500	510	290	240	55	50	170
Repairs 36	600	612	348	288	66	60	204
	700	714	406	336	77	70	238
Insurance 190	800	816	464	384	88	80	272
	900	918	522	432	99	90	306
Taxes 102	1,000	1,020	580	480	110	100	340
	1,100	1,122	638	528	121	110	374
Miscellaneous 4	1,200	1,224	696	576	132	120	408
	1,300	1,326	754	624	143	130	442
	1,400	1,428	812	672	154	140	476
	1,500	1,530	870	720	165	150	510
Arithmetic Average	1,600	1,632	928	768	176	160	544
	1,700	1,734	986	816	187	170	578
Management $838	1,800	1,836	1,044	864	198	180	612
	1,900	1,938	1,102	912	209	190	646
	2,000	2,040	1,160	960	220	200	680
	2,100	2,142	1,218	1,008	231	210	714
	2,200	2,244	1,276	1,056	242	220	748
	2,300	2,346	1,334	1,104	253	230	782
	2,400	2,448	1,392	1,152	264	240	816
	2,500	2,550	1,450	1,200	275	250	850
	2,600	2,652	1,508	1,248	286	260	884
	2,700	2,754	1,566	1,296	297	270	918
	2,800	2,856	1,624	1,344	308	280	952
	2,900	2,958	1,682	1,392	319	290	986
	3,000	3,060	1,740	1,440	330	300	1,020

Profits of Ginning

In a competitive economy, a business to survive, must earn at least a reasonable profit. One of the most important features of cost to the ginner is that it represents a deduction from his gin income. While the ginner may be interested in means for computing ginning cost he is likewise interested in means for computing profit. In computing the profit of the gin business, an additional factor must be considered, the gin income per bale. This income per bale times the number of bales ginned gives the total gin income. The relationship between the gin income and the cost of ginning determines whether the ginner suffers a loss, breaks even, or makes a profit.

Gin income as used in this discussion is the gin toll added to the net profits on bagging and ties and cottonseed. The gin income per bale is the total gin income divided by the number of bales ginned.[1]

Tables of "Break Even" Volume

Net profits of the gin business may be approached from the standpoint of the "break even" volume. At this volume, cost and gin income are

[1]Profit, or loss, on lint cotton which may be bought by the ginner and on a sideline business may be reduced to a per bale profit, or loss, and the gin income per bale adjusted accordingly.

identical. If the "break even" volume be considered as a unit of ginning, the volume beyond this point may be considered as the "profit" volume. Two facts stand out in bold relief from this division of the total volume of ginning. (a) The gin income on the "break even" volume pays all the fixed cost of ginning and all the variable cost of this volume. (b) The only cost deduction from the "profit" volume is the variable cost of this volume. Thus the profit per bale on the "profit" volume is the gin income per bale less the variable cost per bale.

The approach to net profits of ginning from the standpoint of the "break even" volume is facilitated by two types of tables. The one shows net profits per bale on the "profit" volume according to section of the state, type of power, and gin income per bale. To serve this purpose, Table 50 was compiled. For example, Table 50 indicates that at a gin income of $5.25 per bale in the Blackland Area the profits per bale on the "profit" volume are $3.47, $3.88, and $3.20 for steam, Diesel, and electric gins. The total net profit in each instance is the product of this profit per bale and the number of "profit" bales. The other type of table shows the "break even" volume for gins according to various investments in the gin plant and various gin incomes per bale by section of the state and type of power. To serve this purpose Tables 51 to 59 were compiled. For example, Table 51 shows that a steam plant in the Blackland Area with an investment of $20,000 has "break even" volumes of 1,617, 1,115, and 851 bales at gin incomes of $4.00, $5.00, and $6.00 per bale.

How to Use Tables of "Break Even" Volumes

Several definite types of questions may be answered by the use of the tables of "break even" volumes. A ginner operating a $26,000 Diesel plant of average efficiency in the Gulf Coast Area may wish to know:

1. The net profit on a volume of 1,500 bales at a gin income of $6.25 per bale. According to Table 58, the "break even" volume is 986 bales; thus the "profit" volume is 1,500 — 986, or 514 bales. According to Table 50, the net profit per bale on the "profit" volume is $4.26. Thus the total net profit is $4.26 x 514, or $2,190.

2. The volume needed at a gin income of $6.25 per bale to earn:
   a. A net profit of $2,000. Since the net profit per bale on the "profit" volume is $4.26, the number of "profit" bales needed is 2,000 ÷ 4.26, or 469. The needed volume is 469 + 986, or 1,455 bales.
   b. A return of 10 per cent on the investment. On an investment of $26,000 this means a net profit of $2,600. The number of "profit" bales needed is 2,600 ÷ 4.26, or 610. Thus the needed volume is 610 + 986, or 1,596 bales.

3. The effect of a reduction of five cents in the gin rate per cwt. of seed cotton on a volume of 1,500 bales. This means a reduction in the gin income per bale of about 75 cents. According to the example in Point 1. above, the net profit at a volume of 1,500 bales and a gin income of $6.25 per bale is $2,190. At a reduction of 75 cents per bale, the gin income drops to $5.50 per bale. According to Table 58, the "break even" volume of a $26,000 Diesel gin in the Golf Coast Area with a gin income of $5.50 per bale is 1,196 bales. The "profit" volume is 1,500 — 1,196, or 304 bales. According to Table 50 the net profit per bale on the "profit" volume is $3.51. Thus the net profit is $3.51 × 304, or $1,067. The higher gin income per bale yields a net return on the investment of 8.4 per cent; the lower a net return of 4.1 per cent.

4. The effect on net profits of buying the cotton of his patrons at a price above the market. Ginners buy their patrons cotton at a price above the market with the expectation, rather generally, of increasing their volume of

ginning. Increased volume decreases the cost of ginning per bale. The ginner in question makes a profit of $2,190 on a volume of 1,500 bales at a gin income of $6.25 per bale. Suppose this ginner decides to overpay for cotton at the rate of $1.25 per bale. The question arises, What volume must this ginner attain to improve his profit position? This overpayment for the cotton purchased has the effect of reducing the gin income per bale to $5.00. At this gin income, according to Table 58, the "break even" volume is 1,395 bales. The net profit per bale on the "profit" volume, according to Table 50, is $3.01. Thus the number of "profit" bales needed is 2,190 ÷ 3.01, or 728. The volume needed to earn a net profit of $2,190 is 728 + 1,395, or 2,123 bales. This ginner would find it necessary to increase his volume by more than 42 per cent to improve his profit status through overpaying for cotton at the rate of $1.25 per bale.

The figures given at the bottom of the tables of "break even" volume facilitate adjustments for investments falling within the even $1,000. For instance, the problem is to find the "break even" volume of a steam gin in the Blackland Area with an investment of $16,800 and a gin income of $5.25 per bale. According to Table 51, the "break even" volume at an investment of $16,000 is 927. The additional investment of $800 requires 21 bales more. Thus the "break even" volume for an investment of $16,800 is 927 + 21, or 948 bales.

