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The Texas Cotton Ginning Industry: Industry Characteristics, Production Capacity, and Utilization

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Department of Agricultural Economics
College of Agricultural Sciences
Texas Tech University
Lubbock, Texas

THE TEXAS COTTON GINNING INDUSTRY:
INDUSTRY CHARACTERISTICS, PRODUCTION
CAPACITY, and UTILIZATION

by

Thomas R. Owens and James E. Justice¹

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¹Associate Professor and Former Research
Assistant, Respectively, Department of
Agricultural Economics, Texas Tech University
Lubbock, Texas

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Detailed Appendix Tables illustrating industry characteristics described in this study by individual Crop Reporting Districts are available on request from the Department of Agricultural Economics, Texas Tech University, Lubbock, Texas.

I. SUMMARY

The cotton gin remains a center of economic activity for cotton growing communities in Texas despite the decrease in the number of active gins. A decline of 10 percent in gin numbers occurred in the five-year period, 1964-1968. Total ginning per gin plant during the same five-year period, however, remained relatively constant. Cooperative gins averaged approximately 1,000 bales more in volume than did their independent counterparts. Despite the greater ginning volume experienced by cooperative gins, the average length of the ginning season for both cooperative and independent gins during the period, 1964-1968, remained fairly constant, averaging ten to eleven weeks per season.

Ownership patterns reveal that 27 percent of all Texas gins are owned cooperatively with the remaining 73 percent representing independent ownership. Over 50 percent of all gins reporting indicated that they depend on ginning revenues as the sole source of income. The remaining ginning enterprises typically have become more diversified in the types of goods and services they offer their customers.

Responses from the industry indicate that gin management personnel are well established in their profession. Managers on the average have been associated with gin management for 23 years, 17 of these years at the present gin operation.

Respondent independent gins on the average indicated four gin stands per plant with an average output of six bales per hour. Likewise, cooperative gins averaged four gin stands per gin operation; however, hourly output in bales averaged eight bales per hour, two bales per hour greater than for independent gins.

Employment per ginning operation for all respondent gins averaged 15 employees per gin. Cooperative gins on the average hired 3 more clerical or office personnel, suction hands, ginners and ginners' helpers, press hands, and other hired individuals. Two full-time employees were employed on the average by both cooperative and independent gins. Both cooperative and independent gins reported that approximately 85 percent of their work force consisted of seasonal employees. Of the total hired labor force, approximately one-half of all employees were migratory laborers for both independent and cooperative gins.

All respondent gins reported an average of 67 patrons or customers serviced. However, cooperative gins serviced a slightly larger number of patrons than the independent gins. Forty-five percent of the gins reporting indicated that the gin supplied patrons with cotton trailers, with the cooperative gins averaging slightly higher in numbers of trailers per gin than independents. These trailers were issued to the customer to aid him in harvesting his crop. The trailer-customer ratio for all independent and cooperative gins supplying trailers was in the ratio of 1.1 to 1.

Ginning charges averaged 69 cents per hundredweight of seed cotton for all respondent gins. Bagging and ties, insurance and freight averaged \$6.65 per bale over the state. Gross revenues derived from these charges amounted to an

average of \$20.84 per bale for all reporting gin operations. Total gross revenue was estimated at approximately 70 million dollars for all Texas gins or an average of 56.4 thousand dollars per active cotton gin in 1968.

Texas cotton gins resort to a number of different sources to meet their credit needs. The most active lending agency appeared to be the cotton oil mills which constituted a source of credit for 31 percent of the respondent gins. Commercial banking enterprises accounted for 26 percent of the lending activities as indicated by both the reporting cooperative and independent gins. Twenty-two percent of the gins indicated they used the cotton oil mills and commercial banks together as sources of credit. The remaining 21 percent of all gins indicated financing from such lending agencies as the Houston Bank for Cooperatives, the Houston Bank for Cooperatives in conjunction with the commercial banks, and other sources.

New equipment and machinery was installed by over 60 percent of the respondent gins during the last three years at an average cost of over 15 thousand dollars per gin. Sixty-eight percent of all respondent gins reported an overall increase in the ginning rate after the installation of new machinery and equipment. Investment averaged \$2.11 per bale ginned for the machinery and equipment during the three-year period. Total book value of all machinery, equipment, buildings, and other facilities ranged from an average of 80 thousand dollars per gin in District 4 to 189,000 dollars per gin in District 6. For the state as a whole, cooperative gins average 29 thousand dollars more per gin in total investment than did the independent gins. However, independent gins indicated an average of \$49.66 investment per bale as compared to an average of \$40.96 per bale for cooperative gins in 1968. Average total investment per gin plant for all reporting gins amounted to 127 thousand dollars, or an average investment per bale of \$47.01 for 1968 for all reporting gins.

Although the rate of attrition of Texas gins has averaged approximately 2.7 percent per year over the last five years, considerable excess ginning capacity continues to exist in the industry. For the peak production year of 1964-65, a total of 450 gins were considered in excess of the industry needs. Similarly, capacity utilization for the crop year 1968 amounted to approximately 58 percent for the state with an estimated 516 gins falling in the excess facility category. Estimates on employee dislocations and disinvestment in facilities (1968 crop year) required to achieve a balance between production and ginning capacity were 7,740 excess employees and 65.6 million dollars in facilities. The magnitude of the problem of excess capacity and of the adjustments required to achieve a balance between ginning capacity and cotton production may be considered indicative of the problems facing the industry.

