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A Market-Window Analysis for Crown-Cut Broccoli Produced in Southwest Virginia

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This research determines the profitability for farmers of marketing film-wrapped Crown-Cut broccoli in Southwest Virginia. Historical price data was collected in three eastern terminal markets (Atlanta, Baltimore, and Philadelphia) for Crown-Cut and bunched broccoli from October 1998 to January 2005. Cost-of-production budgets were estimated for Crown-Cut broccoli. The economic data was entered into a market window analysis and the profitability of each market was evaluated.

The profitability of Crown-Cut broccoli was illustrated by market-window graphics. Market windows were generated using an analysis platform developed by Kalo (1998). The profitability estimates were calculated by posting historical market prices by week in a Microsoft Excel spreadsheet and subtracting corresponding unit costs for transportation and production.

Study results show that there is potential profit for producing Crown-Cut broccoli during the first weeks of October. Atlanta proved to have the most profit potential of the three markets studied. Given the frost dates in the area, these production windows favor broccoli production without weather risk. Southwestern Virginia producers should consider developing Crown-Cut production options: the early open market windows combined with the potential for reducing production costs by double-cropping means that a potential profit opportunity exists.

Virginia Tech has encouraged agricultural diversification of enterprises among Virginia farmers. Many production and marketing studies have been produced to show the costs and benefits of specific farm enterprises. During the 1980s, farmers tested the market for bunched broccoli in Virginia supermarkets. Later, Virginia farmers cooperated in several projects dealing with direct marketing and agri-tourism. All of these efforts enabled farmers to assess their options and to establish on new farm enterprises.

Research Objectives

The overall objective of this research was to determine if profitable markets existed for Crown-Cut broccoli by applying economic principles to a market-window analysis. Specific objectives included collecting historic price data from three eastern terminal markets (Atlanta, Baltimore, and Philadelphia) for Crown-Cut and bunched broccoli,

estimating transportation costs from Southwest Virginia to each terminal market, estimating the production costs for Crown-Cut broccoli (both wrapped in film and unwrapped) and for bunched broccoli; and displaying economic data and conducting a market window analysis showing the profitability of each terminal market.

Research Methods

This economic research was part of an interdisciplinary project submitted by the Virginia Tech faculty in the Department of Horticulture and Food Science to the Virginia Agricultural Foundation. The horticultural experimental test-plots and food-science film-wrap experiments were conducted concurrently in a first-year proposal. It was determined that a quality pack of Crown-Cut broccoli could be grown and wrapped for market, but the profitability of marketing the Crown-Cut broccoli pack remained to be answered. If the Crown-Cut pack could be marketed profitably, a program of market development could proceed.

Analysis, Methods, and Data

In this research method, a market window showed the potential profit or loss by seasonal results

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(weekly) by selecting and combining certain variables including a terminal market, a transportation mode, and a production budget showing a specific combination of farm resources. Economic analysis of a market window can reveal whether market opportunity exists for Crown-Cut broccoli.

Market-Window Concepts

A profitable market window shows a positive difference between revenues and costs. The market window is created by collecting and plotting historical prices and subtracting pre-harvest, harvest, fixed, and transportation costs. These budgets represent factor costs and returns for broccoli economics. These profitability measurements are displayed in dollars per box.

Transportation costs were calculated from an assembly point to a terminal market based on a truck-load lot. Production-cost budgets were estimated by calculating factor costs and organizing a budget into pre-harvest, harvest, transportation and fixed costs.

The economic data for the market-window analysis was derived from USDA's Agricultural Marketing Services. A price quote from the first, fifteenth, and thirtieth of each month during the broccoli season was used. If there was no price available for that day, the next closest day's data was used. Prices from the months of October, November, December, and January 1998–2005 were used. Price quotes from California Crown-Cut broccoli and California Bunched.¹ Boxes of 14 heads were collected. Prices for California broccoli were used in the analysis because this was the only type of broccoli that was consistently reported during the target market. California is the principal competitor in these wholesale markets.

The price data was compiled into a spreadsheet and analyzed. It was then analyzed using a rolling average of three prices to smooth out spikes and obtain a visual understanding for marketing periods. The prices were also used directly in cost/profit graphing and analyzed by averaging each month over the entire time span to get one average for each month over from 1998–2005.

The initial step was to determine the price advantage of Crown-Cut over bunched broccoli using the

¹ Bunched broccoli consists of heads bound together. The California Bunched 14's consist of 14 bunches in a packaging box.

average prices to realize extra profit potential. The next step in the process was to examine the overall profit potential by looking at the average prices and comparing them to the broccoli budget. This price and cost data were entered into a market-window spreadsheet. This program enabled the agricultural economist to determine the optimal time period to market produce given area, crop, and terminal market.