Table 50.—Gin Income[1] Per Bale Less Variable Cost of Ginning (Dollars) 1930-1938

Income Per Bale	Blackland Area			High and Low Plains Area				Gulf Coast Area		Income Per Bale
	Steam	Diesel	Electric	Steam	Diesel	Electric	Large	Diesel	Electric	
4.00	2.22	2.63	1.95	1.75	2.24	1.58	2.25	2.01	1.41	4.00
4.25	2.47	2.88	2.20	2.00	2.49	1.83	2.50	2.26	1.66	4.25
4.50	2.72	3.13	2.45	2.25	2.74	2.08	2.75	2.51	1.91	4.50
4.75	2.97	3.38	2.70	2.50	2.99	2.33	3.00	2.76	2.16	4.75
5.00	3.22	3.63	2.95	2.75	3.24	2.58	3.25	3.01	2.41	5.00
5.25	3.47	3.88	3.20	3.00	3.49	2.83	3.50	3.26	2.66	5.25
5.50	3.72	4.13	3.45	3.25	3.74	3.08	3.75	3.51	2.91	5.50
5.75	3.97	4.38	3.70	3.50	3.99	3.33	4.00	3.76	3.16	5.75
6.00	4.22	4.63	3.95	3.75	4.24	3.58	4.25	4.01	3.41	6.00
6.25	4.47	4.88	4.20	4.00	4.49	3.83	4.50	4.26	3.66	6.25
6.50	4.72	5.13	4.45	4.25	4.74	4.08	4.75	4.51	3.91	6.50
6.75	4.97	5.38	4.70	4.50	4.99	4.33	5.00	4.76	4.16	6.75
7.00	5.22	5.63	4.95	4.75	5.24	4.58	5.25	5.01	4.41	7.00
7.25	5.47	5.88	5.20	5.00	5.49	4.83	5.50	5.26	4.66	7.25
7.50	5.72	6.13	5.45	5.25	5.74	5.08	5.75	5.51	4.91	7.50
7.75	5.97	6.38	5.70	5.50	5.99	5.33	6.00	5.76	5.16	7.75
8.00	6.22	6.63	5.95	5.75	6.24	5.58	6.25	6.01	5.41	8.00

[1]Gin income per bale as used in this connection is composed of the gin toll and the net profits per bale on bagging and ties and cottonseed.

Table 51.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Steam Power—Blackland Area, 1930-1938

Investment	Gin Income Per Bale								
	$4.00	$4.25	$4.50	$4.75	$5.00	$5.25	$5.50	$5.75	$6.00
$ 6,000	1,031	926	841	770	711	659	615	576	542
7,000	1,073	964	875	801	740	686	640	599	564
8,000	1,115	1,001	909	833	769	713	665	623	586
9,000	1,157	1,039	944	864	798	739	690	646	608
10,000	1,199	1,077	978	895	827	766	715	670	630
11,000	1,240	1,114	1,012	927	855	793	740	693	652
12,000	1,282	1,152	1,046	958	884	820	765	717	674
13,000	1,324	1,190	1,080	989	913	847	790	740	696
14,000	1,366	1,227	1,115	1,021	942	874	815	764	718
15,000	1,408	1,265	1,149	1,052	971	900	840	787	740
16,000	1,450	1,303	1,183	1,083	1,000	927	865	811	762
17,000	1,492	1,340	1,217	1,115	1,029	954	890	834	784
18,000	1,534	1,378	1,251	1,146	1,058	981	915	857	807
19,000	1,575	1,416	1,286	1,177	1,086	1,008	940	881	829
20,000	1,617	1,453	1,320	1,209	1,115	1,035	965	904	851
21,000	1,659	1,491	1,354	1,240	1,144	1,061	990	928	873
22,000	1,701	1,529	1,388	1,271	1,173	1,088	1,015	951	895
23,000	1,743	1,566	1,423	1,303	1,202	1,115	1,040	975	917
24,000	1,785	1,604	1,457	1,334	1,231	1,142	1,065	998	939
25,000	1,827	1,642	1,491	1,365	1,260	1,169	1,090	1,022	961
26,000	1,869	1,679	1,525	1,397	1,289	1,196	1,115	1,045	983
27,000	1,910	1,717	1,559	1,428	1,317	1,222	1,140	1,069	1,005
28,000	1,952	1,755	1,594	1,459	1,346	1,249	1,165	1,092	1,027
29,000	1,994	1,792	1,628	1,491	1,375	1,276	1,190	1,116	1,049
30,000	2,036	1,830	1,662	1,522	1,404	1,303	1,215	1,139	1,071
200	8	8	7	6	6	5	5	5	4
400	17	15	14	13	12	11	10	9	9
600	25	23	21	19	17	16	15	14	13
800	34	30	27	25	23	21	20	19	18
1,000	42	38	34	31	29	27	25	23	22

Table 52.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Diesel Power—Blackland Area, 1930-1938

Investment	Gin Income Per Bale								
	$4.00	$4.25	$4.50	$4.75	$5.00	$5.25	$5.50	$5.75	$6.00
$ 6,000	1,088	948	872	808	752	704	661	624	590
7,000	1,072	979	900	834	776	727	683	644	609
8,000	1,106	1,010	929	861	801	750	704	664	628
9,000	1,139	1,040	957	887	825	772	726	685	647
10,000	1,173	1,071	985	913	850	795	747	705	667
11,000	1,207	1,102	1,014	939	874	818	769	725	686
12,000	1,241	1,133	1,042	966	899	841	790	745	705
13,000	1,274	1,164	1,070	992	923	864	812	765	724
14,000	1,308	1,194	1,099	1,018	948	887	833	786	743
15,000	1,342	1,225	1,127	1,044	972	909	855	806	762
16,000	1,376	1,256	1,155	1,071	997	932	876	826	781
17,000	1,409	1,287	1,184	1,097	1,021	955	898	846	800
18,000	1,443	1,318	1,212	1,123	1,045	978	919	866	820
19,000	1,477	1,348	1,240	1,149	1,070	1,001	941	887	839
20,000	1,511	1,379	1,269	1,176	1,094	1,024	962	907	858
21,000	1,544	1,410	1,297	1,202	1,119	1,046	984	927	877
22,000	1,578	1,441	1,325	1,228	1,143	1,069	1,005	947	896
23,000	1,612	1,471	1,354	1,254	1,168	1,092	1,027	968	915
24,000	1,646	1,502	1,382	1,281	1,192	1,115	1,048	988	934
25,000	1,679	1,533	1,410	1,307	1,217	1,138	1,070	1,008	953
26,000	1,713	1,564	1,439	1,333	1,241	1,161	1,091	1,028	973
27,000	1,747	1,595	1,467	1,359	1,266	1,183	1,113	1,048	992
28,000	1,781	1,625	1,495	1,386	1,290	1,206	1,134	1,069	1,011
29,000	1,814	1,656	1,524	1,412	1,315	1,229	1,156	1,089	1,030
30,000	1,848	1,687	1,552	1,438	1,339	1,252	1,177	1,109	1,049
200	7	6	6	5	5	5	4	4	4
400	14	12	11	11	10	9	9	8	8
600	20	18	17	16	15	14	13	12	11
800	27	25	23	21	20	18	17	16	15
1,000	34	31	28	26	24	23	22	20	19