II. INTRODUCTION

Cotton ginning is an essential process in the production of both cotton fiber and cotton seed; it is one of the few such processes which necessarily is widely distributed geographically among small urban centers within the areas of production; and it provides some continuous and much seasonal employment to many unskilled, low income people. Long-term developments in the cotton industry have resulted in economic conditions requiring severe adjustments in the ginning sector. These adjustments have been given sharp focus by recent developments which have sharply reduced the volume of seed cotton available for ginning. Greatly reduced levels of cotton production in many areas, increased competition in fiber markets, a reduction in the availability and supply of unskilled labor and other factors have placed new demands on cotton ginners. In many areas, increased volumes of mechanically harvested cotton have sharply reduced the length of harvesting periods and have required additional ginning capacity and have created problems in the maintenance of fiber quality and provision for adequate preginning storage. In adjusting to these problems, cotton ginners have purchased new equipment, increased storage capacity through use of trailers and otherwise modified their operations. Ginners' efforts to keep abreast of changes occurring in their industry have resulted in significantly higher ginning costs. Conversely, ginning revenues have remained relatively stable and the excess capacity resulting from a decrease in cotton acreage has significantly reduced profits and in many instances forced a number of gins out of business. For example, the combined effects of the cotton program under the Food and Agricultural Act of 1965 and adverse weather resulted in a 25 percent reduction in cotton production and ginning for the 1966-67 crop year. This was followed by 14 percent reduction in production and ginning for the 1967-68 crop year. Production for 1967 and 1968 amounted to 2,712,700 and 3,250,000 bales, respectively.

The former Federal Farm Program expired at the end of the 1970 crop year. Grower intentions under the new program for 1971 compiled in early March indicated that acreage will be maintained at approximately the same level as in recent years. However, cotton producers and ginners have no assurance that present government support payments will continue indefinitely. Elimination of current government programs would result in cotton prices which would approximate world prices, a situation which would greatly affect the relative profitability of cotton production. The magnitude of this price and farm income reduction and its effect on cotton production and on revenues received by cotton ginners is unknown.

The Texas Cotton Ginning Industry consisted of 1,201 active gins in 1968 of which 865 were independently owned and 336 were cooperatives. Independent gins, thus, represent 75 percent of the active gins in the state. Although both of these segments of the ginning industry are plagued with a number of problems, many of the problems faced by independent ginners are different from problems faced by cooperatives. In the matter of credit, for example, cooperative gin enterprises have a ready source of funds at reasonable rates of interest in the Houston Bank for Cooperatives. Independent ginners, in contrast, must resort to commercial money markets in competition with other types of business enterprises. In these latter markets, loanable funds are not

Always available at rates which ginners can afford to pay.

Another major difference between the two types of enterprises rests in the market for ginning services. Cooperative ginning enterprises market their services through their memberships which individually stand to gain through patronage refunds according to the volume of business handled. Independent gins compete for patronage among themselves and among cooperative gins on the basis of price, qualitative differences in services or by providing additional services either free or at cost. Finally, a difference exists in the quantity and quality of data available on these two segments of the ginning industry. The Farmer Cooperative Service of the United States Department of Agriculture in cooperation with the Houston Bank for Cooperatives has documented over time many of the operational aspects, problems, and needs of the cooperative segment of the ginning industry. Contrariwise, no similar agency has concerned itself primarily with the problems of the independently owned segment of the industry.

III. PROCEDURES

This report summarizes the data obtained by means of a mail questionnaire sent to all active cotton gins in Texas in the spring of 1969. A major purpose of the questionnaire was to obtain a more complete and updated version of data formerly reported by Cotton Economic Research of the University of Texas. This latter agency had reported for a number of years the results of a mail survey of the Texas Ginning Industry. However, at the time the Texas Tech questionnaire was mailed to Texas ginners the last such report had been issued in 1965.^{1/} Furthermore, the extent of independent ginner participation in the Cotton Economic Research Survey had continued to decline and was estimated at only 18 percent of the total active gins in Texas in the 1965 report. In the Tech survey, emphasis was placed on securing information from independent ginners since this group had been considerably under-represented in earlier surveys. Arrangements were made to forward the mail questionnaire under the imprimatur of the Texas Independent Ginners Association to insure greater cooperation from independent ginners. Following the mailing of the questionnaire, arrangements were made with Cotton Economic Research to survey Texas cooperative gins and to exchange information to the mutual benefit of both studies.

Survey Response

In 1969, there were 1,191 active gins in Texas of which 868 or 72.9 percent were independent gins and 323 or 27.1 percent were cooperative gins.^{2/} A total of 421 responses representing 49 percent of the independent gins and 104 responses representing 32 percent of the cooperative gins were received. In all, a total of 525 responses were received or a 44 percent return of the total active gins in the state.

¹ A new survey was published in 1969 as the result of a cooperative effort between Texas Tech University and Cotton Economic Research.

² Texas Cotton Ginners' Association 1968 Ginners Red Book, Dallas, Texas, Cotton Ginners' Association Printing Office, 1968.

Area and Data Classification

Data obtained from the questionnaire were broken down by Texas Crop Reporting Districts. Each of these districts constitutes a fairly homogeneous agricultural area. Classifying each gin by district has a further advantage in that other important production data are also reported by the same districts. The ten districts which comprise the state of Texas are shown in Figure 1.

The data were further summarized by organizing a listing of all answers to a particular part of the mail questionnaire. Upon completion of a listing, the data were summed and divided by the number of gins responding to that section of the questionnaire. Where applicable, weighted averages were used so that no particular segment of the data would be over or under emphasized. Weighted averages were most commonly associated with data describing the independent and cooperative sectors simultaneously. Weights were used so that the particular sector of the industry that had the greatest number of responses would have the greatest total effect upon the final answer in numerical terms.

Statistical Technique for Range Estimates

Projections from the data obtained from the respondent gins were made through the use of a common statistical technique, the determination of the confidence interval. This technique was used to establish estimates of various parameters for independent, cooperative, and for all gins in the state on the basis of the survey data. All projections were made at the 95 percent level of confidence. The method by which these projections were estimated is summarized below:

$$\bar{y} \pm t_{.025} s / \sqrt{n}$$

where:

\bar{y} = mean of observations

n = number of observations

s = standard deviation

$t_{.025}$ = "t" value statistic for $n - 1$ degrees of freedom at the 5 percent significance level.

This procedure yields an estimate of the upper and lower limits for the particular parameters being estimated. Projections are stated in terms of probable limits. For example, in projecting total gin employment on the basis of data contained in the questionnaire, the procedure gives a probable range of 16,643 to 17,433 employees. Ranges computed in this way from samples of the size obtained from the questionnaire (504) would include the actual number of total gin employees for the state 95 percent of the time. Thus, a subject to a 5 percent chance of being wrong, full time gin employment for the state will fall between 16.6 and 17.4 thousand employees.

