An Economic Evaluation of the Cherry Industry Administrative Board

Dr. Harry M. Kaiser
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Executive Summary

The Cherry Industry Administrative Board (CIAB) is the administrative arm of the Federal Marketing Order for tart cherries in the U.S. and has been in existence since 1997. The CIAB has been a leader in educating consumers about the great taste and many benefits of consuming tart cherries. The funding for CIAB was authorized by the USDA in a referendum of cherry growers and handlers. The CIAB collects assessments from U.S. tart cherry handlers to fund generic promotion designed to increase returns to U.S. tart cherry growers.

Under the Federal Agriculture Improvement and Reform (FAIR) Act, the CIAB is required to have an independent economic evaluation conducted on the effectiveness and economic impacts of their domestic promotional program expenditures covering the most recent five-year period. Accordingly, the purpose of this study was to conduct an economic evaluation for the most recent five-year period of performance for the CIAB, addressing the following two important objectives:

1. To measure the domestic market impacts of the CIAB's promotion programs. Specifically, to determine whether the CIAB's promotion activities increased the demand for tart cherries in the United States compared to what would have occurred in the absence of these activities.

2. To measure the benefits of the CIAB promotion activities in terms of incremental profitability for the entire industry and compare these benefits with the cost of the checkoff to compute a benefit-cost ratio for its stakeholders.

This study quantified the relationship between CIAB's domestic promotion and the demand for tart cherries by developing an econometric model of tart cherry demand. The export market is ignored, since the focus is solely on the CIAB, which devotes most of its services to the domestic market. The econometric approach quantifies economic relationships using economic theory and statistical procedures with data. It enables one to simultaneously account for the impact of a variety of factors affecting demand for a commodity. A domestic demand model similar to Saitone, Sexton, and Ma (2017) and Kaiser (2021) was estimated using annual data for crop years 1980/81 through 2020/21. Both studies estimated a domestic demand model for U.S. cranberries using the grower cranberry price per bbl. as their measure of demand (i.e., their dependent variable). Following this methodology, the current study measured national tart cherry demand as the grower price for all tart cherry utilization (fresh and processed) in cents per pound.

The findings of this study clearly show that both the promotion programs by the CIAB have increased the demand for Cherries. CIAB cherry promotion had a positive and statistically significant impact on the grower price, which was the measure of demand used in this study. Specifically, had there not been any CIAB promotion, the grower price would have averaged 5.1% lower than it actually was since 2016/17.

Moreover, CIAB promotion provided net benefits to cherry growers. The results showed that had there been no CIAB promotion from 2016 through 2020, grower net revenue would have been $14.6 million lower than it actually was. Over this period of time, the CIAB spent $7.1 million on promotion of cherries. Therefore, the BCR from the CIAB domestic marketing over this period was 2.05, i.e., each dollar invested in CIAB promotion returned $2.05 in net grower revenue to the U.S. cherry industry.

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Under the Federal Agriculture Improvement and Reform (FAIR) Act, the CIAB is required to have an independent economic evaluation conducted on the effectiveness and economic impacts of their domestic promotional program expenditures covering the most recent five-year period. Accordingly, the purpose of this study was to conduct an economic evaluation for the most recent five-year period of performance for the CIAB.

Objective and Scope

The overall goal of the research was to independently evaluate the economic effectiveness of the domestic promotion program funded by the CIAB. Specifically, this research addressed the following two important objectives:

3. To measure the domestic market impacts of the CIAB's promotion programs. Specifically, to determine whether the CIAB's promotion activities increased the demand for tart cherries in the United States compared to what would have occurred in the absence of these activities.

4. To measure the benefits of the CIAB promotion activities in terms of incremental profitability for the entire industry and compare these benefits with the cost of the checkoff to compute a benefit-cost ratio for its stakeholders.