Table 53.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Electric Power—Blackland Area, 1930-1938

Investment	Gin Income Per Bale								
	$4.00	$4.25	$4.50	$4.75	$5.00	$5.25	$5.50	$5.75	$6.00
$ 6,000	1,253	1,111	998	905	828	764	708	661	619
7,000	1,283	1,138	1,022	927	848	783	725	677	634
8,000	1,314	1,165	1,046	949	868	801	742	693	649
9,000	1,344	1,192	1,070	971	888	820	760	709	664
10,000	1,375	1,219	1,095	993	908	838	777	725	679
11,000	1,405	1,246	1,119	1,015	929	857	794	741	694
12,000	1,435	1,272	1,143	1,037	949	875	811	757	709
13,000	1,466	1,299	1,167	1,059	969	894	828	773	724
14,000	1,496	1,326	1,191	1,081	989	912	846	789	739
15,000	1,527	1,353	1,215	1,103	1,009	931	863	805	754
16,000	1,557	1,380	1,240	1,125	1,029	949	880	821	769
17,000	1,587	1,407	1,264	1,146	1,049	968	897	837	783
18,000	1,618	1,434	1,288	1,168	1,069	986	914	853	798
19,000	1,648	1,461	1,312	1,190	1,089	1,005	932	869	813
20,000	1,679	1,488	1,336	1,212	1,109	1,023	949	885	828
21,000	1,709	1,515	1,360	1,234	1,130	1,042	966	901	843
22,000	1,739	1,541	1,384	1,256	1,150	1,060	983	917	858
23,000	1,770	1,568	1,409	1,278	1,170	1,079	1,000	933	873
24,000	1,800	1,595	1,433	1,300	1,190	1,097	1,018	949	888
25,000	1,831	1,622	1,457	1,322	1,210	1,116	1,035	965	903
26,000	1,861	1,649	1,481	1,344	1,230	1,134	1,052	981	918
200	6	5	5	4	4	4	3	3	3
400	12	11	10	9	8	7	7	6	6
600	18	16	14	13	12	11	10	10	9
800	24	22	19	18	16	15	14	13	12
1,000	30	27	24	22	20	19	17	16	15

Table 54.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Steam Power—High and Low Plains Area, 1930-1938

Investment	Gin Income Per Bale									
	$5.00	$5.25	$5.50	$5.75	$6.00	$6.25	$6.50	$6.75	$7.00	$7.25
$15,000	1,556	1,427	1,317	1,223	1,141	1,070	1,007	951	901	856
16,000	1,578	1,447	1,335	1,240	1,157	1,085	1,021	964	913	868
17,000	1,599	1,466	1,353	1,257	1,173	1,100	1,035	977	926	880
18,000	1,621	1,486	1,372	1,274	1,188	1,114	1,049	991	938	891
19,000	1,642	1,506	1,390	1,291	1,204	1,129	1,063	1,004	951	903
20,000	1,664	1,526	1,408	1,308	1,220	1,144	1,077	1,017	963	915
21,000	1,685	1,545	1,426	1,324	1,236	1,159	1,091	1,030	976	927
22,000	1,707	1,565	1,444	1,341	1,252	1,174	1,105	1,043	988	939
23,000	1,728	1,585	1,463	1,358	1,267	1,188	1,118	1,056	1,001	951
24,000	1,750	1,605	1,481	1,375	1,283	1,203	1,132	1,070	1,013	962
25,000	1,771	1,624	1,499	1,392	1,299	1,218	1,146	1,083	1,026	974
26,000	1,793	1,644	1,517	1,409	1,315	1,233	1,160	1,096	1,038	986
27,000	1,814	1,664	1,535	1,426	1,331	1,248	1,174	1,109	1,051	998
28,000	1,836	1,684	1,554	1,443	1,346	1,262	1,188	1,122	1,063	1,010
29,000	1,857	1,703	1,572	1,460	1,362	1,277	1,202	1,135	1,076	1,022
30,000	1,879	1,723	1,590	1,477	1,378	1,292	1,216	1,149	1,088	1,033
31,000	1,901	1,743	1,608	1,493	1,394	1,307	1,230	1,162	1,100	1,045
32,000	1,922	1,762	1,626	1,510	1,410	1,322	1,244	1,175	1,113	1,057
33,000	1,944	1,782	1,645	1,527	1,425	1,336	1,258	1,188	1,125	1,069
34,000	1,965	1,802	1,663	1,544	1,441	1,351	1,272	1,201	1,138	1,081
35,000	1,987	1,822	1,681	1,561	1,457	1,366	1,286	1,214	1,150	1,093
36,000	2,008	1,841	1,699	1,578	1,473	1,381	1,300	1,228	1,163	1,104
37,000	2,030	1,861	1,717	1,595	1,489	1,396	1,314	1,241	1,175	1,116
38,000	2,051	1,881	1,736	1,612	1,504	1,410	1,327	1,254	1,188	1,128
39,000	2,073	1,901	1,754	1,629	1,520	1,425	1,341	1,267	1,200	1,140
40,000	2,094	1,920	1,772	1,646	1,536	1,440	1,355	1,280	1,213	1,152
41,000	2,116	1,940	1,790	1,662	1,552	1,455	1,369	1,293	1,225	1,164
42,000	2,137	1,960	1,808	1,679	1,568	1,470	1,383	1,307	1,238	1,175
43,000	2,159	1,980	1,827	1,696	1,583	1,484	1,397	1,320	1,250	1,187
44,000	2,180	1,999	1,845	1,713	1,599	1,499	1,411	1,333	1,263	1,199
45,000	2,202	2,019	1,863	1,730	1,615	1,514	1,425	1,346	1,275	1,211
200	4	4	4	3	3	3	3	3	2	2
400	9	8	7	7	6	6	6	5	5	5
600	13	12	11	10	9	9	8	8	7	7
800	17	16	15	14	13	12	11	11	10	9
1,000	22	20	18	17	16	15	14	13	12	12

Table 55.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Diesel Power—High and Low Plains Area, 1930-1938

