AN ANALYSIS OF THE IMPACT OF COLLECTIVE BARGAINING ON GROWER PRICES AND INTEGRATIVE EFFICIENCY - A CASE STUDY OF THE OHIO CONCORD GRAPE INDUSTRY

BY

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INTRODUCTION

Interest in collective bargaining by farmers with first handlers over prices and terms of trade has been evidenced for several years. Such interest is a general manifestation of the trend away from an "open market" agriculture toward a market system increasingly dominated by large-scale buyers and characterized by production contracts, private treaty sales and other forms of specification buying (1, 2, 3). These institutional changes have resulted in a decline both in the importance of open, spot markets and their reliability as a means of price discovery. The demise of open markets has kindled interest in alternative institutional mechanisms, such as collective bargaining, as a means for establishing terms of trade and improving the equity position of farmers in markets where imbalances of power exist.

Interest in collective bargaining has generated a substantial body of literature which examines potential costs and benefits. Much of this work, however, has been a theoretical rather than an empirical analysis of performance by farmer bargaining organizations. Yet the results of empirical analysis would appear to be rather important, particularly as an input into the continuing public policy debate over legislation that would facilitate collective bargaining by farmers.

Sources of Potential Economic Gains

Related literature suggests that the nature and source of economic gains potentially achievable through collective bargaining may be classified into two categories: distributive and integrative. Distributive gains are those that accrue through a redistribution of income (e.g.,out of handler profits or

through higher consumer prices). Integrative gains are those that result from improved operating and coordinating efficiencies within the market system. Some potential sources of integrative gains are: 1) improved product quality, 2) decreased price variability and uncertainty, 3) reduced product waste and 4) improved buyer-seller coordination. (4,5,6,7).

Substantially different social welfare implications arise when farmers realize economic gains from each of these two sources. An improvement in marketing efficiency generally benefits society-at-large while the social desirability of a redistribution of income is less straightforward. Therefore, an analysis of performance as well as an identification of the nature and source of economic gains realized through collective bargaining efforts would appear to be of significant value.

Objectives

This paper reports the results of a study of the magnitude and sources of pecuniary economic gains realized by a voluntary collective bargaining association.

The objectives of the study were twofold:

1. To examine the extent to which collective bargaining has resulted in higher product prices for member/growers, and
2. If achieved, to determine the magnitude and source(s) of the gains.

Procedure

A case study of the Ohio concord grape industry was engaged. This industry was selected for analysis because it closely approximated a set of research conditions that would allow a meaningful analysis. Active bargaining has taken place in the industry for the past 20 years, thus providing an historical record of bargaining performance. In addition, the annual volume subject to negotiations

is small relative to total industry volume and therefore, has little influence on the aggregate industry price level, thus allowing isolation of the impacts upon grower prices achieved by the bargaining association. Furthermore, the industry meets most of the characteristics generally considered conducive to collective bargaining (e.g., a highly perishable crop, extensive contracting, no viable open market, imbalanced market power and limited market alternatives for growers.)

The Industry

Concord grapes enjoy a modicum of distinction from the other grape varieties grown in the U.S. as this is the preferred variety for most jams, jellies and sweet juices. Over 90 percent of the U.S. concord production is grown in Washington (state) and the eastern Great Lakes states -- New York, Pennsylvania, Michigan and Ohio. New York dominates the eastern pool with about 60 percent of the annual production. Ohio production is small relative to the industry total, generally accounting for 5-6 percent of the harvest. Grape production within Ohio is highly concentrated in the north and northeastern counties that border on Lake Erie (Map 1).

Ohio grape producers depend heavily on grape processors for market outlets since typically less than 15 percent of the Ohio crop is consumed fresh. The eastern Great Lakes grape industry is highly concentrated at the producer/first handler level with a dominant national cooperative headquartered in New York, National Grape Cooperative, Inc. (Welch), handling an estimated 70 percent of the relevant market volume. Currently there is only one major grape processor in Ohio, a subsidiary of the Coca Cola company, that annually processes the equivalent of one-third to one-half of Ohio's crop, or about 2 to 3 percent of the eastern pool. The remainder of the Ohio grape crop is marketed either through Welch, Keystone, or small local wineries.