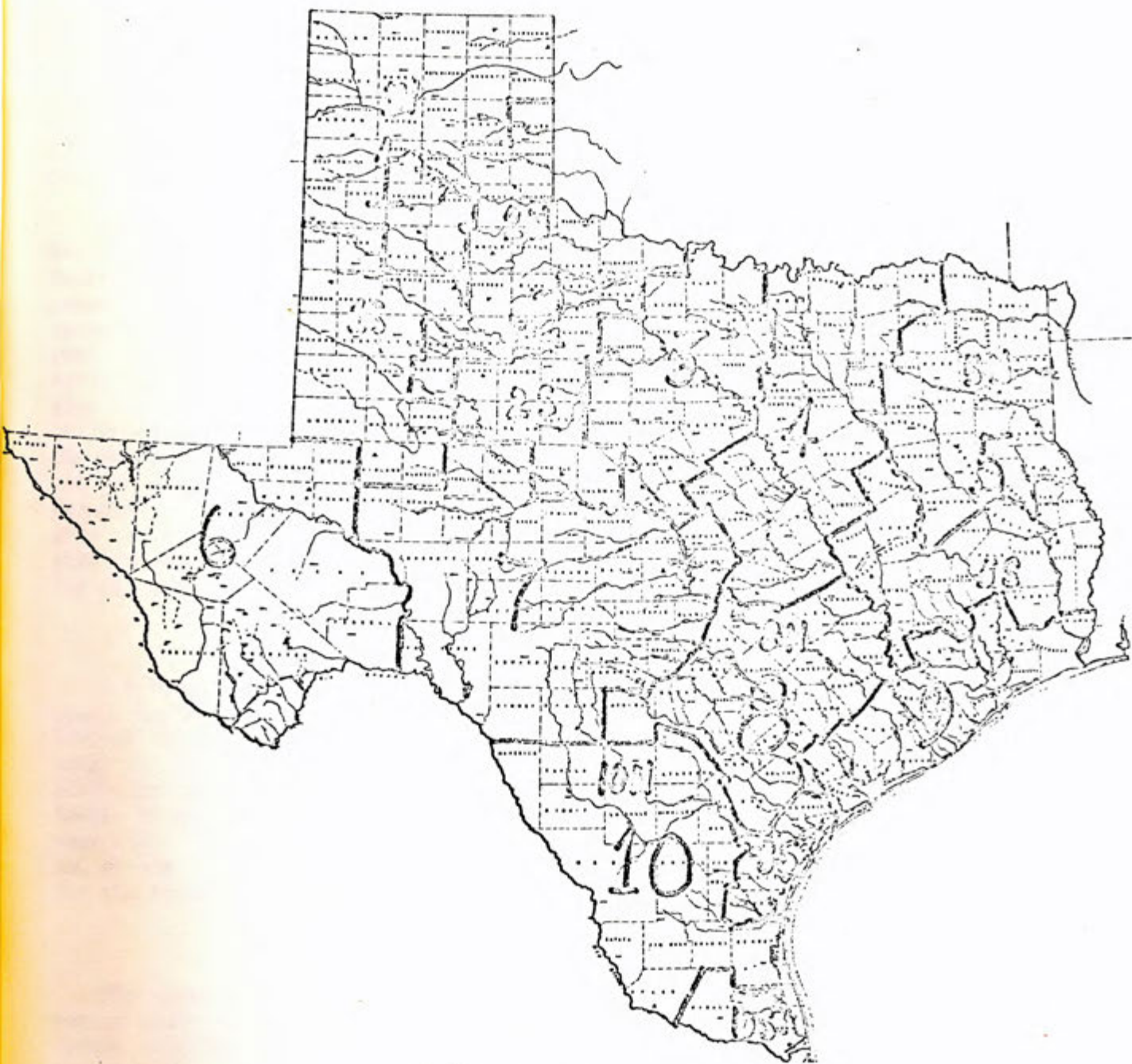


Figure 1

Texas Crop Reporting Districts

IV. INDUSTRY CHARACTERISTICS

Average Output Per Gin

Average output per gin for all gins in Texas for 1968 was estimated at ~~2,713~~ bales per gin based on a total production of 3,359,138 bales and 1,238 active gins.³ Average output for the 525 respondent gins for the same year amounted to 2,702 bales per gin or slightly less than the state average. In the initial period for which data were available, respondent gins experienced a higher output than the average of all gins. However, as the number of active gins declined over the 1964-68 period, average output of all respondent gins has run slightly less than the average of all active gins.

Cooperative gin respondents averaged 4,832 bales per gin in 1964 and 3,695 bales per gin in 1968, a decline of 24 percent in the 5 year period. In 1964, however, average output for cooperative respondent gins exceeded the average output of all active gins by 41 percent. By 1968 average output of cooperative respondent gins was only 27 percent larger than the average output of all active gins. Thus, cooperative respondent gins continue to experience an absolute advantage in terms of average volume per gin over both independent respondent gins and all active gins; however, their relative position in terms of average output per gin has declined in the 5-year period. In contrast, the change in the relative position of independent respondent gins has been much smaller for the same period. Average output for independent respondent gins for 1964 amounted to 2,988 bales or 5 percent greater than average output for all active gins in the same period. By 1968 average output for independent respondent gins had declined to 2,763 bales or 2 percent greater than the average output for all active gins.

Length of Ginning Season

The length of the ginning season, averaged for all gins for the last five years, has remained a relatively constant 10 to 11 weeks over the state. In 1966-67 the length of season for all respondent gins in District 7 averaged 21 weeks or approximately five months. This was the longest season reported by respondent gins in any district. Districts 1N and 8N reported an average length of seven weeks for the shortest season reported by any district in the same year. In 1968, the shortest season was reported by respondents in District 1N, an average of seven weeks, while Districts 3, 6, and 7 all averaged 14 weeks for the longest ginning season reported for the state in the same year.

Model = 14 weeks

Gin Numbers

The number of active gins in any area is directly related to the volume of cotton produced. As cotton production increases, gin numbers increase and as cotton production declines, gin numbers decline. Historically, cotton production in Texas began in East and Central Texas and spread to West and

³ The mail questionnaire was solicited at the end of the 1968 crop year and tabulated during the 1969 crop year.