Investment	Gin Income Per Bale									
	$5.00	$5.25	$5.50	$5.75	$6.00	$6.25	$6.50	$6.75	$7.00	$7.25
$15,000	1,127	1,047	977	916	862	814	771	732	697	665
16,000	1,162	1,079	1,007	944	888	839	795	754	718	685
17,000	1,196	1,111	1,037	972	915	864	818	777	740	706
18,000	1,231	1,143	1,067	1,000	941	889	842	799	761	726
19,000	1,265	1,175	1,097	1,028	968	914	866	822	782	747
20,000	1,300	1,207	1,127	1,056	994	939	889	844	804	767
21,000	1,335	1,239	1,157	1,084	1,020	964	913	867	825	787
22,000	1,369	1,271	1,187	1,112	1,047	989	936	889	847	808
23,000	1,404	1,304	1,216	1,141	1,073	1,013	960	911	868	828
24,000	1,438	1,336	1,246	1,169	1,100	1,038	984	934	889	849
25,000	1,473	1,368	1,276	1,197	1,126	1,063	1,007	956	911	869
26,000	1,508	1,400	1,306	1,225	1,152	1,088	1,031	979	932	889
27,000	1,543	1,432	1,336	1,253	1,179	1,113	1,055	1,001	953	910
28,000	1,577	1,464	1,366	1,281	1,205	1,138	1,078	1,024	975	930
29,000	1,611	1,496	1,396	1,309	1,232	1,163	1,102	1,046	996	951
30,000	1,646	1,528	1,426	1,337	1,258	1,188	1,125	1,068	1,018	971
31,000	1,681	1,560	1,456	1,365	1,284	1,213	1,149	1,091	1,039	991
32,000	1,715	1,592	1,486	1,393	1,311	1,238	1,173	1,113	1,060	1,012
33,000	1,750	1,624	1,516	1,421	1,337	1,263	1,196	1,136	1,082	1,032
34,000	1,784	1,656	1,546	1,449	1,364	1,288	1,220	1,158	1,103	1,053
35,000	1,819	1,688	1,576	1,477	1,390	1,313	1,244	1,181	1,124	1,073
36,000	1,854	1,720	1,606	1,505	1,416	1,338	1,267	1,203	1,146	1,093
37,000	1,888	1,752	1,636	1,533	1,443	1,362	1,291	1,226	1,167	1,114
38,000	1,923	1,785	1,665	1,562	1,469	1,387	1,315	1,248	1,188	1,134
39,000	1,957	1,817	1,695	1,590	1,496	1,412	1,338	1,270	1,210	1,155
40,000	1,992	1,849	1,725	1,618	1,522	1,437	1,362	1,293	1,231	1,175
41,000	2,027	1,881	1,755	1,646	1,548	1,462	1,385	1,315	1,253	1,195
42,000	2,061	1,913	1,785	1,674	1,575	1,487	1,409	1,338	1,274	1,216
43,000	2,096	1,945	1,815	1,702	1,601	1,512	1,433	1,360	1,295	1,236
44,000	2,130	1,977	1,845	1,730	1,628	1,537	1,456	1,383	1,317	1,257
45,000	2,165	2,009	1,875	1,758	1,654	1,562	1,480	1,405	1,338	1,277
200	7	6	6	6	5	5	5	4	4	4
400	14	13	12	11	11	10	9	9	9	8
600	21	19	18	17	16	15	14	13	13	12
800	28	26	24	22	21	20	19	18	17	16
1,000	35	32	30	28	26	25	24	22	21	20

Table 56.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Electric Power—High and Low Plains Area, 1930-1938

Investment	Gin Income Per Bale									
	$5.00	$5.25	$5.50	$5.75	$6.00	$6.25	$6.50	$6.75	$7.00	$7.25
$12,000	1,114	1,016	933	863	803	750	704	664	628	595
13,000	1,158	1,056	969	897	834	779	732	690	653	618
14,000	1,201	1,095	1,006	930	866	809	759	716	677	642
15,000	1,245	1,135	1,042	964	897	838	787	742	702	665
16,000	1,288	1,175	1,079	998	928	867	814	768	726	688
17,000	1,332	1,214	1,115	1,032	960	897	842	793	751	711
18,000	1,375	1,254	1,152	1,065	991	926	869	819	775	735
19,000	1,419	1,294	1,188	1,099	1,022	955	897	845	800	758
20,000	1,462	1,333	1,224	1,133	1,054	985	924	871	824	781
21,000	1,506	1,373	1,261	1,166	1,085	1,014	952	897	849	804
22,000	1,549	1,412	1,297	1,200	1,116	1,043	979	923	873	828
23,000	1,593	1,452	1,334	1,234	1,148	1,073	1,007	949	898	851
24,000	1,636	1,492	1,370	1,268	1,179	1,102	1,034	975	922	874
25,000	1,680	1,531	1,407	1,301	1,210	1,131	1,062	1,001	947	897
26,000	1,723	1,571	1,443	1,335	1,241	1,160	1,090	1,027	971	921
27,000	1,767	1,611	1,479	1,369	1,273	1,190	1,117	1,052	996	944
28,000	1,810	1,650	1,516	1,402	1,304	1,219	1,145	1,078	1,020	967
29,000	1,854	1,690	1,552	1,436	1,335	1,248	1,172	1,104	1,045	990
30,000	1,897	1,730	1,589	1,470	1,367	1,278	1,200	1,130	1,069	1,014
31,000	1,941	1,769	1,625	1,504	1,398	1,307	1,227	1,156	1,094	1,037
32,000	1,984	1,809	1,662	1,537	1,429	1,336	1,255	1,182	1,118	1,060
33,000	2,028	1,849	1,698	1,571	1,461	1,366	1,282	1,208	1,143	1,083
34,000	2,071	1,888	1,734	1,605	1,492	1,395	1,310	1,234	1,167	1,107
35,000	2,115	1,928	1,771	1,638	1,523	1,424	1,337	1,260	1,192	1,130
36,000	2,158	1,967	1,807	1,672	1,555	1,454	1,365	1,285	1,216	1,153
37,000	2,202	2,007	1,844	1,706	1,586	1,483	1,392	1,311	1,241	1,176
38,000	2,245	2,047	1,880	1,740	1,617	1,512	1,420	1,337	1,265	1,200
39,000	2,289	2,086	1,917	1,773	1,649	1,542	1,447	1,363	1,290	1,223
40,000	2,332	2,126	1,953	1,807	1,680	1,571	1,475	1,389	1,314	1,246
200	9	8	7	7	6	6	6	5	5	5
400	17	16	15	13	13	12	11	10	10	9
600	26	24	22	20	19	18	17	16	15	14
800	35	32	29	27	25	23	22	21	20	19
1,000	44	40	36	34	31	29	28	26	25	23

Table 57.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Large Gins—High and Low Plains Area, 1930-1938

