TEXAS AGRICULTURAL EXPERIMENT STATION

A. B. CONNER, DIRECTOR

College Station, Texas

BULLETIN NO. 654 AUGUST 1944

EFFICIENCY AS APPLIED TO COTTON GINNING BUSINESS

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E01-844-5M-L180

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Business efficiency is of concern to the gin industry. To the ginner a satisfactory efficiency depends upon an adequate gin income per bale, a reasonable cost efficiency, and an economic volume of ginning. These aspects of the ginning business are susceptible to measurement in terms of standards. Standards for the Texas ginning industry are suggested in this Bulletin. By means of these standards, additions to, or deductions from, gin profits may be allocated to the actual gin income per bale, cost of ginning and volume of ginning in terms of a standard gin income per bale, a standard cost of ginning, and a standard volume of ginning.

Business efficiency of the ginning industry is of concern to cotton growers patronizing the gins, the employees of the gins, and the general public. Cotton growers are interested in high class ginning service at a reasonable cost; gin employees are interested in adequate wages; the general public is interested in securing cotton goods at reasonable costs.

The interests of cotton growers, gin employees, and the general public are essentially related to business efficiency as viewed by ginners. The gins of the industry operating with an economic volume of ginning and efficient costs may offer ginning service at lower charges and may offer higher wages to employees and still maintain adequate returns on the gin investments as contrasted with the gins operating with a low uneconomic volume of ginning and high costs.

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EFFICIENCY AS APPLIED TO COTTON GINNING BUSINESS

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The word efficiency as commonly used is lacking in definiteness. Efficiency is applied to relationships running the whole gamut from what is in terms of a standard to what is in terms of what ought to be. Only as measured in terms of a standard may efficiency be expressed quantitatively.

Among the many kinds of efficiency, Slichter points out that three are outstanding in importance: "engineering or physical efficiency, the relationship between physical quantities consumed and physical quantities produced; pecuniary or business efficiency, the relationship between dollars spent and income obtained; and social or human efficiency, the relationship between human cost incurred and human satisfaction or benefits produced."[1]

Business efficiency as "the relationship between dollars spent and income obtained" makes profit, or loss, the index of efficiency. Manifestly, by this interpretation the efficiency of a business is reflected in its earnings and the market value of its stock.

In discussing business efficiency advantages may accrue from an analysis of a specific business. Thus efficiency as discussed in this Bulletin is confined to the ginning business of Texas.

COST AS A MEASURE OF EFFICIENCY

The cost of operating a business may be taken as an index of business efficiency. Thus an efficient business is one whose costs are average, or lower, as related to the costs of the industry as a whole. A test of efficiency is the ability of a business to survive over a period of years. A business may operate at average cost, or less, and still be faced with bankruptcy. For instance, a Texas gin of average investment and operating at average cost would have a cost of $12 a bale at a volume of 366 bales. Suppose a gin at this volume had a cost of $10 a bale. This gin would be operating at a cost efficiency 83 per cent of the standard. With a gin income of

*Acknowledgments are made to:
W. J. McAnelly, President,
T. L. McFarland, Appraiser and Field Examiner, The Houston Bank for Cooperatives;
Joel F. Hembree, Agricultural Economist, Office of Distribution, Dallas;
R. L. Hunt, Professor of Agricultural Economics,
T. W. Leland, Head, Department of Accounting and Statistics,
N. D. Durst, Associate Professor of Accounting,
F. B. Clark, Head, Department of Economics,
P. A. Nutter, Professor of Economics, The Texas Agricultural and Mechanical College—
for reading the manuscript and offering many constructive criticisms.

[1]Efficiency, Encyclopedia of the Social Sciences.

$6 a bale, losses sustained would be at the rate of $4 a bale, or a total of $1,500 a season. A gin with this cost, income and volume could survive but a few years.

A gin operating at average cost efficiency and with a favorable volume of ginning might still be in financial difficulties. For instance, a Texas gin of average investment and operating at average cost would have a cost of $3.76 a bale at a volume of 2,000 bales. Suppose this gin had a gin income of $3 a bale. Thus a loss of 76 cents a bale would be incurred, or a total annual loss of $1,500. A continuation of these relations of volume, cost and gin income over a few years could but lead to bankruptcy.

It would seem that a successful ginning business depends upon the gin income per bale, the cost of ginning, and the volume of ginning. It should follow from this that the efficiency of the ginning business must be measured in terms of income, cost, and volume. The measuring of business efficiency of ginning as ratios, or in dollars, requires the formulation of standards for gin income, gin cost, and volume of ginning.

STANDARDS OF GINNING BUSINESS

Purposes to be served by business standards are various. Standards may be applied to certain aspects of a business not directly subject to management control as gin income and volume of ginning. In such instances the standards should engender confidence in the business as well as to point out favorable, or unfavorable, circumstances. Standards may be applied to aspects of a business wholly, or in part, subject to management control as the cost of operating a gin plant. Such cost items as depreciation, taxes, and insurance are largely dependent upon the investment which once made commits the business for the life of the investment. Such cost items as gin labor, power, and repairs are subject to management control within limits. In such instances standards to test actual performance should be most useful in measuring the effectiveness of management control of the business.

The problem encountered in establishing business standards is distinctly different from that arising in fixing standards for such matters as length, weight, and capacity as the meter, the pound, and the bushel. These physical standards once formulated may continue applicable for all time. But the various essential aspects of a business are influenced by changing economic relations, changing techniques of production and distribution, and changing social controls. A realization of the greater difficulties in evolving business standards, however, should not of itself discourage the effort. Business standards in the very nature of the case must be historical. The validity of business standards depends upon the conformity of business conditions in later periods with those of the period in which the standards were devised. Marked changes in business conditions may require revisions of the standards.

Standard Gin Income

The gross income of the typical ginner is derived from three sources: gin tolls; sales of bagging and ties to gin customers; and sales of cottonseed to oil mills. The practice has been rather common among ginners, especially of the Plains Area, of buying the lint cotton from patrons at a price above the market. These over-payments are in essence a form of rebating and may very properly be considered as deductions from gross gin income. A ginner has three types of costs: the cost of operating the gin plant; the cost of bagging and ties; and the cost of the cottonseed purchased from gin customers. Thus the profit of the gin business may be expressed as:

$$\text{Profit} = \text{Gross Gin Income less Costs of} \begin{cases} \text{Ginning} \\ \text{Bagging and Ties} \\ \text{Cottonseed} \end{cases}$$

Relations of volume of ginning to costs and profits of the three departments of the gin business are far from uniform. Ginning profit as the difference between gin tolls and the cost of operating the gin plant is highly sensitive to volume of ginning. As volume increases costs per bale decrease but at a rate somewhat less than the rate of increase in volume. Costs to the ginner per pattern of bagging and ties and per ton of cottonseed purchased are quite independent of volume of ginning. This means that profit margins per unit are relatively constant and total profits vary directly with volume of ginning. Cost and profit computations may be simplified by using as income the gin tolls and profits on bagging and ties and cottonseed. This income may be designated as gin income. Thus profit may be expressed as:

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

If profits of a number of gins the same season or of the same gin for a number of seasons are compared with no attention given to gin incomes, erroneous conclusions may be drawn as to the relative profits of the different gins or the different seasons. The gin income per bale varies with the gin rate per 100 pounds of seed cotton, the weight of seed cotton per bale, the weight of cottonseed per bale left with the gin, the margin of profit on cottonseed, and the margin of profit on bagging and ties. Variations of gin income per bale from gin to gin require standards if the influence of gin income on profit is to be measured.

In designating a standard gin income attention must be given to gin incomes as prevail for the gin industry. Data on gin incomes over the cotton areas of Texas for the period 1930-1938 have been obtained. Standard gin incomes as averages of these actual gin incomes are suggested. These standard gin incomes are: $5.20 per bale for the Blackland Area; $6.85 for the High and Low Plains Area; and $6.40 for the Gulf Coast Area. For boundaries of the sections see Figure 1.

A ginner may determine his gin income by obtaining the total of gin tolls and profits on bagging and ties and cottonseed. In dividing this total by the number of bales ginned, he derives his gin income per bale. The

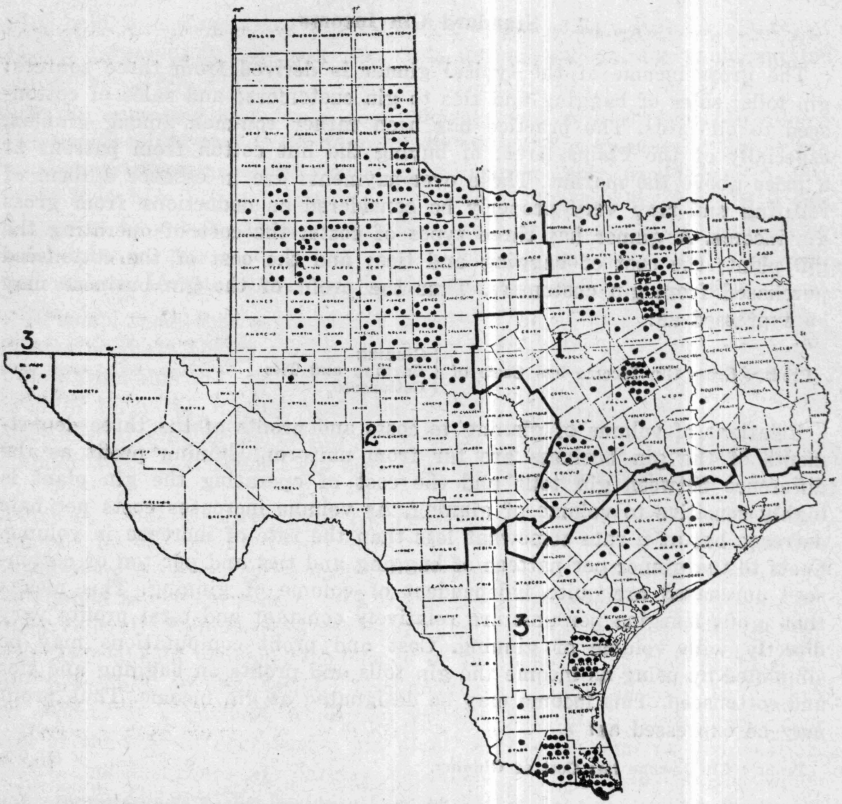

Fig. 1. Sections of the State. 1. Blackland Area. 2. High and Low Plains Area. 3. Gulf Coast Area. Each dot represents a gin within the county from which cost records were obtained. These cost records were for one, or more, seasons within the period 1930-1938.

difference between the actual gin income per bale and the standard multiplied by the number of bales ginned indicates the addition to gin income if the gin income per bale be greater than standard or the reduction in gin income if the gin income per bale be less than standard. A ginner of the Blackland Area, for instance, with a volume of 1,500 bales has a gin income of $5.50 a bale. His gin income per bale is 30 cents higher than standard. Thus the gin income above standard adds $450 to his total gin income.

Standard Cost of Ginning

Standards of ginning costs have been ascertained for Texas.[2] These standards reflect costs of the period 1930-1938 and are based on the cost experience of the ginning industry as a whole rather than on selected in-

[2]Bulletin 606, pages 24-47; 72-89; 99-103.

dividual gins. Obviously these standards are too low for the abnormal conditions of the war period. Ginning costs have increased chiefly because of a rise in costs of gin labor. If physical costs of labor in terms of total hours for the season had been available in the records analyzed, standard hour costs could have been formulated[3]. Quite satisfactory adjustments for war conditions could then be made by applying current wage rates to the standard hour costs.

A ginner by comparing his costs of the pre-war period with the standard and his costs of the war period with the standard may gain a rather accurate measure of the effects of war-time conditions. A ginner may measure the effect on his profit of his relative cost efficiency by comparing his actual cost of ginning with the standard cost. Two sets of cost equations for determining total standard costs according to type of power and section of the state are given in Exhibit A. With the one set standard costs may be determined according to volume of ginning and investment in the gin plant; with the other standard costs may be determined according to volume of ginning alone.