In this study, the impacts of all factors affecting the domestic tart cherry demand for which data were available were measured statistically. In this way, we netted out the impacts of other important factors besides CIAB promotion activities affecting cherry demand over time. In addition, the value of the incremental sales volume and revenue generated by CIAB activities were estimated. These benefits for cherry growers were compared to the costs associated with the CIAB in order to determine the net benefits or benefit-cost ratio for the CIAB.

This independent evaluation was carried out by Dr. Harry M. Kaiser. Dr. Kaiser is one of the most eminent agricultural economists in the world who has extensively studied the economics of commodity promotion programs. Dr. Harry M. Kaiser is the Gellert Family Professor in the Dyson School of Applied Economics and Management at Cornell University where he teaches and conducts research in the areas of price analysis, marketing, and quantitative

methods. He has written 150 refereed journal articles, five books, 17 book chapters, and over 150 research bulletins. Dr. Kaiser has conducted over 130 economic evaluation studies of domestic and international checkoff programs in the United States, Canada, and Europe on such commodities as fluid milk, cheese, butter, salmon, peanuts, red meat, pork, raisins, walnuts, blueberries, potatoes, beef, wheat, watermelons, high-valued-agricultural commodities, and bulk agricultural commodities. In 2005, Kaiser was the lead author of a book on all commodity checkoff programs in California. In 2006, 2010, and 2015, Dr. Kaiser was a principal (or co-principal) investigator on three comprehensive economic studies investigating the overall benefits and costs of all FAS programs to cooperators and the general economy. Dr. Kaiser received the Distinguished Member Award from the Northeastern Association of Agricultural and Resource Economics in 2002 and then again in 2009. In 2006, Professor Kaiser received the highest award given to alumni of the University of Wisconsin-Eau Claire—the Alumni Distinguished Achievement Award. In 2009, Professor Kaiser received the Outstanding Achievement Award from the Board of Regents of the University of Minnesota, which is the highest award conferred by the university to an alumnus. Professor Kaiser received the Outstanding Alumni Award from the Department of Applied Economics, University of Minnesota, in 2009.

Background

The Cherry Industry Administrative Board (CIAB) is the administrative arm of the Federal Marketing Order for tart cherries in the U.S. and has been in existence since 1997. The CIAB has been a leader in educating consumers about the great taste and many benefits of consuming tart cherries. The funding for CIAB was authorized by the USDA in a referendum of cherry growers and handlers. The CIAB collects assessments from U.S. tart cherry handlers to fund generic promotion designed to increase returns to U.S. tart cherry growers and handlers. The promotion efforts of the CIAB have taken place since 2006. One of the main goals of the CIAB is to increase the consumption of tart cherries in the United States.

Since 2007, one of the main goals of the CIAB has been to educate consumers on the benefits of tart cherries via a national generic promotion program. When the marketing program began, tart cherries were mainly perceived as an iconic pie ingredient. As more consumers were looking for health and wellness products and consuming less desserts, the industry decided to focus promotional efforts on positioning tart cherries as a superfruit with a variety of potential health benefits to help drive demand for the various forms available – dried, juice, frozen and canned.

Over the past 16 years, the national marketing program has driven demand by repositioning U.S.-grown Montmorency tart cherries as a superfruit that has a daily place in the lives of consumers and an on-trend ingredient that food manufacturers should include in their foods and beverages. Key highlights of the program include:

- Leveraging scientific research to share tart cherries' health and taste benefits with consumers. The marketing program has secured more than 33,000 media placements and

2.4 billion media impressions[1] in top food magazines, national morning and talk shows as well as local news broadcasts.

- As social media usage has increased, the promotion program consistently keeps Montmorency tart cherries on the minds of consumers in the channels they frequent for food and nutrition inspiration by securing 59 million impressions and 18.5 million engagements during the last 5 years alone.

- A targeted B2B campaign encouraging food and beverage manufacturers to include U.S.-grown Montmorency tart cherries in new product innovations by positioning the superfruit as a sought-after ingredient in a wide range of nutritious foods and beverages. According to Mintel Global New Products Database, new tart cherry product introductions increased 113% from 2015-2020.