Investment	Gin Income Per Bale									
	$5.00	$5.25	$5.50	$5.75	$6.00	$6.25	$6.50	$6.75	$7.00	$7.25
$20,000	2,210	2,053	1,916	1,796	1,690	1,596	1,512	1,437	1,368	1,306
22,000	2,275	2,113	1,972	1,849	1,740	1,643	1,556	1,479	1,408	1,344
24,000	2,339	2,173	2,028	1,901	1,789	1,690	1,601	1,521	1,448	1,383
26,000	2,404	2,233	2,084	1,954	1,839	1,736	1,645	1,563	1,488	1,421
28,000	2,469	2,293	2,140	2,006	1,888	1,783	1,689	1,605	1,528	1,459
30,000	2,534	2,354	2,197	2,059	1,938	1,830	1,734	1,647	1,568	1,497
32,000	2,598	2,414	2,253	2,112	1,987	1,877	1,778	1,689	1,608	1,536
34,000	2,663	2,474	2,309	2,164	2,037	1,923	1,822	1,732	1,649	1,574
36,000	2,728	2,534	2,365	2,217	2,086	1,970	1,867	1,774	1,689	1,612
38,000	2,793	2,594	2,421	2,269	2,136	2,017	1,911	1,816	1,729	1,650
40,000	2,857	2,654	2,477	2,322	2,185	2,064	1,955	1,858	1,769	1,689
42,000	2,922	2,714	2,533	2,375	2,235	2,110	1,999	1,900	1,809	1,727
44,000	2,987	2,774	2,589	2,427	2,284	2,157	2,044	1,942	1,849	1,765
46,000	3,052	2,834	2,645	2,480	2,334	2,204	2,088	1,984	1,889	1,802
48,000	3,116	2,894	2,701	2,532	2,383	2,251	2,132	2,026	1,929	1,842
50,000	3,181	2,955	2,758	2,585	2,433	2,297	2,177	2,068	1,969	1,880
52,000	3,246	3,015	2,814	2,638	2,482	2,344	2,221	2,110	2,009	1,918
54,000	3,311	3,075	2,870	2,690	2,532	2,391	2,265	2,152	2,049	1,956
56,000	3,375	3,135	2,926	2,743	2,581	2,438	2,310	2,194	2,089	1,995
58,000	3,440	3,195	2,982	2,795	2,631	2,484	2,354	2,237	2,130	2,033
60,000	3,505	3,255	3,038	2,848	2,681	2,531	2,398	2,279	2,170	2,071
62,000	3,569	3,315	3,094	2,901	2,730	2,578	2,443	2,321	2,210	2,110
64,000	3,634	3,375	3,150	2,953	2,780	2,625	2,487	2,363	2,250	2,148
66,000	3,699	3,435	3,206	3,006	2,829	2,672	2,531	2,405	2,290	2,186
68,000	3,764	3,496	3,263	3,059	2,879	2,719	2,576	2,447	2,330	2,224
70,000	3,828	3,555	3,319	3,111	2,928	2,765	2,620	2,489	2,370	2,263
72,000	3,893	3,616	3,375	3,164	2,978	2,812	2,664	2,531	2,410	2,301
74,000	3,958	3,676	3,431	3,216	3,027	2,859	2,709	2,573	2,450	2,339
76,000	4,023	3,736	3,487	3,269	3,077	2,905	2,753	2,615	2,490	2,377
78,000	4,087	3,796	3,543	3,322	3,126	2,952	2,797	2,657	2,530	2,416
80,000	4,152	3,856	3,599	3,374	3,176	2,999	2,841	2,699	2,570	2,454
82,000	4,217	3,916	3,655	3,427	3,225	3,046	2,886	2,741	2,610	2,492
84,000	4,282	3,976	3,711	3,479	3,275	3,092	2,930	2,784	2,651	2,530
86,000	4,346	4,036	3,767	3,532	3,324	3,139	2,974	2,826	2,691	2,569
88,000	4,411	4,097	3,824	3,585	3,374	3,186	3,019	2,868	2,731	2,607
90,000	4,476	4,157	3,880	3,637	3,423	3,233	3,063	2,910	2,771	2,645
200	6	6	6	5	5	5	4	4	4	4
400	13	12	11	11	10	9	9	8	8	8
600	19	18	17	16	15	14	13	13	12	11
800	26	24	22	21	20	19	18	17	16	15
1,000	32	30	28	26	25	23	22	21	20	19

Table 58.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Diesel Power—Gulf Coast Area, 1930-1938

Investment	Gin Income Per Bale									
	$5.00	$5.25	$5.50	$5.75	$6.00	$6.25	$6.50	$6.75	$7.00	$7.25
$10,000	886	818	760	710	665	626	592	561	533	507
11,000	918	847	787	735	689	648	613	581	552	525
12,000	950	877	815	761	713	671	634	601	571	543
13,000	981	906	842	786	737	693	656	621	590	562
14,000	1,013	936	869	812	761	716	677	641	609	580
15,000	1,045	965	896	837	784	738	698	661	628	598
16,000	1,077	994	923	863	808	761	719	682	648	616
17,000	1,109	1,024	951	888	832	783	740	702	667	634
18,000	1,140	1,053	978	914	856	806	762	722	686	653
19,000	1,172	1,082	1,005	939	880	828	783	742	705	671
20,000	1,204	1,112	1,033	964	904	851	804	762	724	689
21,000	1,236	1,141	1,060	990	928	873	825	782	743	707
22,000	1,268	1,171	1,087	1,015	952	896	846	802	762	725
23,000	1,299	1,200	1,114	1,041	975	918	868	822	781	744
24,000	1,331	1,229	1,142	1,066	999	941	889	842	800	762
25,000	1,363	1,259	1,169	1,092	1,023	963	910	862	819	780
26,000	1,395	1,288	1,196	1,117	1,047	986	931	882	838	798
27,000	1,426	1,317	1,224	1,142	1,071	1,008	953	902	857	817
28,000	1,458	1,347	1,251	1,168	1,095	1,030	974	923	877	835
29,000	1,490	1,376	1,278	1,193	1,119	1,053	995	943	896	853
30,000	1,522	1,406	1,305	1,219	1,143	1,075	1,016	963	915	871
31,000	1,554	1,435	1,333	1,244	1,167	1,098	1,037	983	934	889
32,000	1,585	1,464	1,360	1,270	1,190	1,120	1,059	1,003	953	908
33,000	1,617	1,494	1,387	1,295	1,214	1,143	1,080	1,023	972	926
34,000	1,649	1,523	1,414	1,321	1,238	1,165	1,101	1,043	991	944
35,000	1,681	1,553	1,442	1,346	1,262	1,188	1,122	1,063	1,010	962
36,000	1,713	1,582	1,469	1,371	1,286	1,210	1,143	1,083	1,029	980
37,000	1,744	1,611	1,496	1,397	1,310	1,233	1,165	1,103	1,048	999
38,000	1,776	1,641	1,523	1,422	1,334	1,255	1,186	1,123	1,067	1,017
39,000	1,808	1,670	1,551	1,448	1,358	1,278	1,207	1,144	1,087	1,035
40,000	1,840	1,699	1,578	1,473	1,381	1,300	1,228	1,164	1,106	1,053
41,000	1,872	1,729	1,605	1,499	1,405	1,323	1,249	1,184	1,125	1,071
42,000	1,903	1,758	1,632	1,524	1,429	1,345	1,271	1,204	1,144	1,090
43,000	1,935	1,788	1,660	1,550	1,453	1,368	1,292	1,224	1,163	1,108
44,000	1,967	1,817	1,687	1,575	1,477	1,390	1,313	1,244	1,182	1,126
200	6	6	5	5	5	4	4	4	4	4
400	13	12	11	10	10	9	8	8	8	7
600	19	18	16	15	14	13	13	12	11	11
800	25	24	22	20	19	18	17	16	15	15
1,000	32	29	27	25	24	22	21	20	19	18

Table 59.—"Break Even" Volume According to Investment in the Gin Plant and Gin Income Per Bale—Electric Power—Gulf Coast Area, 1930-1938