Objections may be raised to the use of investment as a factor in determining standard costs since the investment once made is beyond management control. It must be recognized, however, that standard costs based on volume alone will appear favorable to gins with investments lower than average and unfavorable to gins with investments higher than average. For instance, two steam gins of the Blackland Area with investments of $10,000 and $20,000 and volumes of 1,000 bales would have the same standard cost of $4,953 with volume as the only variable. But with investment as a second factor of cost, the $10,000 gin would have a standard cost of $4,440 at 1,000 bales and the $20,000 gin a standard cost of $5,370 at 1,000 bales. Without taking into account advantages of low investment in computing standard costs, the low investment gin may operate with relatively inefficient costs and still have a favorable record in terms of standard costs based on volume alone; without taking into account disadvantages of high investment in computing standard costs, the high investment gin may operate with relatively efficient costs and still have an unfavorable record in terms of standard costs based on volume alone. After appraising the weight of investment on costs, management should be in better position to control intelligently such costs as are subject to direct management control.

A ginner, for instance, with a $20,000 Diesel gin in the Blackland Area has a cost of $3.60 a bale at a volume of 2,000 bales. The standard cost at this volume and investment is $3.36 a bale. Hence this ginner loses 24 cents a bale because of cost efficiency lower than standard, or a total loss of $480 on the volume of 2,000 bales.

Standard costs as means for controlling costs apply to items of cost rather than to total costs. Equations for estimating standard costs by items are given in Exhibit B. These equations have been transformed into

[3]Bulletin 606, pages 34-39.

table form as given in Bulletin 606, pages 79-89. Standard costs of gin labor, power, and repairs should be particularly significant to gin management.

Standard Volume of Ginning

The volume of ginning affects profoundly the profit, or loss, of the ginning business. The "break-even" volume may be designated as a minimum standard. This volume is well recognized among ginners. At the "break-even" volume the gin income is equal to the cost of operating the gin plant. The amount of this volume for a specific gin depends upon the gin income per bale and the relative cost efficiency. The cost of the "break-even" volume according to standard costs includes such cost items as management and depreciation. Thus this cost is somewhat greater than the out-of-pocket cost of the business. At the "break-even" volume the gin business can maintain its financial structure but without any returns on the investment. As a standard for a ginning business as a going concern, the "break-even" volume is too low. To designate a definite volume as standard would not be satisfactory. Costs, and hence profits, differ according to type of power, section of the state, and investment in the gin plant. One method of designating standard volumes is in terms of what may be considered as satisfactory costs per bale. These satisfactory costs become a matter of judgment. Accordingly standard volumes for Texas are suggested as the volumes which may be ginned at standard costs per bale of $3.75 in the Blackland Area; $4.25 in the High and Low Plains Area; and $4.00 in the Gulf Coast Area.

The standard volume of a specific gin may be determined from the equation:

$$\text{Standard Volume} = \frac{\text{Total Fixed Cost}}{\text{Standard Cost Per Bale less Variable Cost Per Bale}}$$ [4]

The standard fixed cost of a $20,000 Diesel gin of the Blackland Area is $2,198+(20,000 times $0.0887), or $3,972; the variable cost is $1.37 a bale. Hence:

$$\text{Standard Volume} = \frac{\$3,972}{\$3.75-\$1.37}, \text{ or } 1,669 \text{ bales}$$

Profits at standard volume and volume greater than standard are shown graphically in Figure 2. By definition the standard volume for gins in the Blackland Area is the volume having a standard cost of $3.75 a bale. For the gin under consideration, the standard volume is 1,669 bales. The profit per bale at standard volume and standard gin income per bale is $5.20 minus $3.75, or $1.45. Thus the total profit on the standard volume is 1,669 times $1.45, or $2,420. The profit at standard volume, standard cost, and standard gin income may be designated as the standard profit.

As shown in Figure 2, at a volume of 2,500 bales the standard cost of ginning per bale is $2.96, a decrease of 79 cents. The profit per bale at

[4]Bulletin 606, Cost and Profit of Ginning Cotton in Texas, pages 47-51. For Cost equations, see Exhibit A.

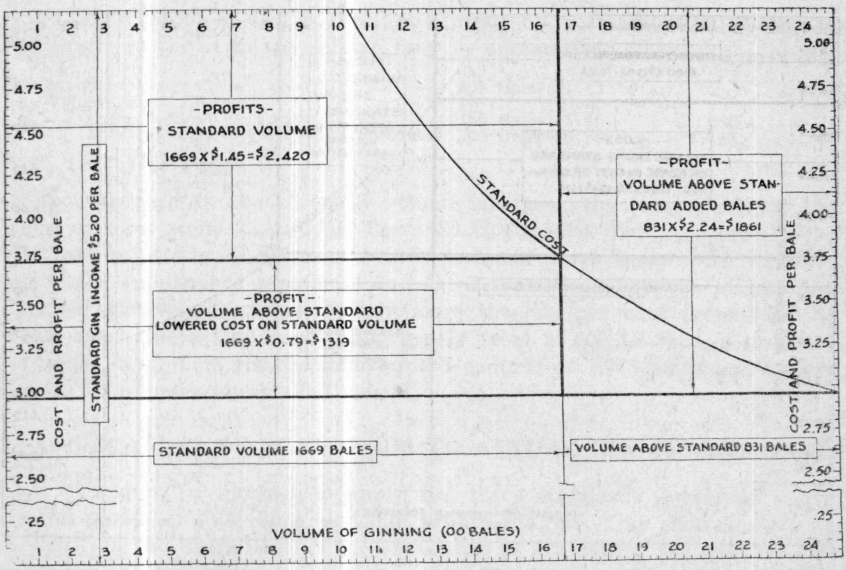

Fig. 2. **Profit as affected by volume greater than standard volume. In this figure standard profit and profits resulting from volume greater than standard are represented by areas with the volume of ginning as one dimension and profit per bale as the other.**

STANDARD PROFIT

Standard profit is the profit resulting from a combination of standard volume, standard cost, and standard gin income per bale. The volume which a $20,000 Diesel gin of the Blackland Area may gin at a standard cost of $3.75 a bale is 1,669 bales. Hence the standard volume is 1,669 bales. The profit per bale on the standard volume is $5.20 minus $3.75, or $1.45. The standard profit may be represented by an area with the dimensions 1,669 times $1.45, or $2,420.

LOWERED COST ON STANDARD VOLUME

As the volume of ginning is increased to 2,500 bales the standard cost is reduced to $2.96 a bale. Hence the cost on the standard volume is reduced from $3.75 to $2.96, or 79 cents a bale. The profit added on the standard volume through the reduction in cost may be represented by an area with the dimensions 1,669 times 79 cents, or $1,319.

VOLUME ABOVE STANDARD

At a volume of 2,500 bales, 831 bales are added to standard volume. The profit per bale on the added volume is $5.20 minus $2.96, or $2.24. The profit added by the volume greater than standard may be represented by an area with the dimensions 831 times $2.24, or $1,861.

this volume is $5.20 minus $2.96, or $2.24. It is evident in the figure that the volume above standard adds profits on two fronts: those resulting directly from the volume added to the standard; and those resulting from the reduction in the cost of ginning on the standard volume. The profit added directly by the volume above standard is 831 times $2.24, or $1,861. The profit added by the decreased cost on the standard volume is 1,669 times $0.79, or $1,319. The sources of profits at a volume of 2,500 bales may be summarized thus:

Standard Volume	1,669 times $1.45		$2,420
Volume above Standard			
Added Bales	831 times 2.24	$1,861	
Decreased Cost on Standard Volume	1,669 times 0.79	1,319	3,180
Total Profit			$5,600

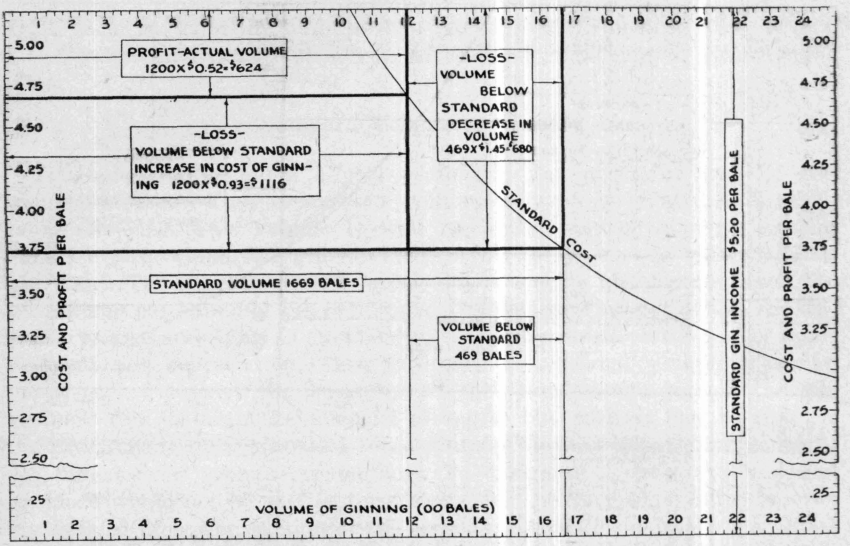

Fig. 3. Profit as affected by volume lower than standard volume.

In this figure standard profit and losses resulting from volume less than standard are represented by areas with the volume of ginning as one dimension and profit per bale as the other.

STANDARD PROFIT

Standard profit is the profit resulting from a combination of standard volume, standard cost, and standard gin income per bale. The volume which a $20,000 Diesel gin of the Blackland Area may gin at a standard cost of $3.75 a bale is 1,669 bales. Hence the standard volume is 1,669 bales. The profit per bale on the standard volume is $5.20 minus $3.75, or $1.45. The standard profit may be represented by an area with the dimensions 1,669 times $1.45, or $2,420.

INCREASED COST ON VOLUME LESS THAN STANDARD

At a volume of 1,200 bales, the standard cost per bale is $4.68. Hence the increase in cost per bale is $4.68 minus $3.75. or 93 cents. In terms of standard profit, the loss because of the increased cost per bale on the volume below standard may be represented by an area with the dimensions 1,200 times 93 cents, or $1,116.

VOLUME BELOW STANDARD

At a volume of 1,200 bales, the loss in terms of standard volume is 469 bales. The loss in profit in terms of standard profit may be represented by an area with the dimensions 469 times $1.45, or $680.

ACTUAL PROFIT

The profit per bale at a volume of 1,200 bales is $5.20 minus $4.68, or 52 cents. The profit on 1,200 bales may be represented by an area with the dimensions 1,200 times 52 cents, or $624.

Without regard to the standard volume analysis, the total profit at the higher volume is 2,500 times $2.24, or $5,600.

The effects on profits if the volume drops below standard volume are illustrated in Figure 3. The cost of $3.75 a bale at standard volume increases to a standard cost of $4.68 at a volume of 1,200 bales, an increase of 93 cents. The profit per bale at a volume of 1,200 bales is $5.20 minus $4.68, or 52 cents. As is apparent in the figure, at a volume below standard profits are lost on two fronts: those resulting directly from the decrease in number of bales below standard and those resulting from the increased cost of ginning on the actual volume. On the decrease in volume the loss is 469 times $1.45, or $680. On the increased cost of ginning the loss is

1,200 times $0.93, or $1,116. The total profit on 1,200 bales as related to the profit on the standard volume may be summarized thus:

Standard Volume	1,669 times	$1.45		$2,420
Volume below Standard				
Loss, Decrease in Volume	469 times	1.45	$ 680	
Loss, Increased cost on Vol. below Stand.	1,200 times	0.93	1,116	1,796
Total profit				$ 624

Without regard to the standard volume analysis, the total profit at the volume below standard is 1,200 times $0.52, or $624.

A careful study of Figures 2 and 3 should drive home with hammer blows the significance of volume as related to costs and profits of ginning. Note as the volume drops slightly more than 50 per cent from 2,500 to 1,200 bales, the profit drops precipitously from $5,600 to $624, a decrease of 89 per cent. This gin breaks even at a volume of 1,035 bales and suffers losses at volumes lower than this.

APPLICATION OF STANDARDS TO ACTUAL GIN OPERATIONS

It should be of interest to apply the three standards developed above to the profits of individual gins and groups of gins. This should serve as a check on the usefulness of the standards in evaluating the relative importance of the various sources of profits. The Houston Bank for Cooperatives classifies the gin associations financed as those operating successfully and those not operating successfully. A profit analysis was made of these two groups in each of the three areas of the state.