Map 1

Ohio Grape Production Areas, 1969

SOURCE: Census of Agriculture, 1969, Vol. 1, Area Reports, Section 2, Ohio County Data.

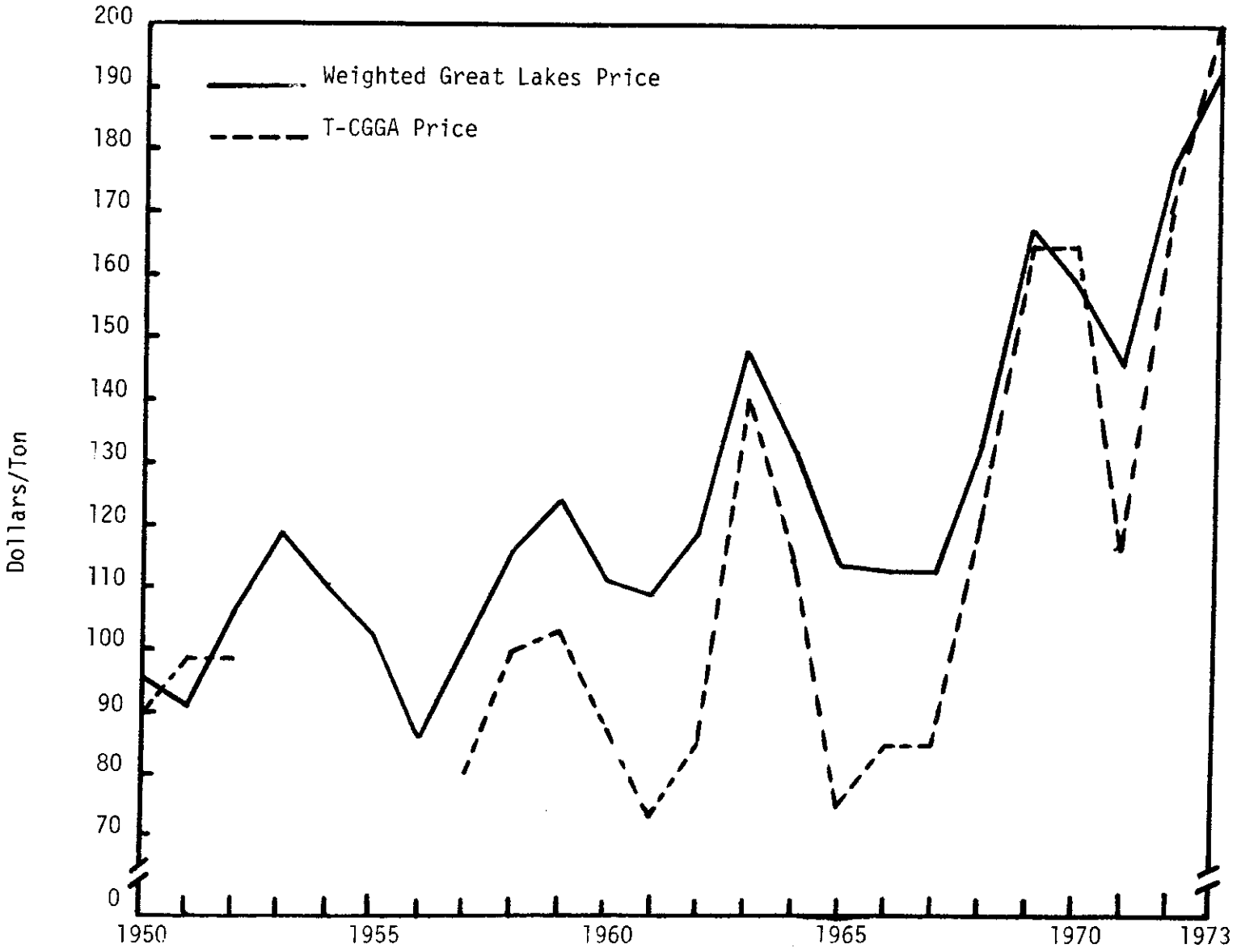
Grape growers in Ohio have actively bargained with this processor since 1956 when the Tri-County Grape Growers Association (T-CGGA) was organized. This organization initially controlled 2,000 to 2,500 tons of grapes (about 45-50 percent of the processor's tonnage) and represented nearly 75 member/growers. Although T-CGGA was originally organized to bargain over prices and other terms of trade, for several years it met with only limited success. Prices paid to member/growers continued to range below the "Great Lakes" average prices (Figure 1) and few changes were implemented which improved the member/growers market position.