Investment	Gin Income Per Bale									
	$5.00	$5.25	$5.50	$5.75	$6.00	$6.25	$6.50	$6.75	$7.00	$7.25
$ 8,000	705	639	584	538	499	464	435	409	385	365
9,000	745	675	617	568	526	491	459	432	407	385
10,000	785	711	650	598	554	517	484	454	429	406
11,000	824	747	682	629	582	543	508	477	450	426
12,000	864	782	715	659	610	569	532	500	472	447
13,000	903	818	748	689	638	595	557	523	494	467
14,000	943	854	781	719	666	621	581	546	515	488
15,000	982	890	814	749	694	647	605	569	537	508
16,000	1,022	926	846	779	722	673	630	592	558	529
17,000	1,061	962	879	810	750	699	654	615	580	549
18,000	1,101	998	912	840	778	725	679	638	602	569
19,000	1,141	1,033	945	870	806	751	703	661	623	590
20,000	1,180	1,069	977	900	834	777	727	684	645	610
21,000	1,220	1,105	1,010	930	862	803	752	707	667	631
22,000	1,259	1,141	1,043	960	890	829	776	730	688	651
200	8	7	7	6	6	5	5	5	4	4
400	16	14	13	12	11	10	10	9	9	8
600	24	22	20	18	17	16	15	14	13	12
800	32	29	26	24	22	21	19	18	17	16
1,000	40	36	33	30	28	26	24	23	22	20

Controlling Costs

A ginner in comparing his actual costs with computed costs at the end of the season is approaching his problem of costs historically. Nothing can be done about the costs of the season just closed. A careful examination of items of high cost may yield suggestions for lowering such costs the coming season. But the time to control costs is while they are being experienced.

Each item of cost is not subject to the same degree of control. The cost of depreciation, for instance, depends upon the investment and the rate charged. The tax cost is based on the assessed valuation and the tax rate. The insurance cost is determined by the value insured and the insurance rate.

Before the opening of the ginning season, the manager should be in possession of certain basic information regarding the year ahead. He should be able to estimate his probable volume of ginning. He should know rather definitely the costs for the season of such items as depreciation, insurance, taxes, repairs, and management. With the estimated volume of ginning he should be enabled to: (a) compute his items of cost and total cost; this would set up the standard for the year; by dividing these costs by the estimated volume, standard costs per bale would be determined; (b) calculate the actual costs per bale of such items as depreciation, insurance, taxes, repairs, and management.

The costs of various items thrown into miscellaneous cost such as telephone and telegraph, advertising and donations, and auditing and legal should be subject to estimate at the opening of the season. Such costs too could be reduced to actual costs per bale on the basis of the estimated volume of ginning.

During the progress of the ginning season, costs largely variable such as labor, power, office salaries, and portions of miscellaneous could be accumulated. At the end of stated periods, 15 or 30 days, these costs could be calculated as per bale costs on the basis of the volume ginned to date. In this manner actual costs could be compared with the standard costs. Periodical comparisons of actual costs with standard costs should show the manager any weak spots in his cost program.

A ginner following his costs as suggested above should become more conscious of the details of his costs. The chances are that he would take steps to effect savings in the various items of cost.

APPENDIX B—EQUATIONS FOR ESTIMATING TOTAL COSTS OF GINNING

AVERAGE COST

Blackland Area

Steam Power = $1,730 + $0.0930I + $1.78V
Diesel Power = 2,198 + 0.0887I + 1.37V
Electric Power = 2,089 + 0.0592I + 2.05V

High and Low Plains Area

Steam Power = $3,392 + $0.0592I + $2.25V
Diesel Power = 1,973 + 0.1120I + 1.76V
Electric Power = 1,528 + 0.1122I + 2.42V
Large Gins = 5,080 + 0.1052I + 1.75V

Gulf Coast Area

Diesel Power = $1,711 + $0.0957I + $1.99V
Electric Power = 938 + 0.0953I + 2.59V

All Texas

Average Cost = $2,035 + $0.0879I + $1.91V

BULK COST

Blackland Area

Steam Power = $2,362 + $0.0861I + $1.95V
Diesel Power = 2,743 + 0.0861I + 1.49V
Electric Power = 1,743 + 0.0990I + 2.40V

High and Low Plains Area

Steam Power = $4,021 + $0.0595I + $2.52V
Diesel Power = 2,698 + 0.1138I + 1.89V
Electric Power = 1,121 + 0.1525I + 2.61V
Large Gins = 4,438 + 0.1353I + 1.82V

Gulf Coast Area

Diesel Power = $2,230 + $0.0970I + $2.28V
Electric Power = 1,071 + 0.1103I + 2.82V

All Texas

Bulk Cost = $2,211 + $0.0912I + $2.10V

I — Investment in gin plant in dollars; V — Volume of ginning in bales.

APPENDIX C—EQUATIONS FOR ESTIMATING ITEMS OF COST

BLACKLAND AREA

Steam Power—Single Battery

	Average Cost	Bulk Cost
Labor	= $ 421 + $0.62V	$ 596 + $0.55V
Power	= 272 + 0.36V	424 + 0.26V
Repairs	= 307 + 0.20V	421 + 0.27V
Ins. & Taxes	= 288 + 0.08V	436 + 0.10V
Management	= −153 + 0.33V + $2.15S	110 + 0.52V + $0.0147I
Depreciation	= 0.0664I	0.0664I
Miscellaneous	= 130 + 0.19V	147 + 0.25V

Diesel Power—Single Battery

Labor	= $ 210 + $0.83V	$ 281 + $0.86V
Power	= 105 + 0.25V	160 + 0.26V
Repairs	= 320 + 0.14V	420 + 0.16V
Ins. & Taxes	= 243 + 1.21S	654 + 0.0060I
Management	= 65 + 3.10S	1,229 + 0.09V
Depreciation	= 0.0647I	0.0647I
Miscellaneous	= 156 + 0.13V	123 + 0.20V

Electric Power—Single Battery

Labor	= $ 133 + $0.75V	$ 70 + $0.94V
Power	= 120 + 0.73V	200 + 0.69V
Repairs	= 230 + 0.15V	205 + 0.30V
Ins. & Taxes	= 76 + 0.0399I	200 + 0.42V
Management	= 1,125	1,139 + 0.05V
Depreciation	= 0.0643I	0.0643I
Miscellaneous	= 329	206 + 0.17V

HIGH AND LOW PLAINS AREA

Steam Power—Single Battery

Labor	=	$ 503	+	$0.86V	$ 674	+	$0.86V	
Power	=	374	+	0.16V	414	+	0.18V	
Repairs	=	470	+	0.49V	670	+	0.61V	
Insurance	=	386	+	0.08V	434	+	0.09V	
Taxes	=	217	+	0.0047I	235	+	0.0050I	
Management	=	686	+	0.0113I + $0.15V	775	+	0.0123I + $0.16V	
Office Sal.	=	204	+	0.10V	255	+	0.11V	
Depreciation	=			0.0613I			0.0613I	
Miscellaneous	=	183	+	0.35V	97	+	0.49V	