Profit Experience of Successful Gin Groups

Thirty-five gins are included in the groups of successful gins. Records on these gins covered a period averaging five seasons per gin. The profit analysis of these gins is revealed in Table 1. Volumes above standard added to standard profits from 5.1 per cent for the Plains gins to 63.9 per cent for the Blackland gins. Gin income above standard added 23.2 per cent to standard profits of the Gulf Coast gins; gin income below standard deducted 19.4 per cent from standard profits of the Plains gins. Cost efficiency less than standard deducted from the standard profits of all three groups, the losses ranging from 12.2 per cent for the Blackland gins to 24.0 per cent for the Gulf Coast gins. Total profits of the Plains gins were 61.3 per cent of standard profits; total profits of the Blackland gins were 136.3 per cent of standard profits.

These gins, in the main, were paying for their gin plants from profits of the ginning business. Average profits were such as to enable paying out the plants in about eight years for the Plains gins to less than five years for the Gulf Coast gins.

Profit Experience of Unsuccessful Gin Groups

Twenty-four gins are included in the groups of unsuccessful gins. Records on these gins covered a period averaging 3.5 seasons per gin. The profit analysis of these gins is shown in Table 2. The financial difficulties of

Table 1. Profit Analysis of Groups of Successful Gins Financed by the Houston Bank for Cooperatives*

Profit	Blackland Area	High Low Plains Area	Gulf Coast Area	Profits Expressed as Percentages of Standard Profit		
				Blackland Area	Plains Area	Gulf Coast Area
Standard†	$2,816	$6,510	$5,364	100.0	100.0	100.0
Volume above Standard	1,799	334	434	63.9	5.1	8.1
Gin Income above, below Standard	—488	—1,261	1,241	—17.3	—19.4	23.2
Cost Efficiency below Standard	—342	—1,068	—1,286	—12.2	—16.4	—24.0
Cotton Trading	53	— 521	130	1.9	— 8.0	2.4
Total Profit	$3,838	$3,994	$5,883	136.3	61.3	109.7
Average Annual Return on Inv	15.3%	12.3%	22.9%			

*Blackland Area: 11 gins, 53 records; High and Low Plains Area: 12 gins, 80 records; Gulf Coast Area: 12 gins, 41 records.
†Standard Profit: Profit on standard volume at standard cost and standard gin income per bale.

	Blackland	Plains	Gulf Coast
STANDARD			
Volume (Bales)	1,942	2,504	2,063
Gin Income (Per Bale)	$5.20	$6.85	$6.40
Cost (Per Bale)	$3.75	$4.25	$4.00
ACTUAL AVERAGE			
Volume (Bales)	2,442	2,573	2,256
Gin Income (Per Bale)	$5.00	$6.36	$6.95
Cost (Per Bale)	$3.45	$4.61	$4.40
Standard Cost (Per Bale)	$3.31	$4.19	$3.83
RELATIVE COST EFFICIENCY	104.2%	109.9%	114.8%

these gin groups are clearly evident in their total profits. Total profits were but 26.7, 13.3, and 28.0 per cent of standard profits for the Blackland, Plains, and Gulf Coast gin groups. The main leak in the profits of the Blackland gins was occasioned by their low gin income per bale. The loss on gin income below standard was equivalent to 42.3 per cent of standard profits. At a standard gin income total profits would have averaged $1,809 and the returns on the investment would have averaged 8.0 per cent. The accumulated effects of losses resulting from a gin income below standard, a cost efficiency below standard, and losses on cotton trading were quite disastrous. The outstanding difficulty of the Plains gins was the low volume of ginning. The loss on volume below standard was equivalent to 74.3 per cent of standard profits. At a standard volume profits would have averaged $4,677 and the returns on the investment would have averaged 21.1 per cent. Loss on cost efficiency below standard was quite heavy with the Gulf Coast gins. Low volume, however, was the main weakness. The loss on volume below standard was equivalent to 60.5 per cent of standard profits. At a standard volume profits would have averaged $4,125 and returns on the investment would have averaged 17.7 per cent.

These unsuccessful gins were also attempting to pay for their gin plants from profits of the ginning business. With net profits ranging from 3.1 to 5.6 per cent on the investment, one can readily appreciate the difficulties confronting these gin groups. These returns would scarcely more than pay the interest on the indebtedness and leave little or nothing for retiring the principal.

Table 2. Profit Analysis of Groups of Unsuccessful Gins Financed by the Houston Bank for Cooperatives*

Profit	Blackland Area	High Low Plains Area	Gulf Coast Area	Profits Expressed as Percentages of Standard Profit		
				Blackland Area	Plains Area	Gulf Coast Area
Standard†	$2,623	$5,338	$4,661	100.0	100.0	100.0
Volume above, below Standard	149	—3,967	—2,821	5.7	—74.3	—60.5
Gin Income above, below Standard	—1,109	— 220	457	—42.3	— 4.1	9.8
Cost Efficiency at, below Standard	— 573	0	—1,005	—21.8	.....	—21.6
Cotton Trading	— 390	— 441	12	—14.9	— 8.3	0.3
Total Profit	$ 700	$ 710	$1,304	26.7	13.3	28.0
Average Annual Return on Inv.	3.1%	3.2%	5.6%			

*Blackland Area: 5 gins, 12 records; High and Low Plains Area: 15 gins, 57 records; Gulf Coast Area: 4 gins, 16 records.
†Standard Profit: Profit on standard volume at standard cost and standard gin income per bale.

	Blackland	Plains	Gulf Coast
STANDARD			
Volume (Bales)	1,809	2,053	1,942
Gin Income (Per Bale)	$5.20	$6.85	$6.40
Cost (Per Bale)	$3.75	$4.25	$4.00
ACTUAL AVERAGE			
Volume (Bales)	1,848	1,224	1,305
Gin Income (Per Bale)	$4.60	$6.67	$6.75
Cost (Per Bale)	$4.01	$5.73	$5.76
Standard Cost (Per Bale)	$3.70	$5.73	$4.99
RELATIVE COST EFFICIENCY	109.3%	100.0%	115.6%

Profit Experience of Three Successful Cooperative Gins

Profit experiences of three cooperative gins have been analyzed as reported in Table 3. The data in the table represent averages on operations of from 7 to 15 seasons. Average annual profits ranging from 153.1 to 325.2 per cent of standard profits and average returns on the investment ranging from 25.6 to 51.8 per cent attest to the outstanding financial success of these three associations. In each instance, volume above standard and gin income above standard of the Blackland gin increased profits by an amount more than the standard profit. The loss on cost efficiency below standard was nearly counterbalanced by profits on cotton trading. An average return of 30.5 per cent on the investment and an average total profit of 170.2 per cent of standard profits over a period of 15 seasons reflect the remarkable record of the Plains gin association. Volume and gin income above standard added profits equal to 82.9 per cent of standard profits. Volume above standard added notably to total profits of the Gulf Coast gin association. From this source, profits were increased by 92.1 per cent of standard profits. Average costs of ginning were less than standard cost by 46 cents a bale. The gin income below standard occasioned a sizable deduction in profits. If this gin had had a standard gin income, average total profits would have been $13,962 and the average return on the investment would have been 36.4 per cent.

Table 3. Profit Analysis of Three Successful Cooperative Gin Associations*

Profit	Blackland Area	High Low Plains Area	Gulf Coast Area	Profits Expressed as Percentages of Standard Profit		
				Blackland Area	Plains Area	Gulf Coast Area
Standard†	$2,610	$13,603	$6,415	100.0	100.0	100.0
Volume above Standard	3,083	7,341	5,905	118.1	54.0	92.1
Gin Income above, below Standard	2,860	3,935	—4,142	109.6	28.9	—64.6
Cost Efficiency above, below Stand.	— 536	—1,467	1,642	—20.5	—10.8	25.6
Cotton Trading	470	— 253	.....	18.0	— 1.9	.....
Total Profit	$8,487	$23,159	$9,820	325.2	170.2	153.1
Average Annual Return on Inv.	51.8%	30.5%	25.6%			

*Number of ginning seasons: Blackland Association, 7; Plains Association, 15; Gulf Coast Association, 13. Gin of Plains Area, Multi-Battery.
†Standard Profit: Profit on standard volume at standard cost and standard gin income per bale.

	Blackland	Plains	Gulf Coast
STANDARD			
Volume (Bales)	1,800	5,232	2,673
Gin Income (Per Bale)	$5.20	$6.85	$6.40
Cost (Per Bale)	$3.75	$4.25	$4.00
ACTUAL AVERAGE			
Volume (Bales)	2,777	6,670	3,571
Gin Income (Per Bale)	$6.23	$7.44	$5.24
Cost (Per Bale)	$3.34	$3.93	$2.49
Standard Cost (Per Bale)	$3.15	$3.71	$2.95
RELATIVE COST EFFICIENCY	106.4%	105.8%	84.4%

Standards Applied to Profits of Plains Cooperative

Experiences of a Plains cooperative gin for the seasons 1927-28 and 1937-38 offer a setting for dramatizing the real significance of costs, profits, and dividends. In 1927-28, 9,013 bales were ginned; members received an average patronage dividend of $5.93 a bale. In 1937-38, 13,523 bales were ginned, a volume 50 per cent greater than that of 1927-28. Some of the members recalling the 1927-28 season expected a dividend as high, if not higher, than $5.93; but members received an average dividend of $3.25 a bale. Many of the members were grievously disappointed. They expressed eagerness to know what had become of the thousands of dollars of profits which must have been squandered! Apparently these members believed that volume alone accounts for profits and dividends.

The portions of the profits distributed did not explain the differences as the patronage dividends absorbed 95.3 per cent of the profits in 1927-28 and 94.8 per cent in 1937-38. The profits per bale were $6.22 in 1927-28 and $3.43 in 1937-38. The comparatively low profit of 1937-38 requires explanation. The increase in volume was apparent rather than real. The volume of ginning per battery was 4,507 bales for the two-battery plant of 1927-28 and 4,508 bales for the three-battery plant of 1937-38. The investment in the gin plant was greater by 77 per cent in the latter season as compared with the former season. Members paid $2.69 a bale more for gin tolls and bagging and ties in 1927-28 than in 1937-38.

Table 4. Profit Analysis of a Plains Cooperative Gin for the Seasons 1927-28 and 1937-38

Profit	1927–28	1937–38	Profits Expressed as Percentages of Standard Profits	
			1927–28	1937–38
Standard*	$11,029	$15,569	100.0	100.0
Volume above Standard	24,302	38,388	220.4	246.6
Gin Income above, below Standard	33,709	—6,762	305.6	—43.4
Cost Efficiency below Standard	—13,008	— 852	—118.0	— 5.5
Total Profit	$56,032	$46,343	508.0	297.7

*Standard Profit: Profit on standard volume at standard cost and standard gin income per bale.

	1927–28	1937–38
STANDARD		
Volume (Bales)	4,242	5,988
Gin Income (Per Bale)	$6.85	$6.85
Cost (Per Bale)	$4.25	$4.25
ACTUAL AVERAGE		
Volume (Bales)	9,013	13,523
Gin Income (Per Bale)	$10.59	$6.35
Cost (Per Bale)	$ 4.37	$2.92
Standard Cost (Per Bale)	$ 2.93	$2.86
Profit (Per Bale)	$ 6.22	$3.43
RELATIVE COST EFFICIENCY	149.2%	102.5%

It should be of interest to apply the standards of cost, volume, and gin income per bale to the profits of the two seasons. Table 4 summarizes such an analysis. In contrasting the two seasons these differences stand out in bold relief: (a) the gin income per bale was $10.59 in 1927-28 and $6.35 in 1937-38; (b) the cost of ginning per bale was $1.44 higher than the standard cost in 1927-28 and but 6 cents higher than the standard cost in 1937-38. The striking features about the profits of 1927-28 were: the profit on the volume above standard adding 220.4 per cent to the standard profit; the profit on the gin income above standard adding 305.6 per cent to the standard profit; and the loss on the cost efficiency below standard being equivalent to 118.0 per cent of the standard profit. The striking features about the profits of 1937-38 were: the profit on the volume above standard adding 246.6 per cent to the standard profit; the rather heavy losses because of a gin income below standard deducting 43.4 per cent from the standard profit; and the quite insignificant losses because of a cost efficiency below standard amounting to only 5.5 per cent of the standard profit.