In 1967, in an effort to strengthen its bargaining position, T-CGGA became affiliated with the Ohio Agricultural Marketing Association (OAMA), a marketing affiliate of the Ohio Farm Bureau Federation. Under the agreement between T-CGGA and OAMA, OAMA would act as the bargaining agent for T-CGGA and, together with T-CGGA's Board of Directors, would participate in contract negotiations with the processor.[1/] OAMA receives 1 percent of the annual value of the member/growers' crop which is paid directly to OAMA by the processor.

Impact of Collective Bargaining

It is logical to assume that bargaining associations place high priority on improving their members' economic position. While growers' economic position can be improved through a variety of measures, the most logical and direct influence is through higher prices. Thus, if the association was "successful," the periods subsequent to its organization should reveal a trend of systematically higher prices for growers. A number of pragmatic considerations, however, discourage any direct measure of performance via price level changes. Intervening factors such as year to year fluctuations in the size of the crop

Figure 1 - Average Grape Prices Paid T-CGGA Growers & Weighted Average Great Lakes Price, 1950-1973.



Source: Agricultural Statistics, U.S. Department of Agriculture, Economic Research Service Washington,D.C., 1958-1975; Ohio Agricultural Marketing Association, Columbus, Ohio.

and changes in general price levels over time can significantly influence grower prices. To control for such factors a price ratio was utilized to indicate the growers' relative price position within the industry. This was expressed as:

$$PR_i = \frac{CP_i}{IP_i}$$

Where:

PR_i = the relative price position of subject growers in the i th time period,

CP_i = the average per unit price paid subject growers in the i th time period, and

IP_i = the weighted average per unit price paid to all growers in the Great Lakes market in the i th time period.

The industry price (IP) is not significantly affected by changes in the prices paid to subject growers because the size of their grape crop is so small relative to total industry production.[2/] Thus, the magnitude of price gains achieved by the bargaining association is approximated by measuring changes in the price ratio.

The first research hypothesis tested is:

H_1: Collective bargaining by subject growers resulted in an increase in the prices received by member/growers over time relative to the prices received by other/producers in the Great Lakes market.

Data were collected on an annual basis for each year from 1950 through 1973. The data were partitioned into three time periods that corresponded with discrete sets of collective bargaining activities:

t_1 = the years 1950 through 1956, a period when there was no organized bargaining. Since data were not available for the years 1953-1956, the relative price position of growers during this period is based solely on the three years, 1950, 1951 and 1952.

t_2 = the years 1957 through 1967, the period when T-CGGA was organized and gaining recognition but during which little organized bargaining occurred, and

t_3 = the years, 1968 through 1973, the period within which organized bargaining occurred under the auspices of OAMA.

The test statistic (PR) was then partitioned into treatment groups that correspond to these time periods. The hypothesized relationship was:

$$\overline{PR}_{t_1} < \overline{PR}_{t_2} < \overline{PR}_{t_3}$$

Where:

$\overline{PR}_{t_i}$ = the mean price ratio in time period t_i.

An analysis of variance and Scheffé's general "S" test[3/] revealed the following relationships:

$\overline{PR}_{t_1} > \overline{PR}_{t_2}$ ** (statistically significant at 0.05 level)

$\overline{PR}_{t_1} > \overline{PR}_{t_3}$ (not statistically significant at 0.10 level)

$\overline{PR}_{t_3} > \overline{PR}_{t_2}$ ** (statistically significant at 0.05 level)

Where:

$\overline{PR}_{t_1}$ = 0.9840

$\overline{PR}_{t_2}$ = 0.7855

$\overline{PR}_{t_3}$ = 0.9537

The results of these contrasts differed somewhat from the expected relationship. Instead of realizing positive pecuniary gains during the inital organizational period of T-CGGA (t_2) relative pecuniary losses were incurred by the growers. After affiliation with OAMA that loss was recovered.