Diesel Power—Single Battery

Labor	=	$ 15	+	$0.0165I + $0.85V	$624	+	$0.92V	
Power	=	−37	+	0.0080I + 0.18V	−68	+	0.0098I + $0.20V	
Repairs	=	550	+	0.25V	706	+	0.32V	
Insurance	=	392	+	0.06V	361	+	0.10V	
Taxes	=	116	+	0.0063I	78	+	0.0081I	
Management	=	611	+	0.0126I + 0.14V	689	+	0.0189I + 0.09V	
Office Sal.	=	118	+	0.14V	118	+	0.17V	
Depreciation	=			0.0627I			0.0627I	
Miscellaneous	=	413	+	0.13V	538	+	0.13V	

Electric Power—Single Battery

Labor	=	$ 288	+	$0.83V	$407	+	$0.91V	
Power	=	383	+	0.64V	524	+	0.54V	
Repairs	=	79	+	0.33V	122	+	0.39V	
Insurance	=	395	+	0.09V	448	+	0.0091I	
Taxes	=	−89	+	0.0153I	238	+	0.0029I	
Management	=	857	+	0.0183I	920	+	0.0081I + $0.21V	
Office Sal.	=	131	+	0.17V	128	+	0.25V	
Depreciation	=			0.0614I			0.0614I	
Miscellaneous	=	102	+	0.28V	188	+	0.25V	

Large Gins—Multiple Battery

Labor	=	$ 992	+	$0.95V	$1,384	+	$0.94V	
Power	=	569	+	0.26V	859	+	0.22V	
Repairs	=	1,689	+	0.27V	458	+	0.37V	
Insurance	=	13	+	1.40S	1,153	+	0.05V	
Taxes	=	−709	+	2.07S	156	+	0.0141I	
Management	=	874	+	0.0201I	652	+	0.0217I	
Office Sal.	=	−2,280	+	4.10S	51	+	0.0207I	
Depreciation	=			0.0590I			0.0590I	
Miscellaneous	=	839	+	0.16V	1,318	+	0.13V	

GULF COAST AREA

Diesel Power—Single Battery

Labor	=	$ 425	+	$0.87V	$468	+	$0.98V	
Power	=	86	+	0.22V	67	+	0.27V	
Repairs	=	31	+	0.0115I + $0.36V	449	+	0.40V	
Insurance	=	294	+	0.07V	269	+	0.0055I	
Taxes	=	251			293			
Management	=	384	+	0.0220I + 0.22V	815	+	0.0190I + $0.19V	
Depreciation	=			0.0612I			0.0612I	
Miscellaneous	=	275	+	0.25V	277	+	0.35V	

Electric Power—Single Battery

Labor	=	$ 235	+	$1.02V	$589	+	$0.83V	
Power	=	90	+	0.58V	105	+	0.60V	
Repairs	=	−36	+	0.48V	11	+	0.60V	
Insurance	=	190	+	0.11V	140	+	0.20V	
Taxes	=	102	+	0.10V	121	+	0.11V	
Management	=	838			324	+	0.0139I + $0.29V	
Depreciation	=			0.0646I			0.0646I	
Miscellaneous	=	−4	+	0.34V	148	+	0.31V	

I — Investment in gin plant in dollars. V — Volume of ginning in running bales. S — Size of gin plant in number of saws.

APPENDIX D—CORRELATIONS OF VOLUMES OF GINNING WITH INVESTMENTS, ITEMS OF COST, AND TOTAL COSTS. CORRELATIONS OF INVESTMENTS WITH ITEMS OF COST AND TOTAL COSTS

Correlations With Volume of Ginning
Average Cost

Area	Type Power	Investment	Labor	Power	Repairs	Ins.	Taxes	Dep.	Mgt.	Of. Sal.	Misc.	Total
Blackland	Steam	.44	.73	.60	.25	.31	---	.45	.44	---	.43	.75
	Diesel	.51	.86	.62	.27	.23	---	.47	.14	---	.46	.80
	Electric	.53	.77	.88	.25	.46	---	.54	.12	---	.21	.85
High and Low Plains	Steam	.26	.88	.55	.58	.41	.14	.30	.47	.50	.53	.86
	Diesel	.11	.83	.65	.42	.27	.21	.11	.37	.50	.32	.73
	Electric	.14	.87	.94	.76	.37	.18	.13	.29	.56	.81	.88
	Large	.17	.87	.63	.65	.24	.26	.09	.31	.19	.39	.84
Gulf Coast	Diesel	.12	.82	.64	.52	.27	.03	.12	.29	---	.50	.71
	Electric	.60	.88	.90	.65	.49	.58	.60	.30	---	.65	.93

Correlations With Investment in Gin Plant
Average Cost

Area	Type Power	Volume	Labor	Power	Repairs	Ins.	Taxes	Dep.	Mgt.	Of. Sal.	Misc.	Total
Blackland	Steam	.44	.35	.26	.23	.37	---	.99	.27	---	.21	.68
	Diesel	.51	.51	.38	.25	.19	---	.99	.03	---	.34	.71
	Electric	.53	.38	.52	.02	.56	---	.96	−.01	---	−.14	.59
High and Low Plains	Steam	.26	.29	.07	.11	.22	.28	.98	.31	.19	−.03	.35
	Diesel	.11	.24	.33	.00	.13	.53	.97	.32	.34	.09	.50
	Electric	.14	.05	.28	.27	.15	.77	.99	.38	.09	.23	.44
	Large	.12	.15	.09	.10	.16	.58	.89	.55	.22	.15	.40
Gulf Coast	Diesel	.12	−.01	.11	.29	.24	.18	.99	.40	---	.18	.54
	Electric	.60	.49	.43	.49	.46	.66	.93	.50	---	.37	.68

Correlations With Volume of Ginning
Bulk Cost

Area	Type Power	Investment	Labor	Power	Repairs	Ins.	Taxes	Dep.	Mgt.	Of. Sal.	Misc.	Total
Blackland	Steam	.23	.63	.40	.24	.15	---	.26	.46	---	.41	.74
	Diesel	.53	.84	.58	.27	.17	---	.49	.13	---	.59	.87
	Electric	.57	.86	.92	.53	.60	---	.50	.09	---	.53	.95
High and Low Plains	Steam	.12	.86	.52	.62	.41	.02	.15	.46	.50	.59	.93
	Diesel	.22	.79	.65	.46	.36	.19	.20	.28	.52	.27	.80
	Electric	.10	.91	.92	.82	.28	.18	.13	.52	.66	.67	.86
	Large	.15	.86	.62	.82	.34	.43	.11	.20	.44	.30	.90
Gulf Coast	Diesel	−.08	.83	.64	.45	.18	.03	−.08	.18	---	.57	.71
	Electric	.56	.84	.90	.68	.79	.06	.57	.84	---	.66	.95