In this study, Crown-Cut broccoli heads were shrink-wrapped individually to keep the produce more sanitary and improve the shelf life of the product. It is believed that consumers prefer this addition of value to the product because of the health-awareness trends in customers.

Assumptions Underlying the Process

Several assumptions should be noted for the purpose of determining the risk of accepting the results of the market window analysis.

Assumption one states that the pricing data used in the analysis is of a historical nature and future prices may deviate from those prices collected in 1998–2005 and displayed in the model.

Assumption two states that during the growing season, production costs per box remain constant during the season.

Assumption three states that transportation costs are based on truckload lots and based on the Kalo's Market Window Analysis (1998). Transportation costs may be higher in the future.

Assumption four states that once this research is published, other competing regions may oversupply the market and reduce the historic market price.

Assumption five states that small producers can produce a quality pack that meets the market standard with forced air cooling and without the benefit of an ice pack.

Assumption six states that the costs of film wrapping the broccoli can be accomplished within the production budget estimates and that quality of the pack can be maintained.

Assumption seven states that weather patterns will enable the growers to complete at least an eight-week production season.

Results of the Research

In the study, all terminal markets researched—Atlanta, Baltimore, and Philadelphia—were estimated

to be profitable for Crown-Cut broccoli. The discussion will focus on the Atlanta market, as it had the most profit potential.

Figure 1 shows that during the production season in Southwestern Virginia the period of production may provide a profit for producers in the Atlanta market. The October period of production was shown to be profitable 100 percent of the time based on historic prices and costs calculations. The probabilities of making a profit in November fall to seventy and sixty percent. The probabilities of making a profit fall further in December period.

Figure 2 displays comparisons in Atlanta market prices across a seven-year period. The graphic shows that during October and November the Atlanta market is profitable but volatile in its pricing

patterns. The result of this price volatility may be attributed to weather or to other seasonal impacts. December prices are a bit more stable, but the local freezing weather may prevent growers from profiting from the favorable market conditions. The cost of the pack including transportation is estimated to be \$11.82 per box for the Atlanta market (Table 2).

Discussion

Atlanta Terminal Market Analysis

Examining the Atlanta terminal market during the months of October through January for the years 1998–2005 generated the average prices over seven

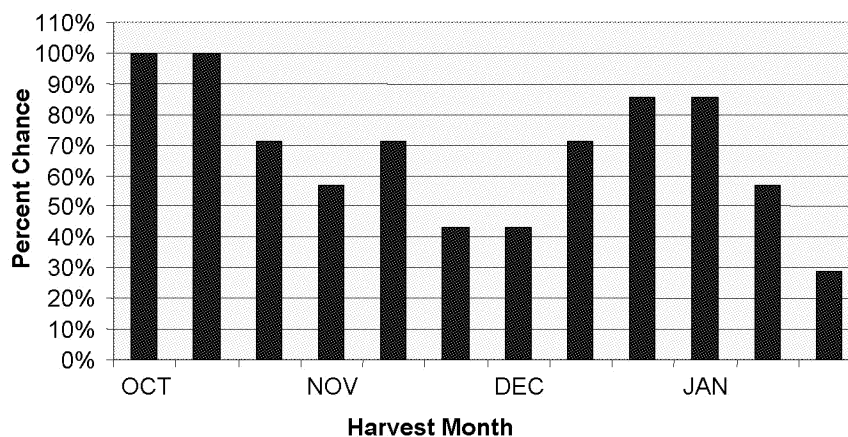


Figure 1. Atlanta Market Chance of Profit, 1998–2005 (%).

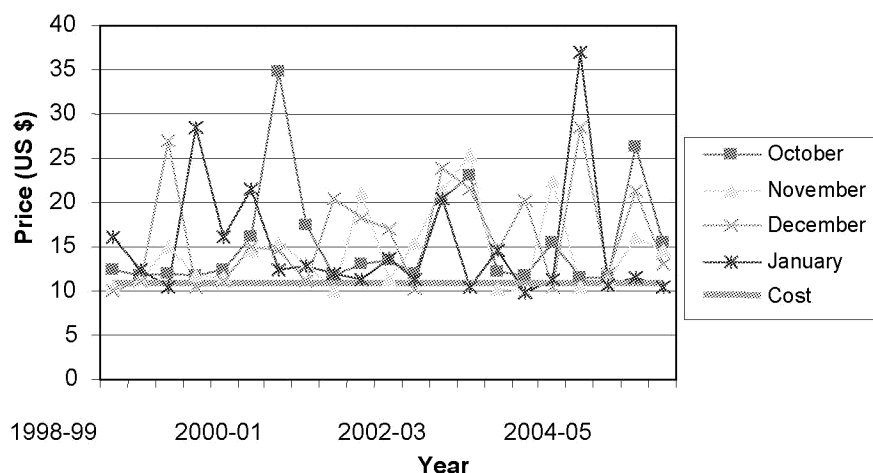


Figure 2. Atlanta Market Prices, 1998–2005.