Profits of Plains Gin at Standard Gin Income

A comparison between the seasons 1927-28 and 1937-38 of the Plains association is facilitated by analyzing the profits in terms of the standard gin income of $6.85 a bale. This eliminates gin income as a variable. Thus profits are accounted for by relative cost efficiency of operations and volume of ginning. An analysis of profits under a standard gin income per bale is indicated in Table 5. At the standard gin income total profits

Table 5. Profit Analysis of a Plains Cooperative Gin for the Seasons, 1927-28 and 1937-38, with a Standard Gin Income of $6.85 a Bale

Profit	1927–28	1937–38	Profits Expressed as Percentages of Standard Profits	
			1927–28	1937–38
Standard*	$11,029	$15,569	100.0	100.0
Volume above Standard	24,302	38,388	220.4	246.6
Cost Efficiency below Standard	−13,008	−852	−118.0	−5.5
Total Profit	$22,323	$53,105	202.4	341.1

*Standard Profit: Profit on standard volume at standard cost and standard gin income per bale.

in 1927-28 were 202.4 per cent of the standard profit; total profits in 1937-38 were 341.1 per cent of the standard profit. The actual profit per bale of the season 1937-38 was but 55 per cent of that of the season 1927-28. At a standard gin income, however, the profit per bale in 1937-38 would have been greater by 58 per cent than that of 1927-28. If the same percentage dividend distribution had been made under the standard gin income as under the actual, the average dividends would have been $2.36 a bale in 1927-28 and $3.72 a bale in 1937-38.

Based on the actual cost of ginning per bale, a matter of paramount importance, for every dollar a member of the Plains gin paid for ginning service in 1927-28 he paid but 67 cents in 1937-38. It would seem that attention directed to profits alone may be quite misleading. Profits, or losses, of the ginning business must always be appraised in terms of volume of ginning, gin income per bale, and relative cost efficiency. An application of the three standards of volume, cost, and gin income assures a sound basis for comparisons of profits and dividend paid of different associations the same year or of the same association for different years.

STANDARD COSTS OF 1927-28 AND 1937-38

As may be noted in the footnotes of Table 4, the standard cost in 1937-38 was less by 7 cents a bale than in 1927-28. As the volume of ginning in 1937-38 was 50 per cent greater than in 1927-28, this reduction in standard cost may appear too slight in terms of the significant influence of volume. The volume of ginning is but one of two factors influencing costs, the other being the investment in the gin plant. The investment in the Plains association increased from $52,529 in 1927-28 to $94,010 in 1937-38. The effect of both the volume and the investment on the costs of the two seasons may be measured. Standard fixed, variable, total and per bale costs in 1927-28 were: $10,606; $15,773; $26,379; and $2.9268. Standard fixed, variable, total, and per bale costs in 1937-38 were: $14,970; $23,665; $38,735; and $2.8570. Thus the per bale cost was higher in 1927-28 by 6.98 cents than in 1937-38. The weight of the investment as a cost factor is reflected in the fixed cost; the weight of volume of ginning as a cost factor is reflected in the variable cost. The influence of volume may

be ascertained by keeping the investment constant. With the investment of 1927-28 and the volume of 1937-38, the cost per bale would have been $2.5343. That is:

$$\frac{\$10{,}606 \text{ (Fixed cost, 1927)} + \$23{,}665 \text{ (Variable cost, 1937)}}{13{,}523 \text{ (Volume, 1937)}} = \$2.5343$$

Hence the reduction in cost because of increased volume was $2.9268 minus $2.5343, or 39.25 cents a bale. In other words the increase in volume from 9,013 to 13,523 bales reduced the cost of ginning by 39.25 cents a bale.

The influence of investment on cost may be ascertained by keeping volume constant. With the investment of 1927-28 and the volume of 1937-38, the cost per bale would have been $2.5343 as indicated above. Hence the increase in cost of ginning resulting from the increased investment was $2.8570 (Volume, 1937; Investment, 1937) minus $2.5343 (Volume, 1937; Investment, 1927), or 32.27 cents a bale. That is, the cost of ginning per bale in 1937-38 was higher by 32.27 cents than in 1927-28 because of the greater investment in 1937-38. The net effect of the increases in both volume of ginning and investment in the gin plant was the difference between increased and decreased costs, or a reduction of 6.98 cents a bale in 1937-38 as compared with 1927-28.

PROFIT AS AN INDEX OF BUSINESS EFFICIENCY

From the above analysis the conclusion could be drawn that profit measures the business efficiency of the ginning business. At this point one may properly raise the question relative to the distinguishing characteristics of a successful ginning business. Is profit the sole and complete measure of efficiency?

To place all the emphasis on profits of ginning is to assume that the interest of owners of gins is paramount. The interest of cotton growers, the gin labor force, and the general public is thus minimized. It would seem, however, that the relations of a business to its customers, employees, and the general public are involved as factors of efficiency. Charges exacted for ginning service are of direct concern to cotton growers. The amount of the charge has a bearing on the relative profitableness of cotton production. The amount of wages and salaries paid to gin laborers, office workers, and managers has a bearing on the purchasing power created for the groups employed. The quality of the ginning service affects the market value of the lint.

Charge for Ginning Service

The particular combination of gin income, cost, and volume obtaining for a given gin is the result of many factors. The charge cotton growers pay for ginning service is in the nature of an administered price rather than a competitive price. Long established custom has rather definitely fixed margins of profit on cottonseed. During the past 10 to 15 years ginners have been selling bagging and ties to patrons at prices yielding profits of about 40 cents a pattern. The gin toll per 100 pounds of seed

cotton over an area continues rather stable from year to year. During the past 20 years, however, the trend has been downward.

The forces which ultimately control the gin charge and margins on bagging and ties and cottonseed have a direct bearing on gin income as a factor of business efficiency. Such influences as tend to raise the charge and widen margins operate beneficially to private ginners and to members of cooperative gin associations placing the emphasis on profits of ginning and patronage dividends; such influences as tend to lower the charge and narrow margins operate beneficially to growers patronizing private ginners. This is assuming that income to ginners is sufficient to maintain gin plants in good working condition so that quality of service is not impaired. To the degree that a decrease in gin income reduces the number of gins with a consequent higher volume for operating gins, costs per bale are reduced. To the extent that gin charges influence the cost of cotton produced the interest of the general public is involved.

Factors Influencing Cost of Ginning

Cost of ginning is influenced by volume of ginning and investment in the gin plant. These two factors, however, do not control cost with the precision of natural law. Cost of ginning reflects, to a considerable degree, the effectiveness, or ineffectiveness, of management control. The supervision extended over the labor force has its effect. The manager does have control, within limits, of labor cost through adjustments made from day to day between the size of the gin crew and the daily volume of ginning[5]. The expertness and resourcefulness of the laborers constituting the gin crew have a marked relation to cost. Within limits, such items as power and repair costs are subject to management control.

The habits of growers in making deliveries of seed cotton to the gin have a bearing on ginning costs. Growers may time their deliveries in such a manner as to facilitate ginning the day's run in the regular day of 10 or 12 hours; or growers may time their deliveries in such a manner as to accumulate a large part of the day's run towards the end of the regular day necessitating several hours of overtime. Under the latter circumstance costs are increased. The impatience of growers to obtain immediate ginning service has led many gin associations to add a second plant following a season of high ginning volume. In general, to maintain the same relations among volume and investment and cost in a double plant as in a single plant, volume of ginning must be doubled. A number of gin associations in Texas have had costly experience in changing from a single battery to a double battery plant. It should be clear that cost as an efficiency factor is subject to the human element in the ginning business as reflected in managers and employees on the one hand and in grower patrons on the other hand.

Significance of Volume of Ginning

In explaining relations of volume and investment to cost of ginning, attention must be called to fixed and variable costs. These costs are de-

[5]Bulletin 606, Cost and Profit of Ginning Cotton in Texas. pp. 32-40.

fined in terms of total costs. Fixed costs remain constant through the normal range of volume; variable costs vary directly with volume. Items of cost, however, are not classified as fixed or variable. In most instances, items of cost are a mixture of fixed and variable costs. Labor cost is usually referred to as a variable or operating cost. In the case of gin labor cost, the mixture of fixed and variable cost is easily explained. By long-established custom in Texas, when the gin laborers report for work in the morning they are entitled to a day's wage even though the gin may not be operated for the day because of adverse weather or a breakdown. Labor costs on days of no ginning are in the nature of fixed costs. Variations between the size of the gin crew and the number of bales ginned from day to day interfere with a close relation between volume and labor cost. A certain amount of fuel is needed in the morning to raise the necessary steam pressure in a steam power plant. This fuel has been expended whether the volume for the day be large or small, or no volume at all. Hence a portion of the fuel cost is constant and the other portion variable.

The investment in the gin plant has a significant relation to ginning costs. (See Standard Costs of 1927-28 and 1937-38, above). The cost of depreciation is entirely governed by investment. According to sections of the state and types of power, depreciation varies from 5.90 per cent for the multi-battery gins of the Plains Area to 6.64 per cent for steam gins in the Blackland Area. These variations can be accounted for by differing proportions of investments carrying different depreciation rates. In most instances, taxes are related to investment. Rather generally cost of management is related to investment. It is logical that the gins with high investment require more skilled and higher paid managers.

Investments in gin plants vary within wide limits. For instance, the average investment of single battery Diesel gins of the High and Low Plains Area is $29,900. About two-thirds of these gins have investments ranging from $20,000 to $40,000. The absolute range is from $15,000 to $54,000. Several factors account for variations in investment. In the first place, the price level at the time the gin was built has a bearing. In the second place, the single battery gin may vary in size from four to six stands. In the third place, the gin may have little or no cleaning equipment, or it may be fully equipped; the gin may or may not have drying equipment. Finally, the present operator may have built new or bought secondhand. Over-expansion of ginning capacity has resulted in about two-thirds of the Texas gins operating at a low profit or at a loss. This has created a buyers' market for purchasers of secondhand plants. In obtaining gin plants at a discount, operators of secondhand plants are escaping, in small measure, from the evil of over-expanded ginning capacity.

While fixed and variable costs are defined in terms of total costs, these costs may also be expressed as per bale costs. Fixed costs per bale vary inversely with ginning volume. That is, a doubling of volume reduces fixed costs per bale by one-half. Variable costs per bale are constant through the normal range of volume. The relations of fixed and variable costs per bale to volume are shown graphically in Figure 4. Note the

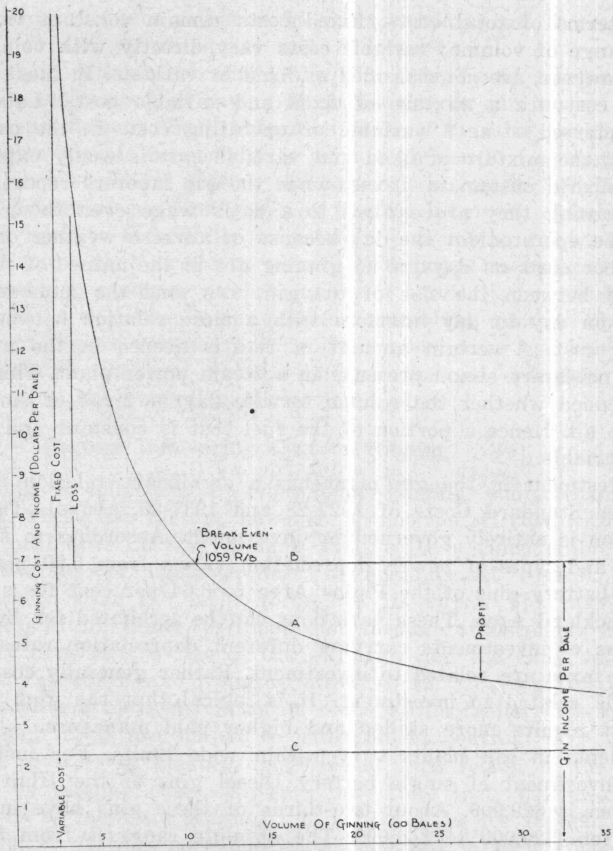

Fig. 4. Relation between fixed cost and variable cost per bale and volume of ginning.

In this figure the distance between the O-Base Line and any given point on Curve A measures the cost of ginning per bale at the specific volume involved.

Line B designates the standard gin income of $6.85 a bale.