- To help the industry take advantage of materials to market their own products, the promotion program delivers ready-to-use materials on a consistent basis including recipes, product images, social media content, consumer and trade educational handouts as well as digital content on choosecherries.com.

- In the past several years, the campaign has evolved to help meet the industry's growing demand for differentiation from imports, positioning Montmorency as "the cherry with more," to help growers be the voice for the industry to educate consumers on the specialty crop and drive purchase of U.S.-grown tart cherries.

Data Limitations

The econometric model used in this study was based on secondary data from government sources, BCI, and the CIAB. Therefore, the accuracy of the results presented here depends on the quality of this secondary data. While these data were judged to be the best available for this economic evaluation, there are errors in data from any data source. To deal somewhat with the potential errors in the data, all parameter estimates from the statistical regression models for the checkoff activities included a 95% confidence interval.

In addition, there are many factors that impact the demand for cherries. The model has used all available secondary data sources to control for these factors over time to get an accurate measure of the impact of the focal factors, CIAB demand enhancing activities. However, it is almost certainly true that not all demand drivers have been accounted for in the model. For example, it was difficult to obtain a measure on how consumers perceptions regarding cherries have changed over time. These perceptions undoubtedly have an impact on cherry demand.

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[1] To measure promotion program success, there are key performance indicators established at the start of each fiscal year. One of these metrics is impressions which is the estimated number of times a print, broadcast or online placement is potentially viewed. Another metric is an engagement which is the number of interactions with a social media placement (i.e. the person clicks, likes, shares, comments or watches a video).

Methodology

This study quantified the relationship between CIAB's domestic promotion and the demand for tart cherries. The export market is ignored, since the focus is solely on the CIAB, which devotes most of its services to the domestic market. The econometric approach quantifies economic relationships using economic theory and statistical procedures with data. It enables one to simultaneously account for the impact of a variety of factors affecting demand for a commodity. By casting the economic evaluation in this type of framework, one can filter out the effect of other demand factors and, hence, quantify the net impact of the CIAB's activities on cherry demand in the U.S.

A domestic demand model similar to Saitone, Sexton, and Ma (2017) and Kaiser (2021) was estimated using annual data for crop years 1980/81 through 2020/21. Both studies estimated a domestic demand model for U.S. cranberries using the grower cranberry price per bbl. as their measure of demand (i.e., their dependent variable). Following this methodology, the current study measured national tart cherry demand as the grower price for all tart cherry utilization (fresh and processed) in cents per pound.

The following demand drivers were included in the initial model to determine whether they were significant drivers impacting the grower cherry price:

1. Available supply utilized in the processed and fresh market. This should be one of the most important of the grower cherry price, and should be inversely related, i.e., the greater the supply availability, the lower the grower price reflecting the Law of Demand. (The source of these prices is the USDA's annual Fruit and Tree Nuts Situation and Outlook Report.).

2. CIAB promotion expenditures in the United States. Of course, this is the key factor that will be statistically tested in this study to see whether it has a significant and positive impact on tart cherry demand. If it has a positive and statistically significant impact on tart cherry commercial disappearance, this means that the promotion activities of the CIAB do have a positive impact on domestic tart cherry demand. (The source of data for this variable was the CIAB office).

3. Price of competing fruits. We initially include the following grower prices to determine whether they have a statistically significant association with the cherry price: strawberries, blueberries, cranberries, raspberries, and blackberries. (The source of these prices is the USDA's annual Fruit and Tree Nuts Situation and Outlook Report.).

4. Median personal income. This should be positively related to tart cherry demand, i.e., as median personal income increases, tart cherry demand should increase. (The source of figures for this variable is the St. Louis Federal Reserve).

To compare the relative importance of each factor on cherry demand, the results from the econometric model are converted into "price flexibility coefficients." A price flexibility measures the percentage change in the cherry grower price given a 1% change for each demand driver,

holding all other demand drivers constant.