Two possible explanations for this unexpected relationship exist. First, the mean price ratio for the 1950-1956 period ($\overline{PR}_{t_1}$) may not be representative of the "actual" mean price ratio because it was based on observations from only the first three years of the period, rather than from the entire seven years. Second, growers may have been subjected to "handler backlash" in response to their collective bargaining efforts and were penalized through somewhat lower prices during the organizational period of T-CGGA. However, while cases of handler discrimination can occur, the amenable working relationship which existed between T-CGGA and the processor does not lend support to the latter explanation.

Confirmation of the expected relationship between $\overline{PR}_{t_2}$ and $\overline{PR}_{t_3}$ indicates that the prices realized by T-CGGA growers were relatively higher and more closely matched prevailing market wide prices after affiliation with OAMA(t_3). These results suggest that the size and nature of the bargaining organization and its method of operation may be important variables in determining the magnitude of gains achievable through collective negotiations. OAMA brought improved market-wide information and more experienced negotiators to bear in the bargaining process.

Magnitude of Pecuniary Gains

An estimate of the pecuniary gains realized by TCGGA/OAMA member/growers can be obtained by using the simple average of the Great Lakes price (average = $162.50 per ton)for the relevant period (1968-1973) and the price ratios associated with time periods t_2 and t_3, respectively. Under the assumption that the t_2 price ratio (.7855) would have approximated the t_3 price ratio had T-CGGA not affiliated with OAMA, subject growers would have received an average price of $127.60 per ton over the t_3 period ($162.50 x .7855). The average

price actually received by growers during this period was $155.00 per ton ($162.50 x .9537). The difference between these two prices - $27.50 per ton represents the average pecuniary gain realized by growers through their collective bargaining efforts or alternatively, the growers opportunity cost of not bargaining.[4/]

Integrative vs. Distributive Gains

Although the results of the analysis of relative grower prices were only partially as hypothesized, the significant differences between $\overline{PR}_{t_2}$ and $\overline{PR}_{t_3}$ indicated that further analysis was warranted to identify the nature and sources of the gains realized by TCGGA/OAMA. The objective of the additional analysis was to determine to what extent the higher relative prices in period t_3 were attributable to improved efficiency and/or other sources of integrative gains as opposed to a redistribution of income. Two sources of integrative gains -- greater processor efficiency resulting from improved grower-handler coordination and improved resource allocation resulting from greater price stability--were analyzed for their potential influence on grower prices.

Improved Processor Efficiency

To analyze the impact of collective bargaining on processor efficiency the test statistic, ER, was constructed from the following equation:

$$ER_i = \frac{GT_i}{FC_i}$$

Where:

ER_i = the average daily capacity utilization in case plant in the i th year,

GT_i = the average daily grape tonnage processed by the case plant in the i th year, and

FC = the average daily plant capacity of the case plant in the i th year.

This measure of capacity utilization provides an indication of the degree to which the flow of raw product to the plant matches the plant's capacity to process the raw product.[5/] If grower-handler coordination is improved as a result of collective bargaining, then an increase in capacity utilization of plant facilities should result.

The hypothesis tested is stated as follows:

H_2: Collective bargaining by subject growers resulted in an increase in the relative operational efficiency of the subject processing facility.

Data were partitioned into the two time periods identified, a posteriori, as relevant to collective bargaining activities.[6/] These periods were:

t_2, the 1957-1967, pre-OAMA period, and

t_3, the 1968-1973 OAMA period.

The hypothesized relationship was:

$$\overline{ER}_{t_2} < \overline{ER}_{t_3}$$

Where:

$\overline{ER}_{t_i}$ = the mean plant utilization ratio in the period, t_i.

Subjecting the test statistics to an analysis of variance and F-ratio test revealed no significant differences between the mean utilization ratios in the two periods. Thus, this analysis provided no evidence of significant gains in the operational efficiency of the processing plant that are directly attributable to the bargaining association. Quite possibly the handler had already achieved the available efficiencies through the use of grower contracts and field supervisors. If so, this would suggest that coordinative gains are more a function of contracting rather than bargaining per se.