Line C designates the variable cost of $2.25 a bale. Variable cost per bale is a constant as volumes change.

At any given volume, the vertical distance between Line C and Curve A measures the fixed cost per bale at that volume.

At any given volume less than 1,059 bales, the vertical distance between Curve A and Line B measures the loss per bale at that volume; at any given volume greater than 1,059 bales, the vertical distance between Curve A and Line B measures the profit per bale at that volume.

Curve A in the figure is the standard cost per bale of a $25,000 steam gin of the High and Low Plains Area of Texas. For the cost equation, see Exhibit A.

precipitous drop in costs with slight increases in volume in the low volume area. The decreasing fixed cost per bale with increasing volume added to the variable cost as a constant per bale explains the fact that costs decrease with increasing volume but at a retarded rate. That is, costs decrease at a slower rate than the rate of the increasing volume. Relations of fixed and variable costs to volume also explain the effect of volume on profits and losses of ginning. With volume such that costs

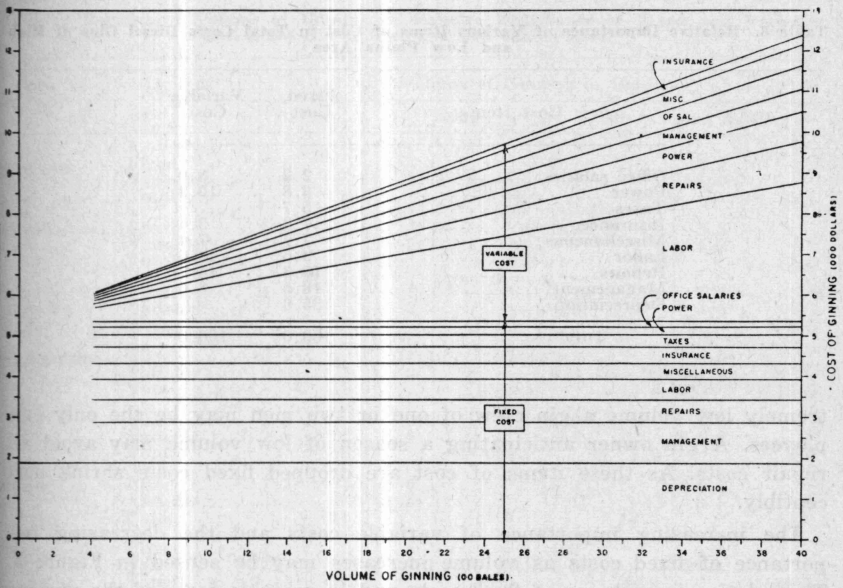

Fig. 5. Volume of ginning as related to total fixed and variable costs. Standard costs of Diesel gins of High and Low Plains Area with investment of $29,900.

Costs in this graph are one dimensional, the vertical distance between the boundaries of any given cost area.

In this instance taxes and depreciation are wholly fixed costs. Depreciation constitutes 35.0 per cent of total fixed costs. Management is second high with 18.5 per cent. These two items account for 53.5 per cent of total fixed costs.

The variable element of labor costs account for 48.6 per cent of total variable costs. Repair costs are second high with 14.3 per cent. These two items account for 62.9 per cent of total variable costs.

exceed the gin income losses per bale decrease with increasing volume but at a retarded rate until the "break-even" point is reached. With volume beyond the "break-even" point profits per bale increase with increasing volume but at an accelerated rate.

The separation of items of cost into their fixed and variable components is shown graphically in Figure 5. This figure is based on standard costs of a single battery Diesel gin of the High and Low Plains Area with the average investment of $29,900. Total standard costs may be ascertained by using an estimating equation for total costs (See Exhibit A). Or total standard costs may be ascertained by adding the standard costs of each of the items constituting total costs (See Exhibit B). Differences between total costs compiled the two ways for the gin under consideration above were: 0.38, 0.30, 0.25, and 0.22 of one per cent for volumes of 1,000, 2,000, 3,000, and 4,000 bales.

Total fixed costs are not projected to 0 volume in Figure 5. The fact should be understood that fixed costs are constant only through the normal range of volumes. As volume decreases to the vanishing point, some of the items of cost disappear. For instance, at a low volume the office force may be dispensed with and even the manager may be dropped. At an ex-

Table 6. Relative Importance of Various Items of Cost in Total Costs Diesel Gins of High and Low Plains Area

Cost Item	Fixed Cost	Variable Cost
Office salaries	2.2	8.0
Power	3.8	10.3
Taxes	5.7	.....
Insurance	7.3	3.4
Miscellaneous	7.7	7.4
Labor	9.5	48.6
Repairs	10.3	14.3
Management	18.5	8.0
Depreciation	35.0	.....
Total	100.0	100.0

tremely low volume a gin crew of one or two men may be the only employees. A gin owner anticipating a season of low volume may avoid all repair costs. As these items of cost are dropped fixed costs shrink perceptibly.

The increasing importance of variable costs and the decreasing importance of fixed costs as volume increases may be sensed in Figure 5. The relative importance of fixed costs and of variable costs of the various items is shown in Table 6. Depreciation is the most important fixed item; the variable aspect of labor cost predominates variable costs.

The relative importance of fixed and variable costs of the different items of cost at volumes of 1,000, 2,000, 3,000, and 4,000 bales is shown in Table 7. The relative importance of miscellaneous and repair costs changes but little with increasing volume. This results from the fact that decreases in relative importance of total fixed costs are counterbalanced by increases in relative importance of total variable costs. Taxes and depreciation as wholly fixed items drop decidedly in relative importance with increasing volume.

Relations of labor costs to total costs as volume increases deserve consideration. As volume increases from 1,000 to 4,000 bales, labor costs increase from 19.2 to 31.7 per cent of total costs. This means that out of every dollar of ginning cost labor gets 19 cents in a 1,000-bale gin and 32 cents in a 4,000-bale gin. Total cost of ginning per bale drops from $7.11 in a 1,000-bale gin to $3.10 in a 4,000-bale gin. Total labor income in 4 1,000-bale gins is $5,532 and in a 4,000-bale gin, $3,908. This means that one hour of gin labor in a 4,000-bale gin is as effective as one hour and 25 minutes in a 1,000-bale gin. Or stating this matter the other way, for every 100 hours of labor in a 1,000-bale gin but 71 hours are required in a 4,000-bale gin. While the 1,000-bale gin loses 3.9 per cent on its investment the 4,000-bale gin earns a return of 38.2 per cent on its investment. The 1,000-bale gin cannot maintain itself as a going concern unless a higher charge is made for ginning service; or a lower wage is paid to employees; or capitalization is reduced; or a combination of all three. The 4,000-bale gin earns much more than the return needed to

Table 7. Relation of Volume of Ginning to Relative Importance of Fixed and Variable Costs. Diesel Gin of High and Low Plains Area*

Item of Cost	Type of Cost	Volume of Ginning in Bales							
		1,000		2,000		3,000		4,000	
Insurance	Fixed	5.5		4.4		3.7		3.2	
	Variable	0.8		1.4		1.7		1.9	
	Total		6.3		5.8		5.4		5.1
Miscellaneous	Fixed	5.8		4.7		3.9		3.3	
	Variable	1.8		2.9		3.7		4.2	
	Total		7.6		7.6		7.6		7.5
Office salaries	Fixed	1.6		1.3		1.1		1.0	
	Variable	2.0		3.2		4.0		4.5	
	Total		3.6		4.5		5.1		5.5
Management	Fixed	13.9		11.1		9.3		8.0	
	Variable	2.0		3.2		4.0		4.5	
	Total		15.9		14.3		13.3		12.5
Power	Fixed	2.8		2.3		1.9		1.6	
	Variable	2.6		4.1		5.1		5.9	
	Total		5.4		6.4		7.0		7.5
Repairs	Fixed	7.7		6.2		5.2		4.5	
	Variable	3.6		5.7		7.1		8.1	
	Total		11.3		11.9		12.3		12.6
Labor	Fixed	7.2		5.7		4.8		4.1	
	Variable	12.0		19.3		24.1		27.6	
	Total		19.2		25.0		28.9		31.7
Taxes	Fixed	4.3		3.4		2.8		2.5	
	Variable	....		....		....		....	
	Total		4.3		3.4		2.8		2.5
Depreciation	Fixed	26.4		21.1		17.6		15.1	
	....	....		....		....		....	
	Total		26.4		21.1		17.6		15.1
All	Fixed	75.2		60.3		50.3		43.2	
	Variable	24.8		39.7		49.7		56.8	
	Total		100.0		100.0		100.0		100.0
Actual costs	Fixed	$5,350		$5,350		$5,350		$5,350	
	Variable	1,760		3,520		5,280		7,040	
	Total		$7,110		$8,870		$10,630		$12,390

*Gin plant with average investment of $29,900.

maintain itself. Service could be offered at a lower price; wages could be increased; and still a lucrative return would be available on capital.

It should be evident that the productiveness of both labor and capital in the gin business increases with increasing volume. If it may be assumed that opportunities are available for full and efficient utilization of the labor and capital released through higher volume per gin, a general movement towards greater efficiency in the gin industry definitely furthers the public interest.

Many factors determine the volume of a given gin. The amount of cotton produced in the area about a gin point and the number of gins competing for the available cotton control the average volume per gin. The personality of the gin manager is decidedly important. A desirable manager attracts patronage from cotton growers. The cooperative association through its sign-up of members is in a particularly strong position in

acquiring an economic volume of ginning. The influences which assure a gin an economic volume are most important factors of efficiency in the ginning business.

In considering the desirability of increasing the volume of Texas gins the question may be raised whether or not there is an upper limit to the volume which may be ginned economically. The answer is that with the rarest exceptions the volume of Texas gins is far below that showing any indication of increasing costs. Increasing costs per bale with increasing volume would involve increases in variable costs per bale more than offsetting decreases in fixed costs per bale.

A 6/80 steam gin in the High Plains Area had a volume of 11,261 bales in 1937, a volume more than five times greater than the average volume of steam gins in that area. The actual cost of ginning was 24 per cent higher than the standard cost. Repair and power costs were 70 and 101 per cent higher than standard repair and power costs. These two items accounted for 83 per cent of the excess in total costs over total standard costs. This higher cost, however, is inconclusive as evidence of increasing costs. If a sufficient number of records of exceedingly high volume had been available for establishing standard costs, the estimated costs might have been somewhat different from those established by the lower volume.

As a general rule, Texas gins do not furnish hauling service from the cotton field to the gin. Hence the cost of the local haul is borne by the cotton grower. The cost of operating the gin plant does not reflect the increasing cost of the local haul as wider and wider territory is included, nor the cost and inconvenience to the gin patron when he has to take his turn with the many growers waiting for ginning service ahead of him. A 4/80 gin in East Texas had a volume of 5,488 bales in 1933. This cotton was brought from distances as far as 30 miles. At times more than 300 bales of seed cotton were accumulated on the gin lot waiting for ginning service. The wide margin between the charge paid for ginning service and the low cost of ginning resulting from the large volume was by no means clear profit. The large volume was gained at a considerable assembling cost to members of this cooperative. It is quite possible that increasing costs may occur at high volume if account be taken of delivery costs to the gin as well as of ginning costs.