Correlations With Investment in Gin Plant Bulk Cost

Area	Type Power	Volume	Labor	Power	Repairs	Ins.	Taxes	Dep.	Mgt.	Of. Sal.	Misc.	Total
Blackland	Steam	.23	.20	−.08	.06	.22	---	.99	.31	---	.18	.66
	Diesel	.53	.55	.40	.17	.04	---	.99	−.00	---	.53	.76
	Electric	.57	.52	.62	.13	.74	---	.93	−.09	---	.21	.68
High and Low Plains	Steam	.12	.23	.02	−.05	.16	.29	.98	.25	.19	−.13	.24
	Diesel	.22	.35	.44	−.07	.26	.64	.95	.49	.49	−.07	.63
	Electric	.10	.20	.31	.26	.48	.83	.99	.23	.39	.29	.54
	Large	.15	.19	.22	.01	.10	.69	.92	.68	.46	.31	.49
Gulf Coast	Diesel	−.08	−.18	.01	.24	.29	.15	.99	.34	---	.08	.50
	Electric	.56	.51	.60	.32	.35	.72	.97	.62	---	.49	.67

APPENDIX E—STANDARD ERRORS AND COEFFICIENTS OF DETERMINATION OF THE VARIOUS ESTIMATING EQUATIONS OF AVERAGE COSTS

BLACKLAND AREA

Steam Power (N=189)

Type of Expense	Residual	Volume: Regres. Coef.	Volume: Stan. Error	Investment: Regres. Coef.	Investment: Stan. Error	Size: Regres. Coef.	Size: Stan. Error	R^{2*}
Total	$1,730	$1.78V	±$0.20V	$0.0930I	±$0.0135I	---	---	71.1
Labor	421	0.62V	± 0.04V	---	---	---	---	53.2
Power	272	0.36V	± 0.03V	---	---	---	---	36.1
Repairs	307	0.20V	± 0.06V	---	---	---	---	6.3
Ins. & Taxes	288	0.08V	± 0.03V	0.0088I	± 0.0023I	---	---	16.2
Management	−153	0.33V	± 0.07V	---	---	$2.15S	±$0.58S	24.8
Miscellaneous	130	0.19V	± 0.03V	---	---	---	---	18.1

Diesel Power (N=160)

Total	$2,198	$1.37V	±$0.05V	$0.0887I	±$0.0141I	---	---	76.4
Labor	210	0.83V	± 0.04V	---	---	---	---	73.8
Power	105	0.25V	± 0.03V	---	---	---	---	38.3
Repairs	320	0.14V	± 0.04V	---	---	---	---	7.1
Ins. & Taxes	243	---	---	---	---	$1.21S	±$0.41S	5.2
Management	65	---	---	---	---	3.10S	± 0.64S	12.9
Miscellaneous	156	0.13V	± 0.02V	---	---	---	---	21.4

Electric Power (N=68)

Total	$2,089	$2.05V	±$0.24V	$0.0592I	±$0.0231I	---	---	75.2
Labor	133	0.75V	± 0.08V	---	---	---	---	59.0
Power	120	0.73V	± 0.05V	---	---	---	---	77.8
Repairs	230	0.15V	± 0.07V	---	---	---	---	6.1
Ins. & Taxes	76	---	---	0.0399I	± 0.0073I	---	---	31.1
Management	1,125	---	---	---	---	---	---	---
Miscellaneous	329	---	---	---	---	---	---	---

HIGH AND LOW PLAINS AREA

Steam Power (N=208)

Total	$3,392	$2.25V	±$0.10V	$0.0592I	±$0.0150I	---	---	76.4
Labor	503	0.86V	± 0.03V	---	---	---	---	77.3
Power	374	0.16V	± 0.02V	---	---	---	---	30.2
Repairs	470	0.49V	± 0.05V	---	---	---	---	33.9
Insurance	386	0.08V	± 0.01V	---	---	---	---	17.0
Taxes	217	---	---	0.0047I	± 0.0011I	---	---	7.8
Management	686	0.15V	± 0.02V	0.0113I	± 0.0034I	---	---	26.0
Office Sal.	204	0.10V	± 0.01V	---	---	---	---	25.0
Miscellaneous	183	0.35V	± 0.04V	---	---	---	---	27.6

*R^2 indicates the percentage of the variations in cost accounted for by the independent variables listed in each instance.

Type of Expense	Residual	Volume		Investment		Size		R^{2*}
		Regres. Coef.	Stan. Error	Regres. Coef.	Stan. Error	Regres. Coef.	Stan. Error	
Diesel Power (N=140)								
Total	$1,973	$1.76V	±$0.12V	$0.1120I	±$0.0122I			71.5
Labor	15	0.85V	± 0.05V	0.0165I	± 0.0051I			70.5
Power	−37	0.18V	± 0.02V	0.0080I	± 0.0018I			49.2
Repairs	550	0.25V	± 0.05V					17.8
Insurance	392	0.06V	± 0.02V					7.3
Taxes	116			0.0063I	± 0.0010I			27.8
Management	611	0.14V	± 0.03V	0.0126I	± 0.0029I			21.4
Office Sal.	118	0.14V	± 0.02V					24.7
Miscellaneous	413	0.13V	± 0.03V					10.5
Electric Power (N=45)								
Total	$1,528	$2.42V	±$0.15V	$0.1122I	±$0.0179I			88.7
Labor	288	0.83V	± 0.07V					76.3
Power	383	0.64V	± 0.03V					88.9
Repairs	79	0.33V	± 0.04V					57.7
Insurance	395	0.09V	± 0.04V					13.6
Taxes	−89			0.0153I	± 0.0028I			58.5
Management	857			0.0183I	± 0.0069I			14.3
Office Sal.	131	0.17V	± 0.04V					31.2
Miscellaneous	102	0.28V	± 0.03V					65.5
Large Gins (N=81)								
Total	$5,080	$1.75V	±$0.12V	$0.1052I	±$0.0219I			77.1
Labor	992	0.95V	± 0.06V					75.8
Power	569	0.26V	± 0.04V					39.3
Repairs	1,689	0.27V	± 0.04V					41.9
Insurance	13					$1.40S	±$0.38S	14.9
Taxes	−709					2.07S	± 0.27S	43.5
Management	874			0.0201I	± 0.0035I			29.9
Office Sal.	−2,280					4.10S	± 0.68S	31.4
Miscellaneous	839	0.16V	± 0.04V					15.0
GULF COAST AREA								
Diesel Power (N=173)								
Total	$1,711	$1.99V	±$0.13V	$0.0957I	±$0.0085I			71.2
Labor	425	0.87V	± 0.05V					67.2
Power	86	0.22V	± 0.02V					41.0
Repairs	31	0.36V	± 0.05V	0.0115I	± 0.0031I			32.5
Insurance	294	0.07V	± 0.02V					7.5
Taxes	251							
Management	384	0.22V	± 0.06V	0.0220I	± 0.0040I			22.0
Miscellaneous	275	0.25V	± 0.03V					25.4
Electric Power (N=32)								
Total	$ 938	$2.59V	±$0.25V	$0.0953I	±$0.0402I			88.2
Labor	235	1.02V	± 0.10V					77.2
Power	90	0.58V	± 0.05V					80.6
Repairs	−36	0.48V	± 0.10V					42.0
Insurance	190	0.11V	± 0.04V					24.0
Taxes	102	0.10V	± 0.03V					33.8
Management	838							
Miscellaneous	−4	0.34V	± 0.07V					42.6

*R^2 indicates the percentage of the variations in cost accounted for by the independent variables listed in each instance.