Relative Price Stability

Previous research has indicated a significant relationship between price stability and integration efficiencies (11) to test for this relationship, analysis of the impact of collective bargaining on relative price stability was analyzed. The test statistic, CV, was constructed to measure the variance in the price ratio (PR) over time and thus, the degree of relative stability in grower prices. This was developed from the following equation:

$$CV_i = \frac{\sigma_i}{\overline{PR}_i}$$

WHERE:

CV_i = the coefficient of variation of the price ratio in the i th time period,

σ_i = the standard deviation of the price ratio in the i th time period, and

$\overline{PR}_i$ = the mean price ratio in the i th time period.

Smaller coefficients of variation indicate smaller deviations from the mean value and hence, greater price stability. Thus, if the bargaining association was successful in generating more stable prices for its grower/members over time relative to industry-wide prices, the coefficient of variation of the price ratio should be smaller during the period of active bargaining than in previous periods.

The hypothesis tested is stated as follows:

H_3: Collective bargaining resulted in an increase in the degree of relative stability in prices received by member/growers.

To test for this relationship the price ratio data were partitioned into three time periods of six years each.[7] The hypothesized relationships were:

$CV_{t_{2a}} > CV_{t_3}$, and

$CV_{t_{2b}} > CV_{t_3}$

Where:

$CV_{t_{2a}}$ = the coefficient of variation of the price ratio for the years, 1957 through 1962,

$CV_{t_{2b}}$ = the coefficient of variation of the price ratio for the years, 1962 through 1967, and

CV_{t_3} = the coefficient of variation of the price ratio for the years, 1968 through 1973.

The results confirmed that, as hypothesized, there was a smaller coefficient of variation in relative grower prices (0.10) coincident with the period of OAMA bargaining than in either of the previous time periods (0.21 and 0.30 in t_{2a} and t_{2b}, respectively). The results of this analysis, therefore, confirm the expected relationship between collective bargaining and relative price stability. As one previous study has demonstrated, increased price stability results in both direct benefits to producers in terms of higher incomes or reduced losses over time, and reduced social costs as price risk is reduced and resource allocation improved (11).

Summary and Conclusions

The results of the case study indicate that member/growers benefitted from both higher and more stable relative prices as result of their collective bargaining effort, however, these gains were not easily achieved. Initial bargaining efforts by the grower organization met with little success and it was only after affiliation with a larger and more experienced organization that significant gains were realized. This, in turn, suggests that there may be some important size advantages associated with bargaining associations, particularly in their ability to procure more relevant market information

and the skill with which this is brought to bear in the bargaining process.

In the case studied, significant relative price gains were realized by member/growers, however the case results provide no evidence that indicates that these gains resulted from any significant improvement in vertical coordination between handler and growers. In part, at least, this may be due to the failure to specify a more appropriate indicator of coordinative efficiency than the one utilized in this study. Nonetheless, the results of the study suggest that the price gains realized by member/growers were primarily distributive, rather than integrative, in nature.

Although integrative gains due to improved vertical coordination were not evident, some integrative gains were realized through greater relative price stability for growers. Unfortunately, the direct impact of improved price stability on growers is often difficult to assess. While it is posited that more stable prices lead to both social and producer benefits, such benefits accrue rather circuitously, thus, are most difficult to verify and may provide little direct support for voluntary collective bargaining efforts.

Little direct light has been shed on the question of what share of the market needs to be represented by the bargaining association in order to achieve the greatest gains for its members. In the case studied, the bargaining association was able to significantly influence the prices paid its members even though it generally controlled only about 40 percent of the relevant supply. This suggests that the potential for additional distributive gains and possibly some gains of an integrative nature may exist with a larger share of the relevant supply.

FOOTNOTES

1. The agreement is an exclusive sales agency membership contract. Individual T-CGGA members sign yearly contracts with OAMA which gives OAMA exclusive rights over the marketing of the member grapes produced during the contract period.