South Texas. However, the increase in cotton production in West Texas followed a decline of production in East Texas such that as East Texas gins were declining in numbers, West Texas gins were increasing. Consequently, the change in total gin numbers in the state over time is not indicative of the magnitude of the economic dislocations which actually occurred. In more recent years, 1964-1968, however, geographical production patterns have been relatively stable such that a decline in the total number of gins is now more indicative of the current economic problems facing the industry than formerly. These survey data indicated a decline of approximately 10 percent in the number of active gins over the last 5 years. A low point was reached in the 1967 crop year with a total of 1,236 active gins and a production of 2,712,709 bales. An increase of only 2 gins was indicated for 1968, although total production increased to 3,359,128 bales, an increase of 19 percent.

Ownership Patterns

The survey data indicated that the corporate form of ownership prevailed among gin respondents with 175 (34.7 percent) of the 504 gins responding indicating this form of ownership. Partnerships were reported by 124 gins (24.6 percent of the respondents) and single proprietor by 122 gins (24.2 percent of the respondents). Cooperative gins reporting numbered 83 (16.4 percent of the respondents). Cooperatives are concentrated in Districts 1N, 1S, 2N, 2S, 4 and 10S, with 83 percent of the total cooperative gins located in these areas. These districts accounted for 62 gins or 75 percent of the cooperative gin respondents.

Diversification of Activities

The number of services furnished by gins in Texas varies from gin to gin and district to district. A number of gins are concerned only with the ginning of seed cotton, and thus their income is derived solely from gin charges. Approximately 27 percent of the respondent gins indicated that they derived all of their revenues from cotton ginning activities. Among other gin associated activities, the most frequently mentioned activity was farming with 44 percent of the respondent gins' operators indicating farming interests. Other enterprises such as fertilizer, herbicide, and insecticide distributors, grain buying and warehousing operations were indicated by approximately 37 percent of the respondent gin operators.

Years in Business

The survey data indicated that ginning management is an old and established occupation. The average number of years independent managers were doing business at the present site was 17 and the average for cooperative managers was 16 years. Independent gin operators indicated an average of 23 years experience. For all respondent gins, the respective averages were 17 years at the present location and 23 years in the ginning business.

Size of Respondent Gins

The average size of both independent and cooperative gins as measured by the number of gin stands was 4 stands per gin. Within each classification,

however, the number of stands per gin ranged from a low of 2 to a high of 6 stands per gin. The average output for independent respondent gins for the state amounted to 6 bales per hour ranging from a low of 5 bales per hour in Districts 3, 4, 5N, 6, 7, and 8N to a high of 8 bales per hour in Districts 2S, 8S, and 10S. The average output for all cooperative respondent gins was reported at 8 bales per hour ranging from a low of 5 bales to a high of 14 bales per hour. Accordingly, by this measure, cooperative gin respondents were generally larger than their independent counterparts.

Labor Use

Independent gins indicated an average labor force of 15 persons per gin compared to an average of 18 persons for cooperative gins. The average number of employees for the 504 respondent gins answering the query amounted to 15 employees per gin. On the basis of these data, total gin employment for the state was projected at between 16.6 and 17.4 thousand employees.

Although cotton ginning is a seasonal activity, many gins employ a number of full-time employees who generally perform maintenance and repair activities during the off-season. Both cooperative and independent respondent gins indicated an average of 2 full-time employees per gin. Respondent cooperative gins however, indicated an average of 16 seasonal employees whereas the average number of seasonal employees for respondent independent gins amounted to 13 persons. For all respondent gins the number of seasonal employees averaged 13 persons per gin. Projection of these data for the industry yielded a total full-time employment estimate of 2.0 to 2.2 thousand persons and a total seasonal employment estimate of 14.0 to 15.6 thousand persons for the ginning industry in Texas.⁴

Historically, cotton gins in Texas have been dependent to a large extent on migratory labor. Although this source continued to remain important, respondent gins indicated that only one-half of their requirements are currently met from local sources. Independent respondent gins indicated that an average of 8 members of their total labor force are obtained from the local labor pool and 7 are migratory. Cooperative respondent gins indicated that an average of 10 members of their total labor force were obtained from the local labor pool and 8 were migratory. Projecting these data for the state yielded a total of 8.8 to 10.6 thousand migratory employees and 9.8 to 11.1 thousand local employees engaged by the industry. It should be pointed out that projections of the number of migratory employees may involve some double counting since the same migratory labor could be counted in the labor force of more than one gin.

⁴ Differences in the labor force for the projections of all employees, full-time and seasonal, migratory and local, are due to differences in the number of observations in that some gins did not answer completely all questions on labor employment and in other cases the total number of employees did not equal the sum of migratory and local, and the sum of full-time and seasonal employees.

Job Classifications

A total of 5 job classifications were reported by the respondent gins. These classifications were (1) clerical or scale labor, (2) suction hands, (3) ginners and helpers, (4) press hands, and (5) others. Independent respondent gins employed on the average two clerical or scale hands, three suction hands, three ginners and/or ginners' helpers, four press hands, and three other employees. Cooperative respondent gins reported the same number of employees for the clerical or scale classification as independent gin respondents but indicated an average increase over independent gins of one more employee for each of the remaining classifications.

In part, the increase in the number of employees for cooperative respondent gins both in total and by job classification may be explained by the fact that cooperative respondent gins experienced a larger total output than their independent respondent counterparts. Other factors, however, may also have contributed to this difference.

Patrons Per Gin

Respondent independent and cooperative gins reported an average of 54 patrons and 134 patrons per gin, respectively. For the crop year 1968, these data yielded an average of 51 bales per customer for respondent independent gins and 28 bales per customer for respondent cooperative gins. Cooperative gins thus appeared to service a larger number of smaller patrons (in terms of average production per patron) than their independent counterparts.