The econometric cherry demand model was estimated with national annual data for the U.S. cherry market from 1980 through 2020. There was no CIAB promotion program prior to 2006. We include pre-CIAB promotion years of 1980-2005 in order to get the sufficient number of observations (i.e., years) for statistical accuracy and variation in the variables. Similar to Saitone, Sexton, and Ma's (2017) second model, and Kaiser's (2021) model, the model developed here was estimated in "double logarithmic" form, which simply means all data were transformed into their natural logarithm. Because there was no CIAB promotion before 2006, and because the logarithm of zero is undefined, CIAB promotion expenditures were set at an annual value of 1 for 1980 through 2006 because the logarithm of 1 is zero.

The estimated demand model was used to simulate market conditions with and without the CIAB. Specifically, two scenarios were simulated over the most recent five-year time-period for which data were available (2016-2020):

1. Baseline scenario, where the grower price was simulated based on all explanatory variables set to their historical levels.

2. No-CIAB scenario, which was the same as the Baseline scenario, except CIAB promotion expenditures were set to zero[2].

A comparison of the simulated grower prices between these two scenarios provided a measure of the impact of the CIAB's impact on grower prices from 2016-2020.

Finally, benefit-cost ratio (BCR) was computed based on the incremental profits accruing to tart cherry growers due to higher demand and price from the CIAB. Specifically, the BCR was computed as:

$$BCR = \frac{\text{change in industry net revenue from CIAB promotion}}{\text{cost of CIAB promotion}}$$

Results

The estimated "price flexibilities" for the domestic demand model are presented in Table 1. Recall that a price flexibility measures the percentage change in the cherry grower price given a 1% change for each demand driver, holding all other demand drivers constant. These price flexibilities were based on their average values for the entire data sample, 1980 to 2020. The estimated coefficients were consistent with economic theory and all estimated coefficients were statistically significant at conventional significance levels. The demand drivers explained 52% of the variation over time in the real grower price, which is quite good.

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[2] Because of the logarithmic functional form, promotion expenditures were set to a small fraction (10%) of historical levels in this scenario since the logarithm of zero is undefined.

Table 1. Estimated Elasticities for Tart Cherry Demand Model.

Demand driver	Elasticity	p-value[*]
Available cherry supply	-0.860	0.000
Cranberry grower price	-0.332	0.108
Median personal income	-1.198	0.066
CIAB promotion expenditures	0.023	0.036
R-square[**]	0.52	

[*]The p-value is a level of statistical significance. Generally, any p-value below 0.10 is consider statistically significant from zero.
[**]The R-square indicates that the estimated equation explains 52% of the variation in grower price for cherries over time.

Not surprisingly, one of the most important demand driver was the volume of available cherry supply. A 1% increase in available cherry supply, holding constant all other demand drivers, was associated with a decrease in the grower cherry price by 0.86%, on average, from 1980-2020. This inverse relationship between price and quantity reflected the law of demand, i.e., people buy more when the price decreases, and less when the price increases.

The only statistically significant competing berry price was the cranberry price, which had a negative and statistically significant association with the grower cherry price. The results indicated that there was a negative relationship between the cherry and cranberry price, i.e., a 1% increase in the cranberry price was associated with a 0.332% increase in the cherry price, holding constant all other demand drivers.

Median personal income was found to be a statistically significant and negative demand driver for tart cherries. A 1% increase in real (inflation adjusted) median personal income in the U.S. was associated with a 1.2% decrease in the cherry grower price.

Most importantly, the findings of this study indicated that CIAB promotion expenditures had a positive and statistically significant impact on the grower price. A 1% increase in CIAB promotion expenditures was associated with an increase in the grower price by 0.023%, on average over this period, holding all other demand drivers constant. These findings provided statistical support for the notion that the CIAB's promotion programs have increased the grower cherry price.