2. The industry price is generated by weighting the average annual price in a state by the share of the annual "Great Lakes" grape crop produced in that state and then summing across all observations. Since production by subject growers typically accounts for only 2-3 percent of the total annual industry production, changes in their price have only a marginal effect on the overall weighted industry price.

3. There are several multiple comparison procedures, of which Scheffé's "S" offered the greatest appeal in this analysis. The more common least significant difference (lsd) procedure, while accurate for unequal numbers of observations within treatments, cannot be used to test all possible combinations of treatment means. Duncan's, Tukey, and the Student-Newman-Keuls procedures allow for comparison of all possible sets of means but are not accurate for treatments with unequal numbers of observations. The "S" test, however, is appealing because it can be used in conjunction with the F-test, permits comparisons of all possible sets of means and is an accurate test of significance for means that contain unequal numbers of observation. See Appendix A for the general "S" formula.

4. An estimate of the difference between an OAMA bargained price and a non-OAMA price for the period 1957-1973 can be obtained by similar reasoning. Under the assumption that the t_2 price ratio would have prevailed throughout the entire 1957-1973 period, growers would have received an estimated average price of $105 per ton. Alternatively, by assuming that OAMA had been involved in a collective bargaining effort throughout the entire period, growers would have been expected to receive an average price of $128 per ton. Again, the $23 per ton difference between these two price represents the growers opportunity cost of not bargaining over the 17 year period.

5. This variable is not an ideal measure of capacity utilization because it ignores the effect of intervening factors such as inclement weather on average capacity utilization. For example, poor harvest weather may disproportionately lengthen the number processing days relative to the total processed quantity. Thus, if average daily tonnage processed (GTi) is calculated by dividing total tonnage processed by number of processing days and the number of processing days has been substantially increased due to bad weather, the resultant average daily tonnage processed would be reduced, thus reducing the capacity utilization ratio for that year. A better measure of capacity utilization which would partially control for the influence of weather could be obtained by establishing a threshold level for the efficiency ratio on a daily basis and then calculating the average yearly efficiency ratio over only those days when the threshold level was exceeded. Unfortunately this variable requires daily tonnage receipt records which were not available.

6. Time period, t_1, the period prior to the organization of T-CGGA, was not included in this analysis due to the unavailability of data on average daily tonnage processed for that period.

7. The six year groupings were used to equalize the number of observations between the pre-OAMA and post-OAMA data, thus eliminating the influence of different numbers of observations on the total variance within the time period. Since the 1957-1967 period is an 11 year interval, 1962 was included in both $CV_{t_{2a}}$ and $CV_{t_{2b}}$. This adjustment did not materially affect the results because the coefficient of variation for the entire 11 year period is .36, still well above that of the post-OAMA period.

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Appendix A

Scheffé's general formula for a test for significant difference between two treatment means with unequal numbers of observations in the treatment groups is the following:

$$\overline{TM}_i - \overline{TM}_j > \sqrt{(p-1)\,[F_\alpha\,(p-1,\ f)} \cdot \sqrt{s^2\,(\frac{1}{n_i} + \frac{1}{n_j})}$$

Where:

$\overline{TM}_i$ and $\overline{TM}_j$ = any two treatment means with $\overline{TM}_i > \overline{TM}_j$,

p = number of treatments

F_α = tabular F at the appropriate degrees of freedom and at a predetermined significance level,

s^2 = mean square within groups, and

n_i and n_j = number of observations in the i th and j th treatments.