Gin Trailers

Historically, cotton producers have assumed responsibility for transporting seed cotton from the turn-row to the gin. In recent years, however, many gins have undertaken all or part of this function as a competitive device to assure themselves of a larger share of the available crop. In some instances, gins have acquired a sufficient number of cotton trailers such that trailers are loaned out to producers as requested, and subsequently the gin elects to pick up the full trailers and tow them to the gin, supplying empty ones as needed. In other cases, gins will supply trailers as needed while the producer retains the responsibility of returning the full trailers to the gin. In still other cases, gins will supply extra trailers only in the event that all producer-owned trailers are in use and tied up on the operator's gin yard. Finally, at the other extreme are gins which supply no trailers or which rent trailers for a fee with the expectation of covering all or part of trailer operating costs.

Two hundred seventy-nine of the 504 respondent gins indicated that they did not supply trailers to patrons. Respondent independent gins supplying trailers had an average of 53 trailers per gin and serviced an average of 50 patrons. Similarly, cooperative respondent gins supplying trailers reported ownership of an average of 55 trailers per gin and serving 56 patrons. For all gins, the corresponding figures were 54 trailers per gin and 51 patrons or a ratio of 1.1 trailers per patron. Crop reporting District 1S, containing

the largest concentration of gins (127), also reported the highest number of trailers per gin (82). District 10N experienced the highest trailer-patron ratio with 3.6 trailers per patron. Trailer ownership for all gins in the state that supply trailers was estimated at 49 to 60 trailers, with an estimated trailer patron ratio of 0.8 to 0.9 trailers per patron.

Ginning Charges

Expenses incurred from ginning cotton for producers are offset by incomes derived from charges that gins receive for ginning services. Reporting gins indicated charges received for ginning services ranging from \$0.45 to \$1.00 per cwt. of seed cotton for ginning, from \$4.00 to \$8.50 per bale for bagging and ties, from zero to \$1.25 per bale for freight charges, and from zero to \$1.05 per bale for insurance charges.

Average charges received by gins ranged from \$0.59 per cwt. of seed cotton in District 1S to \$0.94 per cwt. in District 10S. Average bagging and tie charges varied from a low of \$5.10 per bale in District 6 to a high of \$6.29 per bale in Districts 1S and 5N. Average freight charges ranged from a low of \$0.50 per bale in District 5S to a high of \$1.63 per bale in District 10N. Average insurance charges ranged from a low of \$0.12 per bale in District 10N to a high of \$0.94 per bale in District 9. The weighted average ginning charge amounted to \$0.68 per cwt. of seed cotton and the weighted average bale or packaging charge amounted to \$6.65 for the state.

The weighted average revenue for the state for ginning and packaging a 500 pound bale was estimated at \$20.84. The maximum difference in average revenue received per 500 pound-bale was noted for Districts 7 and 8N. This difference amounted to \$6.00 per 500-pound bale. The estimate of revenues received for ginning services approached 50 million dollars for the state. Other charges such as bagging and ties, freight, and insurance approximated 22 million dollars. Total revenue received for all cotton ginning services amounted to approximately 70 million dollars. Average revenue from seed cotton ginning and baling amounted to 56.4 thousand dollars per gin for the state. Among the various crop reporting districts, average gin revenues ranged from a low of 17.2 thousand dollars per gin in District 8N to a high of 85.5 thousand dollars per gin in District 1S.

Sources of Credit

A continuing availability of both long and short term credit is a primary requirement for the viability of the ginning industry. For those gins suffering temporary or semipermanent reverses, credit availability may ultimately determine which firms will survive and which must undergo forced liquidation. For this reason, respondent gins were requested to indicate their primary sources of credit. Major sources of credit reported by independent respondent gins were oil mills, 147 gins; commercial banks, 11 gins; oil mills and commercial banks, 114 gins; and other sources, 49 gins. Gin operators reporting other sources indicated use of their own or family funds or borrowing from individuals. Cooperative respondent gins reported major sources of credit as the Houston Bank for Cooperatives and commercial banks, 22 gins. Twenty-two gins indicated other sources of credit than those above.

The data indicated that for the 525 reporting gins in the state, oil mills were the most important source of credit with 160 gins and 30 percent using this source. Other important sources in order of importance were commercial banks, 136 gins and 26 percent; Houston Bank for Cooperatives, 22 gins and 4 percent; oil mills and commercial banks, 114 gins and 22 percent; and Houston Bank for Cooperatives and commercial banks, 21 gins and 4 percent. The estimated number of gins using other sources of credit or indicating no current borrowing amounted to 72 gins or 14 percent of the respondent gins.

New Expenditures

The urge to modernize, to remain competitive and to increase ginning efficiency has resulted in relatively large capital expenditures by many ginners in Texas. In addition, the recent implementation of air pollution laws has forced many gins to purchase pollution abatement equipment and/or revise operating procedures in order to remain in business. In order to determine the magnitude of expenditures for these purposes, respondent gins were requested to report the magnitude of capital expenditures made in the last three years. Of the 504 gins responding, 178 gins reported no capital expenditures in this period. Three hundred and twenty-six gins indicated an average capital expenditure of \$15,657 over the three-year period. Furthermore, 68 percent of those gins making this expenditure indicated an improvement in the ginning rate as a result of the expenditure and 32 percent reported no improvement.

Both independent and cooperative gin respondents reported approximately the same figure for capital expenditures over the three-year period with independent gin respondents indicating \$15,697 per gin and cooperative gin respondents, \$15,536 per gin.

State projections indicate an estimated expenditure per independent gin respondent of 15.2 to 22.2 thousand dollars and 12 to 21 thousand dollars per cooperative gin respondent or a total investment of 12 to 17 million dollars by all active cooperative gins in the three-year period.

Investment Per Gin

Book values of the respondent gins were assumed to represent total current investment in the industry. Average book value for independent respondent gins amounted to \$122,357 as of January 1968. Average book values for cooperative respondent gins as of the same data amounted to \$151,362 and average book values for all respondent gins amounted to \$133,676 per gin.

State projections of total capital investment in the ginning industry based on the survey data indicated total investment of 49 to 63 million dollars by cooperative gins and 106 to 120 million dollars by independent gins or a total investment as measured by book value of 157 to 176 million dollars for all gins in the industry.