Because there is error inherent in any statistical model, a 95% confidence interval was computed for the CIAB promotion price flexibility coefficient. This interval can be interpreted as the range of possible values where one can be confident that the true population price flexibility coefficient could be expected to fall 95% of the time. The 95% confidence interval for the CIAB promotion price flexibility coefficient was (0.002, 0.044). Because the lower bound estimate of the price flexibility coefficient for CIAB promotion was greater than zero, this adds credence to the conclusion that the CIAB promotion had a positive and statistically significant impact on cherry demand.

The estimated demand model was used to simulate market conditions with and without the CIAB. Specifically, two scenarios were simulated over 2016-2020: (1) Baseline scenario, where the grower price was simulated based on all explanatory variables set to their historical levels, and (2) No-CIAB scenario, which was the same as the Baseline scenario, except CIAB promotion expenditures were set to zero. The results of the simulation are presented graphically in Figure 1. In the graph, the blue bar represents the grower cherry price with the promotion programs of the CIAB and the red bar is the simulated grower price without CIAB promotion. Over the entire period, the grower price averaged $0.245 per pound with CIAB promotion compared with $0.233 per pound without CIAB promotion. In other words, CIAB promotion increased the cherry grower price by 1.24 cents per pound (or 5.1%) over this period.

Figure 1. Cherry Grower Price with and without CIAB Promotion, 2016-2020
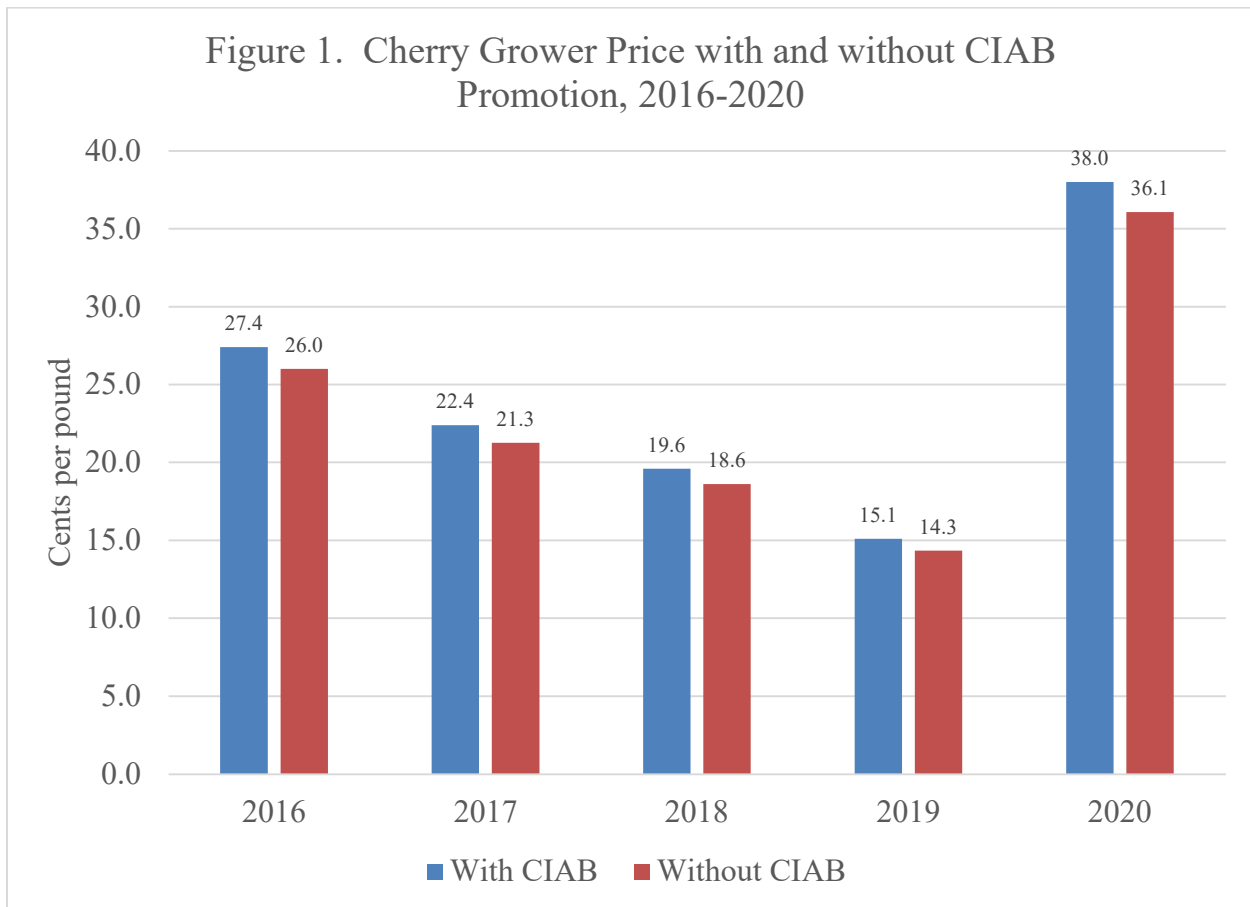
A more important question is how do the stakeholders of the CIAB benefit from their promotion programs? If the incremental gain the grower price is multiplied by total tart cherry volume sold to the commercial market, the results indicate that grower revenue increased by $14.6 million over the past 5-years. Put differently, had there been no CIAB domestic promotion over the past 5-years, total grower revenue would have been $14.6 million lower than it actually was.