Appendix B

Average[a/] Grape Prices Received by Growers,
Great Lakes States, 1951-1973

Year	New York		Pennsylvania		Ohio		Michigan		Weighted Great Lakes
	Dollars	% Great Lakes	Dollars	% Great Lakes	Dollars	% Great Lakes	Dollars	% Great Lakes	Dollars
1951	86.00	94.5	97.00	106.6	98.00	107.7	106.00	116.5	91.00
1952	102.00	96.2	107.00	100.9	110.00	103.8	108.00	101.9	106.00
1953	119.00	100.8	127.00	107.6	121.00	114.2	112.00	94.8	118.00
1954	110.00	100.0	112.00	101.8	112.00	101.8	114.00	103.6	110.00
1955	101.00	99.0	104.00	102.0	106.00	103.9	101.00	99.0	102.00
1956	86.00	100.0	83.00	96.5	93.00	108.1	84.00	97.7	86.00
1957	101.00	100.0	109.00	107.9	112.00	110.9	94.00	93.1	101.00
1958	118.00	101.7	124.00	106.9	116.00	100.0	107.00	92.2	116.00
1959	125.00	100.8	133.00	107.3	125.00	100.8	119.00	96.0	124.00
1960	111.00	100.0	119.00	107.2	114.00	102.7	105.00	94.6	111.00
1961	106.00	97.2	115.00	105.5	116.00	106.4	107.00	98.2	109.00
1962	119.00	100.0	134.00	112.6	112.00	94.1	114.00	95.8	119.00
1963	144.00	97.3	153.00	103.4	153.00	103.4	156.00	105.4	148.00
1964	134.00	101.5	135.00	102.3	141.00	106.8	126.00	95.5	132.00
1965	111.00	97.4	131.00	114.9	136.00	119.3	102.00	89.5	114.00
1966	116.00	102.7	109.00	96.5	124.00	109.7	106.00	93.8	113.00
1967	112.00	99.1	109.00	96.5	124.00	109.7	114.00	100.9	113.00
1968	133.00	100.0	135.00	101.5	137.00	103.0	124.00	93.2	133.00
1969	175.00	104.8	161.00	96.4	170.00	101.8	145.00	86.8	167.00
1970	169.00	106.3	147.00	92.5	174.00	109.4	142.00	89.3	159.00
1971	160.00	109.6	123.00	84.2	170.00	116.4	120.00	82.2	146.00
1972	183.00	102.8	170.00	95.5	182.00	102.2	172.00	96.6	178.00
1973	183.00	95.3	212.00	110.4	182.00	94.8	216.00	112.5	192.00
Mean	126.00	100.3	128.00	102.5	132.00	105.7	121.00	96.9	126.00

[a/] Average price includes all variety grapes.

Source: Reports of the Crop Reporting Board, Statistical Reporting Service, U.S. Department of Agriculture, Washington, D.C.

Appendix C

Grape Processing: Plant Capacity and Tonnage Processed 1959-1974

Years	Days	Processed Tonnage (Tons)	Daily Plant Capacity (Tons)	Avg. Tonnage Processed Per Day	Ratio[a/]
1959	28	4,202	200	150	.750
1960	30	4,805	200	160	.801
1961	32	4,829	200	151	.755
1962	30	4,871	200	162	.812
1963	19	3,001	200	158	.790
1964	32	4,527	200	141	.708
1965	31	6,714	265	217	.817
1966	23	4,820	265	210	.791
1967	32	5,143	265	161	.604
1968	22	2,669	265	121	.458
1969	25	2,765	265	111	.417
1970	36	5,309	265	147	.557
1971	40	7,910	265	198	.746
1972	26	4,407	265	170	.640
1973	27	6,045	265	224	.845
1974	33	8,365	280	253	.905

[a/] This ratio is the ratio of average tonnage processed per day to the daily plant capacity.

Source: Coca Cola Foods Division, Geneva, Ohio.

Appendix D

Table D.1 - Price Ratio: Oneway Analysis of Variance, 3 Group Case.

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Probability
Between Groups	2	0,1591	0.0795	9.991	0.002
Within Groups	17	0.1353	0.0080		
Total	19	0.2944			

Group	Count	Mean	Standard Deviation	Standard Error
1	3	0.9840	0.0815	0.0471
2	11	0.7855	0.0883	0.0266
3	6	0.9537	0.0938	0.0383
Total	20	0.8657	0.1245	0.0278

Table D.2 - Efficiency Ratio: Oneway Analysis of Variance.

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Probability
Between Groups	1	0.0443	0.0443	2.494	0.134
Within Groups	14	0.2488	0.0178		
Total	15	0.2931			

Group	Count	Mean	Standard Deviation	Standard Error
1	9	0.7587	0.0677	0.0226
2	7	0.6526	0.1880	0.0711
Total	16	0.7122	0.1398	0.0349