V. PRODUCTION CAPACITY AND UTILIZATION

The increase in average capacity per gin over the last decade and the reduction in the total crop available for ginning over the last few years has left the cotton ginning industry with a serious surplus of facilities. Competition among gin operators for the limited supply of seed cotton has often resulted in unwise management practices which have seriously affected the overall operation of the ginning enterprise. A case can be made that the existence of surplus capacity has had an adverse effect on both the individual ginning operation and on the industry. Consequently, some measure of this surplus capacity appeared desirable from the standpoint of evaluating both individual firms and the industry.

Wilmot, Shaw, and Looney estimated the available surplus capacity on the High Plains of Texas at 33 and 42 percent for the 1967-68 and 1968-69 season, respectively.⁵ Their estimate was based on an average capacity of 15.1 bales per hour and the availability of 906 operating hours. Excess industry capacity in this study was estimated by utilizing average hourly output for each crop reporting district as reported by individual gins in the mail questionnaire and 912 operating hours. Excess capacity for individual sample gins in each size category was then estimated using actual output for the gin and assuming the same number (912) operating hours.

Annual output for the industry and for any gin is a function of the hourly capacity (size of facility) and the number of operating hours. Operating hours, in turn, depend on the size of the crop and the schedule of seed cotton receipts. Periods of peak seed cotton receipts during any season generally call for full utilization of the gin plant or "round-the-clock" operation. Full utilization, however, does not imply continuous operation for the maximum 168 hours in any week, since from a practical standpoint this would be an unrealistic goal. Full-time operation was thus defined as one 11-hour day shift and one 10.5-hour night shift plus an allowance for crew rest, maintenance, and clean-up.⁶ Crew rest and maintenance were assumed to take 45 minutes per shift and clean-up one-half hour per shift. Assuming a 7-day operating week, this reduced the maximum operating time available to 150.5 hours per week.

Average distribution of seed cotton receipts by weeks for a 10-week season are shown in Table 1.

⁵ Charles A. Wilmont, Dale L. Shaw, and Zolon M. Looney, Cotton Gin Operating Costs in West Texas (U.S. Department of Agriculture, Economic Research Service, Marketing Research Report 903, 1969).

⁶ Charles A. Wilmot, Victor L. Stedronsky, Zolon M. Looney, and Vernon P. Moore, Engineering and Economic Aspects of Cotton Gin Operations -- Midsouth, West Texas and Far West (U. S. Department of Agriculture, Agricultural Economics Report 116, July 1967).

Products
24.5
1 1/2 rest
1 clean-up

24.0

TABLE 1
 AVERAGE DISTRIBUTION OF SEED COTTON RECEIPTS
 BY WEEKS OF GINNING SEASON, TEXAS, 1968

Ginning Period	Proportion of Season's Output	Time Utilized in Ginning
Weeks	Percent	Hours
1	5	46
2	10	91
3	13	119
4	15	137
5	18	164
6	14	128
7	10	91
8	7	64
9	4	36
<u>10</u>	<u>4</u>	<u>36</u>
T o t a l	100	912

If it is assumed that the gins will operate at full capacity (as defined in the preceding paragraph) during the peak two weeks of the season, then 301 operating hours will be available to gin an estimated 33 percent of the crop during the fourth and fifth weeks of the season. On this basis, total available hours for the season can be estimated by:

$$a = \frac{b}{x} \quad (1)$$

where:

a = percent of the season's output ginned in a specific period

b = peak plant utilization in hours for the peak period

x = total operating hours for the season

The above expression becomes:

$$0.33 = \frac{301}{x}$$

where x equals 912.00 hours or the total time required to gin the entire crop. Given the time required for the total crop, then that amount of time required during each week of the season is a function of the percent of the total crop available in that period (Table 1). It should be pointed out that total time available in the fifth week, 150.5 hours, is less than total time required, 164.18 hours. However, the sum of labor requirements for the fourth and fifth weeks is equal to the total time available in these weeks, 301 hours, and hence does not seriously violate the assumption of 150.5 hours available time while providing a better measure of time requirements than any single operating week.

Full capacity utilization of plant is a function of the number of operating hours available and the effective output of the plant in bales per hour. Effective capacity takes into consideration rated output, machinery malfunction and breakdown, crew efficiency, work stoppages resulting from lack of seed cotton, and other factors. Effective capacity was defined as 85 percent of rated capacity, a procedure which has been followed by other investigators. Accordingly, the estimate of capacity utilization was made according to the formula:

$$\text{Capacity Utilization} = \frac{A}{C \times E \times Z} \quad (2)$$

where:

A = actual seasonal volume

C = capacity rating in bales per hour

E = total estimated operating hours per season

Z = effective efficiency of the gin

Average capacity per gin was estimated on the basis of the weighted average ginning rate for each crop reporting district and an assumed operating efficiency of 85 percent. Capacity utilization was then estimated based on average production per gin in each crop reporting district. Subsequently, a determination was made of the number of gins of average capacity required to gin all of the crop in each district in the event all gins were operated at full capacity. This determination provided a measure of the number of excess gins in each crop reporting district. These determinations, based on production for the 1968 crop year, are summarized in Table 2.

Excess capacity ranged from a high of 70 percent in District 1N to a low of 15 percent in District 7. District 1S with excess capacity of 32 percent would require the elimination of 97 gins in order to achieve full utilization of facilities. Similarly, District 4, with excess capacity of 54 percent, would require the elimination of 120 gins to achieve full utilization of facilities. For the state as a whole, 42 percent of the capacity was estimated at excess and full utilization would require elimination of 516 gins to achieve full capacity.