SIZE OF TEXAS COTTON CROP, NUMBER OF GINS, AND RETURNS ON INVESTMENT

In terms of the cost equations by type of power in the different sections of the state and the number of gins by type of power, a weighted cost equation was derived for the state as a whole. Figure 6 was constructed as a device for establishing average relations among size of the Texas cotton crop, number of gins, and profits on the average investment. For instance, an average gin of Texas with a volume of 634 bales would lose 6 per cent on its investment if operated at standard cost and with a

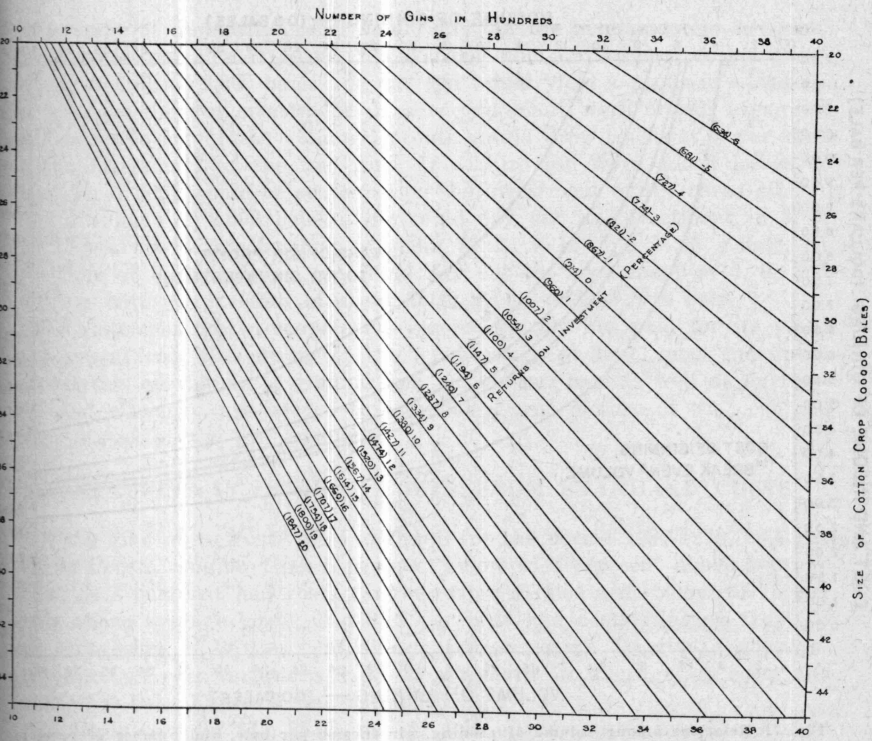

Fig. 6. Relations among size of the Texas cotton crop, the number of operating gins, and average profit on gin investment.

At a volume of 634 bales the average gin would lose 6 per cent on its investment; at a volume of 914 bales the average gin would break even; at a volume of 1,847 bales the average gin would earn 20 per cent on its investment. This figure is based on the straight line relations between the size of the Texas cotton crop and the number of gins required to gin a given volume as an average.

Costs are based on the equation for all Texas:
Cost = \$2,035 + \$0.0879I + \$1.91V

The gin income per bale assumed is \$5.95, the standard for all Texas.

standard gin income per bale. With 4,000 gins this would mean a crop of about 2,540,000 bales; with a crop of 2,000,000 bales this would mean about 3,160 gins. An average gin would break even with a volume of 914 bales if operated at standard cost and with a standard gin income per bale. With 4,000 gins this volume would mean a crop of about 3,640,000 bales; with a crop of 2,000,000 bales this would mean about 2,190 gins. An average gin would earn a profit of 20 per cent on its investment with a volume of 1,847 bales. With crops of 4,500,000 and 2,000,000 bales this would call for about 2,440 and 1,090 gins.

A reading on Figure 6 for size of crop and number of gins will give the average profit on the gin investment; a reading for size of crop and average profit will give the number of gins.

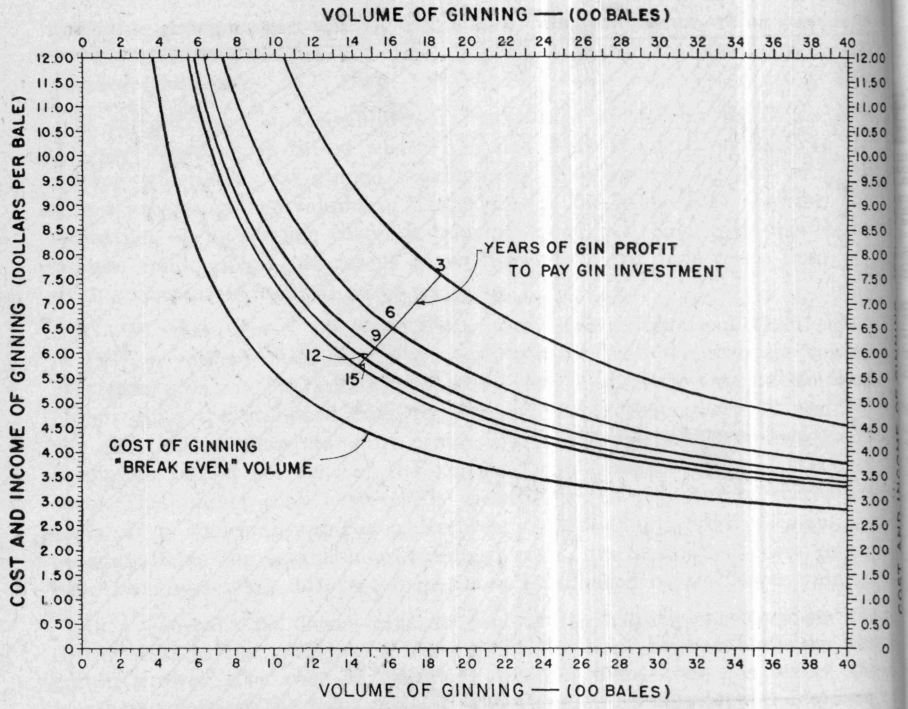

Fig. 7. Relations among volume of ginning, gin income per bale, and number of years required to profit-finance the gin plant.

The gin investment assumed is $18,848. This investment may be profit-financed in 3, 9, and 15 years with volumes of 2,625, 1,600, and 1,375 bales with a standard gin income of $5.95 a bale. At a volume of 2,625 bales the cost of ginning is $3.32 a bale and the gin investment is $7.20 a bale; at a volume of 1,600 bales the cost of ginning is $4.22 a bale and the gin investment is $11.80 a bale; and at a volume of 1,375 bales the cost of ginning is $4.59 a bale and the gin investment is $13.70 a bale.

VOLUME OF GINNING AND NUMBER OF YEARS TO PROFIT-FINANCE GIN PLANT

The prevalence of profit-financing among cooperative gin associations of Texas makes the relations between the volume of ginning and the resultant profits of decided significance. All factors having a bearing on profits affect the rate at which the gin investment may be financed from profits. Figure 7 shows relations among gin income per bale, volume of ginning and number of years required to pay the gin investment from profits. In this analysis the full investment of $18,848 per gin is assumed.

With a gin income of $12 a bale, an average gin could pay out its investment in 3, 9, and 15 years on volumes of about 1,050, 635, and 540 bales. A gin income of $12 a bale may seem quite fantastic under present day circumstances. Twenty-five years ago gin incomes ran as high as $13 to $14 a bale in the Low Plains Area. At a gin income of $5.95 a bale,

the average of the state, profits would pay out the investment in 3, 9, and 15 years on volumes of about 2,625, 1,600, and 1,375 bales. A gin point with a volume of 2,600 bales and one gin would yield a profit of about 37 per cent on the gin investment. If a second plant were added, assuming equal distribution of the volumes, profits would drop to about 9 per cent on the investment of the two gins. If a third gin were added losses of about 1 per cent would be sustained on the investment of the three gins.

At a volume of 2,000 bales a gin could pay out its investment in 3, 9, and 15 years with gin incomes of about $7.25, $5.10, and $4.65 a bale. At a volume of 3,000 bales a gin could pay out its investment in 3, 9, and 15 years with gin incomes of about $5.40, $4.05, and $3.70 a bale.

The statement that a cooperative gin association has paid for its plant in 5 years from the profits of the business, is, at best, most indefinite. Information on volume of ginning, gin income per bale as well as on relative cost efficiency, are needed to establish a true picture of the cost and profit status of the gin business.

VARIATIONS IN GINNING COSTS FROM STANDARD COSTS

Of the gins whose costs were analyzed for the period 1930-1938, 28.4 per cent had costs ranging from 5 per cent below to 5 per cent above average costs; 64.2 per cent had costs ranging from 15 per cent below to 15 per cents above average costs; and 83.2 per cent had costs ranging from 25 per cent below to 25 per cent above average costs[6]. To give a sense of the effects of cost variations from the standard, or average, on costs and profits per bale, Figure 8 was developed.

To attain costs of $12, $5.95, and $4 a bale, gins with costs 30 per cent below standard would require volumes of about 240, 560, and 960 bales. To attain costs of $12, $5.95, and $4 a bale, gins with standard costs would require volumes of about 360, 925, and 1,750 bales. To attain costs of $12, $5.95, and $4 a bale, gins with costs 30 per cent above standard would require volumes of about 510, 1,400, and 3,150 bales.

A sense of the effects of increasing costs as a consequence of rising price levels of the war period may be ascertained from Figure 8. An analysis of more than 300 ginning cost records for the season 1942-43 indicated increased costs of from 15 to 25 per cent above the costs of the 1930-1938 period for the different areas of Texas. An increase of 20 per cent in costs would have these results: At a volume of 1,000 bales costs would increase from $5.60 to $6.70 a bale; to assure the same profit to the gin, the gin income per bale would have to be advanced from $5.95 to $7.05, an increase of 18.5 per cent. At a volume of 1,500 bales costs would increase from $4.35 to $5.25 a bale; to assure the same profit to the gin, the gin income per bale would have to be advanced from $5.95 to $6.85, an increase of 15.1 per cent. At a volume of 2,000 bales costs would increase from $3.75 to $4.50 a bale; to assure the same profit to the gin, the gin income would have to be advanced from $5.95 to $6.70, an increase of 12.6 per cent.

[6]Bulletin 606, Cost and Profit of Ginning Cotton in Texas. p. 27.

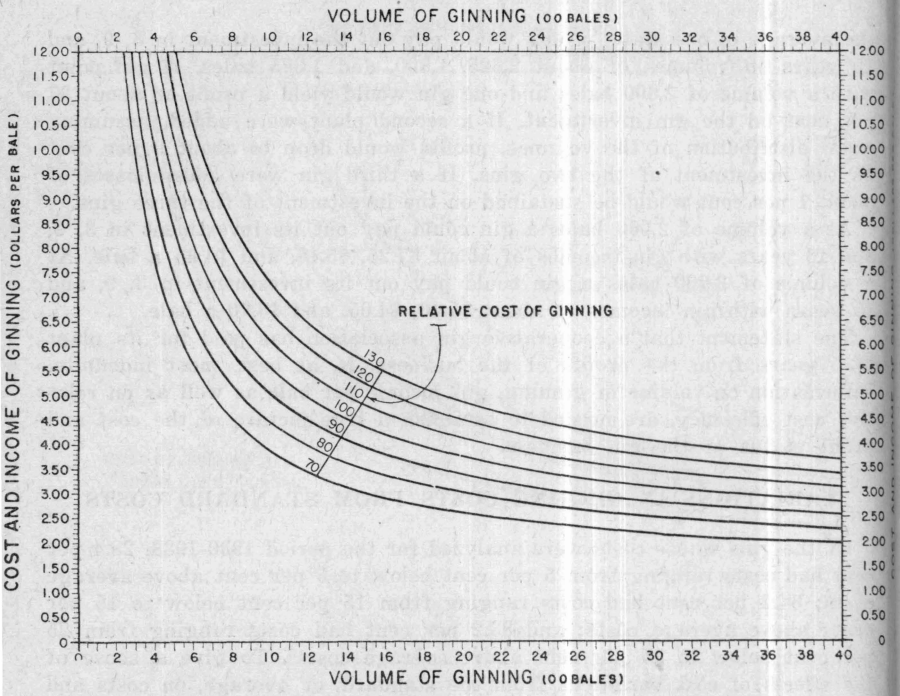

Fig. 8. Relations of volume of ginning to costs of ginning per bale as influenced by varying cost efficiencies. Standard cost is taken as 100.

At a cost efficiency 30 per cent more favorable than standard, a cost of $4.00 a bale may be attained at a volume of 960 bales; at standard cost, a cost of $4.00 a bale may be attained at a volume of 1,750 bales; and at a cost efficiency 30 per cent less favorable than standard, a cost of $4.00 a bale may be attained at a volume of 3,150 bales.

VOLUME OF GINNING AND EFFICIENT USE OF CAPITAL

The capital requirements of the ginning business is characterized by certain peculiarities. Almost universally ginners obtain bagging and ties from the oil mills to which they sell their cottonseed. Settlement is made as the patterns are used. The cottonseed which ginners buy from their patrons is sold within a day or two. Ginners who purchase the lint cotton from their patrons sell the cotton promptly. Thus there is a minimum of merchandising in the ginning business. Ginning service is sold for cash. Current income is usually more than sufficient to meet operating costs. Thus the demand for working capital is of minor significance. The fixed investment in the gin plant is relatively heavy. The shortness of the ginning season has the effect of augmenting the importance of fixed capital requirements.