From 2016 and 2020, the CIAB spent $7.1 million on promotion activities. Therefore, the BCR from CIAB promotion over this period was equal to:

BCR = 14.6/7.1 = 2.05.

In other words, each dollar invested in CIAB promotion returned $2.05 in net grower revenue to the U.S. tart cherry industry.

Conclusions and Discussion

The overall goal of the research was to independently evaluate the economic effectiveness of the promotion programs by the CIAB. Specifically, this research addressed two important objectives:

1. To determine whether the CIAB's promotion activities increased the demand for tart cherries in the United States compared to what would have occurred in the absence of these activities.

2. To measure the benefits of the CIAB promotion activities in terms of incremental profitability for the entire industry and compare these benefits with the cost of the checkoff to compute a benefit-cost ratio for its stakeholders.

The findings of this study clearly show that both the promotion programs by the CIAB have increased the demand for Cherries. CIAB cherry promotion had a positive and statistically significant impact on the grower price, which was the measure of demand used in this study. Specifically, had there not been any CIAB promotion, the grower price would have averaged 5.1% lower than it actually was since 2016/17.

Moreover, CIAB promotion provided net benefits to cherry growers. The results showed that had there been no CIAB promotion from 2016 through 2020, grower net revenue would have been $14.6 million lower than it actually was. Over this period of time, the CIAB spent $7.1 million on promotion of cherries. Therefore, the BCR from the CIAB domestic marketing over this period was 2.05, i.e., each dollar invested in CIAB promotion returned $2.05 in net grower revenue to the U.S. cherry industry.

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Appendix 1. Data used to Estimate Demand Model