The elimination of excess ginning facilities would result in large monetary losses from disinvestment in facilities and would cause serious

TABLE 2

ACTIVE GINS, TOTAL GIN CAPACITY, AVERAGE GIN CAPACITY,
COTTON PRODUCTION, AND ESTIMATED CAPACITY
UTILIZATION, TEXAS GINS BY CROP
REPORTING DISTRICTS, 1968
CROP YEAR

District	Active Gins	Total Gin Capacity	Average Gin Capacity ^{1/}	1968 Cotton Production	Capacity Utilization
----- Bales -----					
1N	106	657,412	6,202	196,218	.299
1S	307	1,904,014	6,202	1,304,406	.685
2N	76	353,552	4,652	271,320	.767
2S	96	595,392	6,202	372,999	.626
3	9	34,893	3,877	<u>2/</u>	<u>2/</u>
4	220	852,940	3,877	387,043	.454
5N	11	42,647	3,877	13,154	.308
5S	18	111,636	6,202	48,570	.435
6	47	218,644	4,652	173,261	.792
7	13	50,401	3,877	43,389	.861
8N	66	255,882	3,877	44,444	.174
8S	58	359,716	6,202	92,913	.258
9	60	279,120	4,652	76,367	.274
10N	15	81,405	5,427	13,832	.170
10S	97	676,866	6,978	241,662	.357
All other counties	<u>53</u>	<u>239,581</u>	<u>4,652</u>	<u>111,791</u>	<u>.467</u>
Total	1,238	5,759,176	4,652	3,359,128	.583

^{1/} Average capacity is computed by taking the average capacity per gin in bales per hour and assuming an operating season of 912.12 hours.

^{2/} Included with all other counties.

dislocations in the hired labor force. The magnitude of these losses in each case was estimated on the basis of the average labor force per gin and the average book value per gin as determined from the mail questionnaire (Table 3). These data indicate that expected monetary losses from disinvestment in facilities would range from a high of 17.6 million dollars in District 1S to a low of 0.3 million dollars in District 7. Total losses from disinvestment for the state were estimated at 65.5 million dollars in facilities.

Labor dislocations ranged from a high of 240 full-time and 1,320 seasonal employees in District 4 to a low of 2 full-time and 36 seasonal employees in District 7. Total labor dislocations for the state were estimated at 1.0 thousand full-time employees and 6.7 thousand seasonal employees. These estimates do not consider possible reemployment of displaced labor in those gins which would achieve full utilization of capacity and may to some extent overstate the dislocations which would occur.

The utilization of ginning capacity is dependent on the total size of the crop available for ginning which will fluctuate from year to year. Total state production in the 1968 crop year amounted to 3,359,128 bales. This volume was considerably less than the production of 4,151,182 bales achieved in 1964-65 before the present Federal Farm Program. Consequently, two additional estimates of excess ginning capacity were made which take into account variations in size of the crop. The first hypothesized situation was based on the size of the crop for the 1964-65 crop year (Table 4). The second hypothesized situation was based on 1968 conditions but assumed the elimination of the Federal Farm Program. A 35 percent expansion of cotton acreage was assumed (Table 5). The rationale for this situation was based on the assumption that considerable excess cotton production capacity exists at the farm level and that the elimination of the Federal Farm Program could result in the utilization of this capacity. The assumed adjustment for 1968 conditions with elimination of the Federal Farm Program yielded a total crop of 4.6 million bales.

Situation I, total crop production for 1964-65, of 4.2 million bales yielded an estimate of 66.5 percent utilization for the state. Under these conditions, full utilization of capacity by the industry would require the elimination of 450 gins, a disinvestment of 57.2 million dollars and the dislocation of 800 full-time and 5.8 thousand seasonal employees (Table 6). Districts 1S and 4 would require the elimination of 118 and 139 gins respectively, in order to utilize fully existing capacity.

Situation II, 1968 conditions and elimination of the Federal Farm Program, yielded an estimate of 79.3 percent capacity utilization for the state (Table 7). Full utilization of capacity by ginning industry would require a disinvestment of 32.5 million dollars; however, several districts would require additional capacity and new investment in facilities in the amount of 14.0 million dollars if the assumed acreage expansion took place (Table 7). This assumes that new gins could be built for a cost of 500,000 dollars per gin. Labor dislocation from existing gins resulting from Situation II would amount to 512 full-time and 3,328 seasonal employees. However, new employment opportunities in districts with insufficient capacity would require 40 full-time

TABLE 3

ESTIMATED NUMBER OF GINS REQUIRED, 100 PERCENT UTILIZATION
OF FACILITIES, NUMBER AND PERCENT OF EXCESS GINS,
REQUIRED DISINVESTMENT IN FACILITIES, AND
REQUIRED LABOR DISLOCATIONS, BY CROP
REPORTING DISTRICTS, TEXAS, 1968
CROP YEAR

District	Actual Gins Needed	Decrease Percent Excess	Excess Gins	Disinvest- ment ^{1/}	Labor Dislocation ^{2/} Full-time Seasonal	
1N	32	70	(74)	12.6	148	1036
1S	210	32	(97)	17.6	194	1358
2N	58	24	(18)	2.0	18	216
2S	60	37	(36)	5.6	72	468
3	-	-	-	-	-	-
4	100	54	(120)	9.6	240	1320
5N	3	73	(9)	1.5	18	108
5S	8	56	(10)	1.7	20	110
6	37	21	(10)	1.9	30	190
7	11	15	(2)	0.3	2	36
8N	11	83	(55)	5.2	110	385
8S	15	74	(43)	5.7	86	731
9	16	73	(44)	4.2	44	528
10N	3	80	(12)	1.0	12	132
10S	35	64	(62)	8.5	62	930
All other counties	24	55	(29)	3.7	58	377
State	722	42	(516)	65.6	1032	6708

^{1/} Based on average book value of 504 respondent gins and assuming no salvage value.

^{2/} Based on average labor force of 504 respondent gins.

TABLE 4

ACTIVE GINS, TOTAL GIN CAPACITY, AVERAGE GIN CAPACITY,
COTTON PRODUCTION, ESTIMATED CAPACITY UTILIZATION,
TEXAS GINS, BY CROP REPORTING DISTRICTS,
1964-65 CROP YEAR

District	Active Gins	Total Gin Capacity	Average Gin Capacity	Cotton Production	Capacity Utilization
----- Bales -----					
1N	114	707,028	6,202	539,856	.764
1S	311	1,928,822	6,202	1,199,992	.622
2N	82	381,464	4,652	254,714	.668
2S	97	601,594	6,202	397,929	.661
3	9	34,893	3,877	<u>1/</u>	<u>1/</u>
4	252	977,004	3,877	438,682	.449
5N	12	46,524	3,877	21,726	.467
5S	24	148,848	6,202	60,157	.404
6	55	255,860	4,652	194,844	.762
7	13	50,401	3,877	34,768	.690
8N	78	302,406	3,877	88,870	.294
8S	56	347,312	6,202	167,143	.481
9	64	297,728	4,652	190,851	.644
10N	16	86,832	5,427	19,696	.227
10S	107	746,646	6,978	386,866	.518
All other counties	52	241,904	4,652	154,718	.640
State	1,342	6,242,984	4,652	4,151,812	.665

1/ Included with all other counties.