The success of any business is influenced by the efficiency with which its capital is employed. In the ginning business the relation between the volume of ginning and the investment in the gin plant per bale is most significant. Figure 9 shows this relation for volumes from 1,000 to 4,000

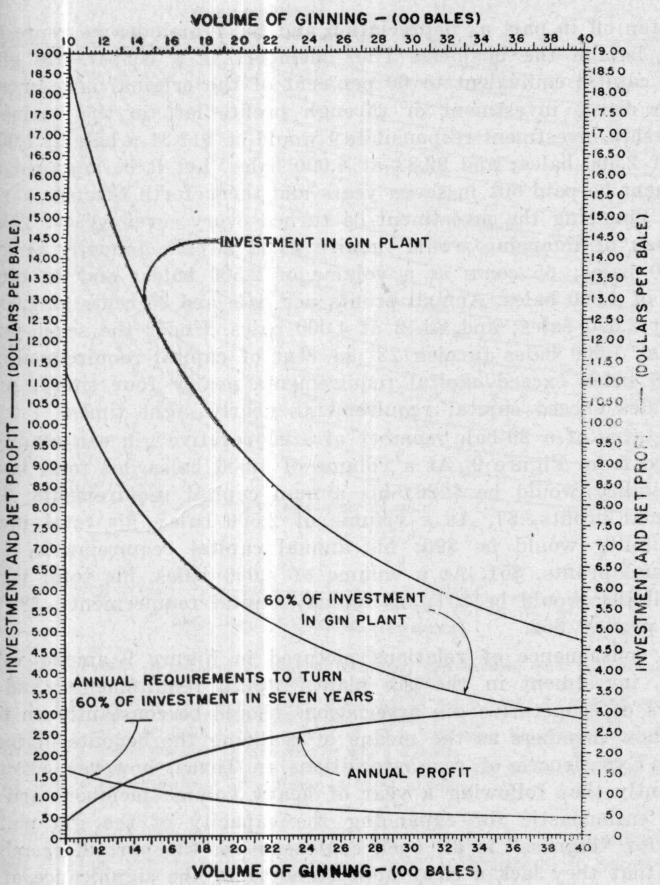

Fig. 9. Investments, capital requirements, and profits per bale as influenced by volume of ginning. Gin investment, $18,848.

INVESTMENT PER BALE

The investment per bale drops from $18.85 a bale at 1,000 bales to $4.71 a bale at 4,000 bales. Sixty per cent of the original cost drops from $11.31 a bale at 1,000 bales to $2.83 a bale at 4,000 bales.

CAPITAL REQUIREMENTS

Annual capital requirements per bale to pay out 60 per cent of the gin investment in 7 years and to turn this investment every 7 years drop from $1.62 at 1,000 bales to 40 cents at 4,000 bales.

ANNUAL PROFIT

Annual profits per bale increases from 35 cents a bale at 1,000 bales to $3.12 at 4,000 bales.

At 1,000 bales the annual profit furnishes 22 per cent of capital requirements; at 4,000 bales the annual profit exceeds capital requirements nearly 8 times.

bales. An investment of $18.85 a bale at a volume of 1,000 bales drops to $7.54 and $4.71 at volume of 2,500 and 4,000 bales.

Let it be assumed that a cooperative gin association follows a sound financial policy in assigning membership equities to not more than 60 per cent of the original cost of fixed assets. The other 40 per cent may

be written off in part as depreciation and the remainder be represented by surplus left in the business. Thus members in a cooperative gin would furnish capital equivalent to 60 per cent of the original investment either through direct investment or through profits left in the business. This membership investment responsibility would be $11.31 a bale at 1,000 bales; $4.52 at 2,500 bales; and $2.83 at 4,000 bales. Let it be assumed that the investment be paid out in seven years and thenceforth through a revolving plan of financing the investment be turned every seven years. This seven-year plan of financing would require $1.62 a bale annually at a volume of 1,000 bales; 65 cents at a volume of 2,500 bales; and 40 cents at a volume of 4,000 bales. Annual profits per bale are 35 cents at 1,000 bales; $2.56 at 2,500 bales; and $3.12 at 4,000 bales. Under the seven-year plan, profits at 1,000 bales furnish 22 per cent of capital requirements; profits at 2,500 bales exceed capital requirements nearly four times; profits at 4,000 bales exceed capital requirements nearly eight times.

The status of a 20-bale member of a cooperative gin can readily be ascertained from Figure 9. At a volume of 1,000 bales, his total investment responsibility would be $226; his annual capital requirements, $32; and his annual profits, $7. At a volume of 2,500 bales, his total investment responsibility would be $90; his annual capital requirements, $13; and his annual profits, $51. At a volume of 4,000 bales, his total investment responsibility would be $57; his annual capital requirements, $8; and his annual profits, $62.

As a consequence of relations pictured in Figure 9 among volume of ginning, investment in the gin plant, capital requirements, and profits, members of cooperative gin associations should be constantly on the alert to add new members as the means of realizing the benefits of increasing volume. Experiences of gin associations in Texas, however, show rather consistently that following a year of heavy volume members and officials become enthusiastic for expanding the capacity of the gin plant. This clamor for "bigness" is an open confession on the part of members and leaders that they lack a clear understanding of the significance of volume as related to cost of ginning and financing of the gin plant.

INDEX ON BUSINESS EFFICIENCY OF TEXAS GIN INDUSTRY

The business efficiency of the Texas gin industry is determined by the status of each gin as to gin income per bale, volume of ginning, and relative cost efficiency. To speak of the business efficiency of the Texas gin industry as a whole would seem inappropriate. Nevertheless, a measure, in the nature of the index of the relative status of the industry should serve useful purposes. The government program the past 10 years regarding cotton production has affected the gin industry as to the volume of ginning. The level of gin rates and the margins on cottonseed and bagging and ties established under O.P.A. regulations affect the gin income.

The profits of the ginning business may be viewed as a rate on the bales ginned or as a return on the capital invested. Members of cooperatives who receive patronage dividends are interested in profits and dividends

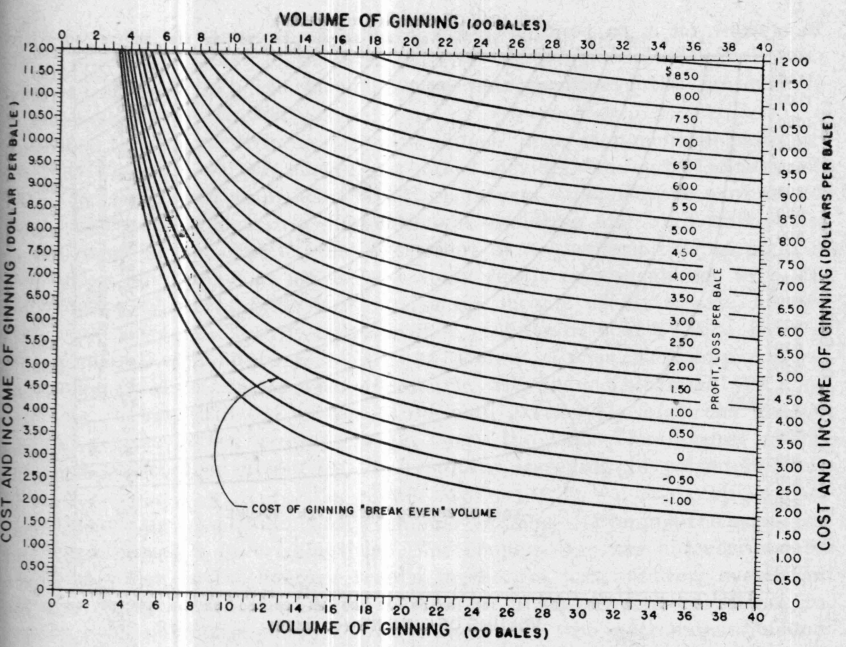

Fig. 10. Profit per bale as related to cost of ginning, gin income and volume of ginning. Average gin of Texas with investment of $18,848.

At a gin income of $12 a bale, a profit of $2 a bale may be earned on a volume of 460 bales; the cost of ginning is $10 a bale.

At a volume of 2,000 bales a profit of $2 a bale may be earned at a gin income of $5.75 a bale; the cost of ginning is $3.75 a bale.

At a volume of 4,000 bales a profit of $2 a bale may be earned at a gin income of $4.82 a bale; the cost of ginning is $2.82 a bale.

on a per bale basis. The owners of private gins and the members of cooperatives during the paying out period are interested in profits as returns on the investment.

The relations among volume of ginning and the gin income, the cost, and the profit per bale are pictured in Figure 10. For instance, a profit of $2 a bale, a volume of 2,000 bales, and a gin income of $6 a bale indicate a cost of $4 a bale, a cost about 25 cents a bale above standard cost. A volume of 1,000 bales and a gin income of $6 a bale indicate a profit of about 40 cents a bale if the gin be operated at standard cost. A volume of 600 bales and a gin income of $6 a bale show a loss of about $2.10 a bale if the gin be operated at standard cost.

Figure 11 may serve as an index on business efficiency as applied to the Texas gin industry as a whole. The standard volume for the average gin of Texas is 1,767 bales, the volume at a standard cost of $4 a bale. The returns on the investment in the average gin at this volume and a standard gin income of $5.95 a bale is about 18 per cent.

An extensive study of ginning costs of Texas over a 10-year period indicates an unmistakable tendency of the gin industry to adjust the number

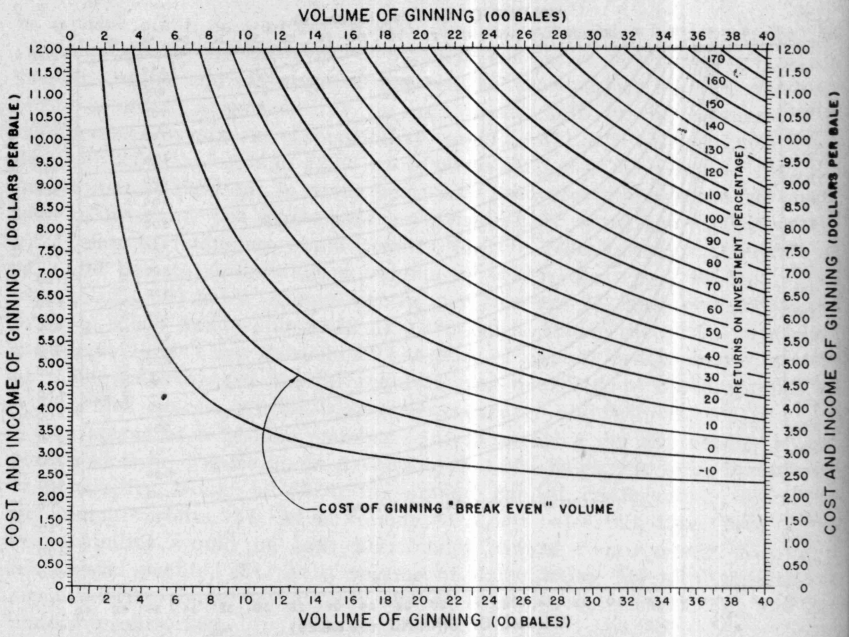

Fig. 11. Returns on gin investment as related to cost of ginning, gin income, and volume of ginning. Average gin of Texas with investment of $18,848.

At a gin income of $12 a bale, 20 per cent may be earned on the gin investment at a volume of 740 bales; the cost of ginning is $6.85 a bale.

At a volume of 2,000 bales a profit of 20 per cent may be earned on the gin investment at a gin income of $5.60 a bale; the cost of ginning is $3.75 a bale.

At a volume of 4,000 bales a profit of 20 per cent may be earned on the gin investment at a gin income of $3.75 a bale; the cost of ginning is $2.82 a bale.

of gins to the size of the cotton crop and the gin income per bale such that the average gin breaks even on operations. "Break-even" volumes for the average gin at gin incomes of $12, $5.95, and $5 a bale would be 366, 914, and 1,195 bales. For a 3,000,000-bale crop this would mean 8,200, 3,280, and 2,500 gins for the state. For every dollar invested in ginning facilities at an average volume of 366 bales, there would be 40 cents and 31 cents at average volumes of 914 and 1,195 bales. For every dollar of labor cost at a volume of 366 bales, there would be 66 cents and 60 cents of labor costs at volumes of 914 and 1,195 bales.