YEAR	CPI 1982-84=100	CRANBERRY PRICE cents/lb	REAL MEDIAN PER CAPITA INCOME	CHERRY PRICE cents/lb
1980	83.9	33.2	23826	20.2
1981	92.3	41.5	23382	44.5
1982	96.5	40.2	23629	14.1
1983	99.6	44.8	24091	46.6
1984	103.9	46.7	24788	25.0
1985	107.9	46.3	25324	22.4
1986	110.9	44.7	26105	20.3
1987	114.8	44.5	26454	7.8
1988	122.1	45.7	27287	18.7
1989	132.4	44.0	28006	14.5
1990	140.0	46.1	27705	18.1
1991	145.8	49.0	27299	46.4
1992	151.5	51.6	27025	17.6
1993	156.6	50.2	27289	12.1
1994	163.0	49.3	27625	16.3
1995	167.5	53.4	28383	5.9
1996	174.0	65.9	28985	16.1
1997	177.6	63.7	30257	15.9
1998	181.1	36.6	31758	14.5
1999	185.0	17.2	32079	21.8
2000	188.3	18.1	32431	18.7
2001	193.8	23.8	32146	18.6
2002	198.0	32.2	31913	44.8
2003	202.8	33.9	31986	35.4
2004	206.0	32.9	31889	32.8
2005	209.0	35.2	32320	23.8
2006	212.8	41.1	33197	21.5
2007	222.1	50.7	33321	27.3
2008	244.9	58.1	31953	37.7
2009	252.6	44.2	31606	19.2
2010	250.4	43.9	31142	22.2
2011	260.3	44.8	30667	30.0
2012	267.7	47.9	30484	59.4
2013	270.4	32.4	30804	35.9
2014	271.1	30.9	31473	35.5
2015	274.1	31.0	33040	34.7
2016	273.1	30.6	33545	27.4
2017	271.7	30.2	33750	22.4
2018	272.8	27.8	34745	19.6
2019	276.6	34.5	36426	15.1
2020	282.6	37.3	35805	38.0

YEAR	POPULATIOIN mil	CIAB PROMOTION $	PER CAPITA CHERRY SUPPLY lbs/person	RASPBERRY PRICE cents/lb	STRAWBERRY PRICE cents/lb
1980	227.7	0	0.949	26.8	41.2
1981	230.0	0	0.577	40.2	42.0
1982	232.2	0	1.055	105.3	48.1
1983	234.3	0	0.656	37.6	45.6
1984	236.3	0	1.083	43.1	41.7
1985	238.5	0	1.175	41.5	44.3
1986	240.7	0	0.908	109.2	49.4
1987	242.8	0	1.178	51.7	49.4
1988	245.0	0	0.953	51.0	46.2
1989	247.3	0	0.982	83.9	47.1
1990	250.0	0	0.812	27.6	47.0
1991	253.3	0	0.749	48.7	46.2
1992	256.7	0	1.219	42.9	52.3
1993	260.0	0	1.052	51.7	46.3
1994	263.2	0	1.126	106.1	50.7
1995	266.4	0	1.168	60.3	50.7
1996	269.5	0	0.965	117.5	47.3
1997	272.8	0	1.039	59.0	55.5
1998	276.0	0	1.107	20.3	61.1
1999	279.1	0	0.910	133.4	62.5
2000	282.4	0	0.997	26.2	55.0
2001	285.3	0	1.079	50.7	64.7
2002	288.1	0	0.216	45.8	61.6
2003	290.8	0	0.778	38.2	63.8
2004	293.5	0	0.726	107.2	58.5
2005	296.2	0	0.904	87.8	60.1
2006	299.0	72,128	0.831	25.0	63.2
2007	302.0	1,286,803	0.823	2.9	71.6
2008	304.8	893,717	0.699	3.0	75.8
2009	307.4	1,098,405	1.043	2.9	76.0
2010	309.7	1,404,725	0.591	2.5	79.3
2011	312.0	1,095,155	0.738	2.1	82.4
2012	314.2	872,682	0.271	1.7	80.4
2013	316.3	800,731	0.920	2.1	85.6
2014	318.6	1,366,604	0.944	2.6	93.3
2015	320.9	1,505,962	0.783	2.4	73.0
2016	323.2	1,331,943	0.986	1.5	110.0
2017	325.2	1,593,866	0.781	2.2	107.0
2018	326.9	1,187,162	0.883	1.7	93.5
2019	328.5	2,051,237	0.716	2.0	109.7
2020	330.1	938,606	0.418	2.1	

	POPULATIOIN mil	CIAB PROMOTION $	PER CAPITA CHERRY SUPPLY lbs/person	RASPBERRY PRICE cents/lb	STRAWBERRY PRICE cents/lb
YEAR					