TABLE 5

ACTIVE GINS, TOTAL GIN CAPACITY, AVERAGE GIN CAPACITY,
ESTIMATED PRODUCTION, AND ESTIMATED CAPACITY
UTILIZATION OF TEXAS GINS BY CROP
REPORTING DISTRICTS WITH
ASSUMED 35 PERCENT
INCREASE IN ACREAGE
OVER THE CROP YEAR ^{1/}

Districts	Active Gins	Total Gin Capacity	Average Gin Capacity	Estimated ^{2/} Production	Capacity ^{3/} Utilization
-----Bales-----					
1N	106	657,412	6,202	272,373	.414
1S	307	1,904,014	6,202	1,791,466	.941
2N	76	353,552	4,652	403,356	1.141
2S	96	595,392	6,202	482,024	.810
3	9	34,893	3,877	25,615	.734
4	220	852,940	3,877	530,473	.622
5N	11	42,647	3,877	24,973	.586
5S	18	111,636	6,202	52,969	.474
6	47	281,644	4,652	244,988	1.120
7	13	50,401	3,877	92,767	1.841
8N	66	255,882	3,877	73,912	.289
8S	58	259,716	6,202	120,816	.465
9	60	279,120	4,652	101,647	.364
10N	15	81,405	5,427	32,965	.405
10S	97	676,866	6,978	313,740	.464
State	1,238	5,759,176	4,652	4,566,370	.793

^{1/} Assumed considerable excess production capacity at the farm level which might be released with the elimination of the government program.

^{2/} Harvested acres x 135 x $\frac{\text{Yield per Harvested Acre}}{500 \text{ pounds}}$ = Estimated Production.

^{3/} Assumes an operating season of 912 hours.

TABLE 6

ESTIMATED NUMBER OF GINS REQUIRED, 100 PERCENT UTILIZATION
OF FACILITIES, NUMBER AND PERCENT OF EXCESS GINS,
REQUIRED DISINVESTMENT IN FACILITIES AND
REQUIRED LABOR DISLOCATIONS, BY CROP
REPORTING DISTRICTS, TEXAS,
1964-65 CROP YEAR

District	Actual Gins Needed	Decrease		Disinvest- ment ^{1/}	Labor Dislocation ^{2/}	
		Percent Excess	Excess Gins		Full-time	Seasonal
1N	87	24	27	4.6	54	378
1S	193	38	118	21.4	236	1652
2N	55	33	27	2.9	27	324
2S	64	34	33	5.1	66	429
3	-	-	-	-	-	-
4	113	55	139	11.1	278	1529
5N	6	50	6	1.0	12	72
5S	10	58	14	2.4	28	154
6	42	24	13	2.5	39	247
7	9	31	4	.5	4	172
8N	23	70	55	5.2	110	385
8S	27	52	29	3.9	58	493
9	41	36	23	2.2	23	276
10N	4	75	12	1.0	12	132
10S	55	49	52	7.2	52	780
All other counties	33	37	17	2.2	34	221
State	892	33	450	57.2	800	5850

^{1/} Based on average book value of 504 respondent gins and assuming no salvage value.

^{2/} Based on average labor force of 504 respondent gins.

TABLE 7

ESTIMATED NUMBER OF GINS REQUIRED, 100 PERCENT UTILIZATION OF FACILITIES, NUMBER OF EXCESS OR NEW GINS, REQUIRED DISINVESTMENT OR INVESTMENT IN FACILITIES, AND REQUIRED LABOR DISLOCATION OR LOCATION, WITH ASSUMED 35 PERCENT INCREASE IN ACREAGE OVER 1968 CROP YEAR, BY CROP REPORTING DISTRICTS, TEXAS

Districts	Actual Gins Needed	Percent Decrease in Gin No.	No of Gins not Needed	No. of New Gins Needed	Disinvest-ment 1/	New Invest-ment	New Labor Needed- Full-Time Seasonal	New Labor Needed- 2/ Full Time Seasonal
1N	44	58	62	-	10.5	-	124	868
1S	289	06	18	-	3.3	-	39	252
2N	87	-	-	11	-	5.5	-	-
2S	78	19	18	-	2.8	-	39	234
3	7	22	2	-	0.2	-	2	14
4	137	38	83	-	6.6	-	166	913
5N	6	45	5	-	0.8	-	10	60
5S	9	50	9	-	1.5	-	18	99
6	53	-	-	6	-	3.0	-	-
7	24	-	-	11	-	5.5	-	-
8N	19	71	47	-	4.4	-	94	329
8S	20	66	38	-	5.1	-	76	646
9	22	63	38	-	3.6	-	38	456
10N	6	60	9	-	0.8	-	9	99
10S	45	54	52	-	7.1	-	52	780
State	982	21	256	28	32.5	14.0	512	3328
								40
								114
								198

1/ Based on a cost of 500,000 per gin for new construction.

2/ Based on average labor force of 504 respondent gins.

and 444 seasonal employees for a net change of minus 472 full-time employees and minus 2,884 seasonal employees.

The rate of attrition of Texas cotton gins in 1964-65 amounted to two percent or a total of 32 gins at an estimated facility value of 4.1 million dollars. Similarly, attrition in 1965-66 and 1966-67 amounted to 4 percent and 5 percent, respectively. A total of 47 gins (6.0 million dollars) were liquidated in 1965-66 followed by 59 gins (7.5 million dollars) in 1966-67. Gin numbers remained constant at 1,238 gins during the 1967-68 season. The weighted average attrition rate over the last five years amounted to 2.7 percent per year. Accordingly, it would require a period of 20 years at this average attrition rate to achieve a balance between ginning capacity and cotton production as represented by the 1968 crop. The magnitude of this adjustment and the length of the time period required for the necessary adjustment to take place serves to emphasize the seriousness of the excess capacity problem for the industry.