The weakness and fallacy of the high price philosophy may be demonstrated through readings on Figure 11. Granted that 10 per cent be a desirable return on gin investment. At a gin income of $12 a bale this return may be realized on a volume of 550 bales with a gin operating at standard cost. At a gin income of $5.95 a bale this return would require a volume of 1,380 bales. The lower volume would call for 2.5 times as many gins as the higher volume. Thus a high gin income would aggravate the tendency of over-duplication of ginning facilities. As a result human and capital resources would be used extravagantly. At a volume of 1,380

bales 10 per cent could be earned on the investment at a gin income of $10 a bale and a cost of $6.63 a bale, a cost 44 per cent higher than standard cost. A high gin income would tend to relieve the pressure to attain a high cost efficiency.

Figure 11 also pictures what may happen in a monopolized industry. Suppose through patent control or other devices, the gin industry of Texas were operated as a monopoly. High returns on the investment would be possible even under over-duplication of facilities and high unit costs. A return of 50 per cent on the investment at a standard cost of $4.75 a bale and a gin income of $12 a bale would result from a volume of 1,100 bales. At a volume of 2,050 bales and a gin income of $12 a bale, 50 per cent could be earned on investment at a ginning cost of $7.40 a bale, a cost double the standard cost at that volume. Under monopoly control the tendency is to charge what the traffic will bear. This might be considerably higher than $12 a bale. Under an excessively high charge for ginning service cotton growers would carry the load. The general public would be affected adversely by the resultant lessening in cotton production.

In the matter of attaining an economic volume of ginning the cooperative gin occupies a favored position. The cooperatives are not confined to a volume which on the average results in the gin just breaking even. The savings on decreased costs from increased volume become available to members as patronage dividends. By and large, the patronage dividend is the attraction maintaining favorable volume with cooperative gins.

MEANING OF GREATER BUSINESS EFFICIENCY IN TEXAS GIN INDUSTRY

Adjustments in the Texas gin industry facilitating greater business efficiency would have significant results. The number of gins could be reduced materially without increasing the distances growers would need to go to obtain ginning service. Over-duplication occurs with too many gins at gin points rather than with single gin points located too closely together. Reduction in the number of gins may be effected through failure of replacing many of the gins as they wear out and by junking other gins for whatever value they may have as replacements and repair parts.

Under present conditions in Texas the number of gins is such that the average volume is about 900 bales with a crop of 3,000,000 bales. At this volume the average gin breaks even. Suppose the number of gins were cut in half. At a volume of 1,800 bales the average gin would earn a profit of 19 per cent on its investment. The investment tied up in ginning facilities would be reduced by one-half. The labor force would be reduced to about 75 per cent. The gin crews would enjoy a longer period of employment.

A positive step towards greater business efficiency in the Texas gin industry is now being taken by developments in the cooperative gin movement. The average volume of the cooperative gins is more than twice that of the private ginners. Already large numbers of Texas cotton growers may

choose between relatively high costs of ginning service resulting from too many gins and the lower costs resulting from an economic volume of ginning attained by the cooperative gins.

SUMMARY

Efficiency may be expressed quantitatively only as measured in terms of a standard. Efficiency is the ratio between expenditures in the form of money and material costs and personal sacrifices and output in the form of products, services, and personal benefits.

Pecuniary efficiency as "the relationship between dollars spent and income obtained" makes profit, or loss, the index of efficiency.

A treatment of business efficiency may be made more realistic by confining the discussion to a specific business. Efficiency as analyzed in this Bulletin is limited to the ginning business of Texas.

The suitability of profits as the index of business efficiency must be judged in terms of the varying situations giving rise to ginning profits. A gin business could be profitable and still its operations might be socially undesirable in that charges for service might be unreasonably high or gin employees might be underpaid.

A successful ginning business depends upon volume of ginning, cost of ginning, and gin income per bale. The measuring of efficiency of the ginning business requires the formulation of standards for gin income, cost, and volume of ginning.

Business standards must reflect business in action. Consequently, such standards, of necessity, must be historical. The validity of business standards depends upon business conditions in later periods as related to business conditions of the period the standards were formulated. Changes in economic relations, techniques of production, or social controls may require revisions of business standards.

Gin incomes for the cotton areas of Texas were obtained for the period 1930-1938. The averages of these gin incomes are suggested as standards. These standard gin incomes per bale are: $5.20 for the Blackland Area; $6.85 for the High and Low Plains Area; and $6.40 for the Gulf Coast Area.

Standards for total cost of ginning and items of ginning cost have been developed for the Texas ginning business in the form of estimating equations as given in Exhibits A and B. These standards reflect costs for the period 1930-1938.

For want of more definite procedure, standard volume was approached from the standpoint of the volume which may be ginned at what may be termed a reasonable cost. This cost per bale is strictly a matter of judgment. Accordingly standards are suggested as the volumes which may be ginned at a standard cost of $3.75 a bale in the Blackland Area; $4.25 in the High and Low Plains Area; and $4.00 in the Gulf Coast Area.

In applying the three standards to an analysis of business operations of a gin, or a group of gins, these features may be demonstrated: (1) Additions to, or deductions from, the total gin income resulting from the

actual gin income per bale being above, or below, the standard gin income. (2) Additions to, or deductions from, the cost of ginning resulting from the actual ginning cost per bale being higher, or lower, than the standard ginning cost. (3) Determination of standard profit at standard gin income, standard cost, and standard volume; additions to profits at volumes greater than standard volume; deductions from profits at volumes less than standard volume.

An analysis of three groups of successful gins showed these results: Total actual profits were 61.3 per cent of standard profits in the High and Low Plains Area; total actual profits were 109.7 of standard profits in the Gulf Coast Area; total actual profits were 136.3 per cent of standard profits in the Blackland Area. Gin income and cost of ginning below standard deducted 35.8 per cent from standard profits in the High and Low Plains Area. Volume above standard added 63.9 per cent to standard profits in the Blackland Area. Gin income and cost of ginning below standard, however, canceled nearly one-half of the volume advantage.

An analysis of the three groups of unsuccessful gins demonstrated clearly reasons for financial distress. Total actual profits were 13.3 per cent in the High and Low Plains Area, 26.7 per cent in the Blackland Area, and 28.0 per cent in the High and Low Plains Area of standard profits. A volume below standard deducting 74.3 per cent from standard profits struck a crippling blow to the gin group of the High and Low Plains Area. Gin income and cost of ginning below standard and losses on cotton trading all but wrecked the profits of the Blackland group. Volume and cost of ginning below standard reduced profits of the Gulf Coast gins most severely.

A profit analysis of three successful cooperative gins gave ample proof that the standards formulated are not unreasonable. Over an 8 year period a Blackland gin earned profits 325.2 per cent of its standard profits. Over a 15 year period a Plains gin earned profits 170.2 per cent of its standard profits. Over a 16 year period a Gulf Coast gin earned profits 153.1 per cent of its standard profits.

The success of any business is influenced by the efficiency with which the capital of the business is employed. In general in the ginning business if the total investment be $10 a bale or less, the volume-capital ratio is favorable; if the total investment be greater than $10 a bale, the volume-capital ratio is unfavorable.

The relation of volume of ginning to cost is explainable in terms of the behavior of total fixed and variable costs. Total fixed costs remain constant through the normal range of volume; total variable cost varies directly with the volume of ginning. Fixed and variable costs may also be considered in terms of per bale costs. Fixed costs per bale vary inversely with volume; that is, an increase in volume from 1,000 to 2,000 bales reduces fixed costs by one-half. Variable costs per bale remain constant through the normal range of volume. Consequently as volume of ginning increases fixed and variable costs per bale decrease but at a retarded rate. Thus at volumes beyond the "break-even" volume, as volume increases profits increase but at an accelerated rate.

The Texas gin industry tends to adjust the number of gins to the size of crop and the gin income per bale such that the average gin breaks even. For a 3,000,000 bale crop at a gin income of $12 a bale this would mean about 8,200 gins; and at a gin income of $5.95 about 3,280 gins. For every dollar invested in gin facilities under the lower volume and higher gin income there would be but 40 cents invested under the higher volume and lower gin income; for every dollar expended for gin labor under the lower volume, there would be 66 cents expended under the higher volume per gin. It should be manifest that at a low average volume of ginning, labor and capital resources are used extravagantly and inefficiently.

In the matter of attaining an economic volume of ginning, cooperative gins occupy a favored position. Savings on decreased costs resulting from increased volume become available to members as patronage dividends. By and large the patronage dividend is the attraction maintaining favorable volume with cooperative gin associations.

EXHIBIT A. EQUATIONS FOR ESTIMATING TOTAL STANDARD COSTS OF GINNING

I. Costs According to Volume of Ginning and Investment in Gin Plant

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

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

II. Costs According to Volume of Grinding

Blackland Area

Steam power	=	$2,573	+	$2.38V
Diesel power	=	3,046	+	1.84V
Electric power	=	2,569	+	2.32V

High and Low Plains Area

Steam power	=	$4,773	+	$2.34V
Diesel power	=	5,693	+	2.18V
Electric power	=	4,375	+	2.55V
Large Gins	=	11,169	+	1.85V

Gulf Coast Area

Diesel power	=	$3,823	+	$2.27V
Electric power	=	2,024	+	2.95V

All Texas

Average Cost	=	$3,381	+	$2.27V

EXHIBIT B. EQUATIONS FOR ESTIMATING STANDARD COSTS OF ITEMS OF COST

Blackland Area

	Steam Power						Diesel Power				
Labor	=	$ 421	+	$0.62V			$ 210	+	$0.83V		
Power	=	272	+	0.36V			105	+	0.25V		
Repairs	=	307	+	0.20V			320	+	0.14V		
Ins. and Taxes	=	288	+	0.08V			243	+	1.21S		
Management	=	—153	+	0.33V	+	$2.15S	65	+	3.10S		
Depreciation	=			0.0664I					0.0647I		
Miscellaneous	=	130	+	0.19V			156	+	0.13V		

	Electric Power			
Labor	=	$133	+	$0.75 V
Power	=	120	+	0.73V
Repairs	=	230	+	0.15V
Ins. and Taxes	=	76	+	0.0399I
Management	=	1,125		
Depreciation	=			0.0643I
Miscellaneous	=	329		

High and Low Plains Area

	Steam Power						Diesel Power				
Labor	=	$503	+	$0.86V			$ 15	+	$0.0165I	+	$0.85V
Power	=	374	+	0.16V			—37	+	0.0080I	+	0.18V
Repairs	=	470	+	0.49V			550	+	0.25V		
Insurance	=	386	+	0.08V			392	+	0.06V		
Taxes	=	217	+	0.0047I			116	+	0.0063I		
Management	=	686	+	0.0113I	+	$0.15V	611	+	0.0126I	+	0.14V
Office salaries	=	204	+	0.10V			118	+	0.14V		
Depreciation	=			0.0613I					0.0627I		
Miscellaneous	=	183	+	0.35V			413	+	0.13V		

	Electric Power				Multiple Battery			
Labor	=	$ 288	+	$0.83V	$ 992	+	$0.95V	
Power	=	383	+	0.64V	569	+	0.26V	
Repairs	=	79	+	0.33V	1,689	+	0.27V	
Insurance	=	395	+	0.09V	13	+	1.40S	
Taxes	=	—89	+	0.0153I	—709	+	2.07S	
Management	=	857	+	0.0183I	874	+	0.0201I	
Office salaries	=	131	+	0.17V	—2,280	+	4.10S	
Depreciation	=			0.0614I			0.0590I	
Miscellaneous	=	102	+	0.28V	839	+	0.16V	

Gulf Coast Area

	Diesel Power						Electric Power		
Labor	=	$425	+	$0.87V			$235	+	$1.02V
Power	=	86	+	0.22V			90	+	0.58V
Repairs	=	31	+	0.0115I	+	$0.36V	—36	+	0.48V
Insurance	=	294	+	0.07V			190	+	0.11V
Taxes	=	251					102	+	0.10V
Management	=	384	+	0.0220I	+	0.22V	838		
Depreciation	=			0.0612I					0.0646I
Miscellaneous	=	275	+	0.25V			—4	+	0.34V

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