Table 1. Average Atlanta Market Prices 1998–2005.

	October	November	December	January
Average bunched broccoli price (\$)	12.98	12.82	14.76	12.67
Average Crown-Cut broccoli price (\$)	15.56	14.40	16.26	14.99

Table 2. Cost and Returns for Producing and Distributing Crown-Cut Broccoli at Terminal Markets.

Cost item	Atlanta market	Baltimore market	Philadelphia market
Pre-harvest variable cost	\$3.94	\$3.94	\$3.94
Harvest cost	\$4.34	\$4.34	\$4.34
Fixed costs	\$2.71	\$2.71	\$2.71
Transportation costs	\$0.83	\$0.73	\$0.73
Total cost	\$11.82	\$11.72	\$11.72
Average price	\$15.30	\$14.26	\$14.80
Average profitability	\$3.48	\$2.54	\$3.08

years shown in Table 1. The California Crown-Cut Broccoli is priced above Bunched Broccoli in all months in the Atlanta Terminal Market.

After analyzing the past seven years of data from the Atlanta Terminal Market, it is projected that a producer is best positioned to enter the market in mid-December through early January. There is often a spike in prices during mid-November, which could be related to the upcoming Thanksgiving Holiday. However, a producer must realize that it might not be feasible to produce broccoli to be ready for harvest in mid-December due to weather restrictions. Another time frame that is more feasible for producers in Southwest Virginia is the beginning of October. Over the past seven years, the month of October had the second highest prices in the Atlanta Terminal Market.

Some significant outliers were found in January 2002, when prices of Crown-Cut broccoli skyrocketed to \$37.05 and Bunched Broccoli went up to \$35.50 per box. From the end of December 2001 and into January 2002, prices were seen at \$28.00 per box for Crown-Cut broccoli. These prices pulled the average for the year up significantly.

Cost and Returns of Production

Table 2 is derived from the estimated production budgets developed in the study and shows the main

points of the differences in cost and price of the three terminal markets. The estimated budgets are available from the authors upon request.

Conclusion

Study results show that there is potential profit for producing Crown-Cut broccoli during the first weeks of October. Atlanta proved to have the most profit potential of the three markets studied. Given the frost dates in the area, these production windows favor broccoli production without weather risk. Southwestern Virginia producers should consider developing Crown-Cut production options—the early open market windows combined with the potential for reducing production costs by double-cropping means that a potential profit opportunity exists.

Risk Management

This study identifies two risk factors in price risk and production risk. The market-window analysis showed that the production cost risk may be greater than the price risk. The terminal market showed favorable prices for the Southwestern production period for fall Crown-Cut broccoli. Of greater concern is the ability of the smaller production units in Southwestern Virginia to produce and coordinate

the shipment of broccoli to the market.

Pricing Volatility

Prices look favorable for a Crown-Cut product mix. The most stable of the three markets studied appeared to be Atlanta terminal. The main concern about Crown-Cut pricing estimates is the year-to-year variability. It is difficult to see a consistent pattern from year to year in all three terminal markets.

Terminal-Market Selection

The terminal markets used in this study were selected on the basis of their proximity to Southwestern Virginia. The Philadelphia market was selected because of its usually strong prices offered for produce. In the Crown-Cut broccoli example, the market prices were not as attractive as in the Atlanta or Baltimore markets. The Baltimore market was also located closer to the Southwestern Virginia production region.

Importance of Assumptions

Explicit assumptions were made about the outcome for the profit potential for crown cut broccoli. The importance of the assumptions gives future researchers a benchmark for making more detailed estimates of a commercial Crown-Cut broccoli industry. The assumptions have significant impacts on the relationship of costs and returns in future industry development.

Consistent Product Quality

Potential growers for the Crown-Cut broccoli industry in Southwest Virginia are typically small growers. Given the concentrated downstream market, considerable pressure is placed on each grower to provide a consistent supply of product. In order to assemble truck-load lots during a two month period (October and November) of favorable prices, growers will be pressured to pack quality produce for each of the forty days of the season. Many small growers will be needed to satisfy this quality and quantity assumption.

Management and Market Coordination

A marketing company probably will be needed to manage the local supply and demand from buyers. Broccoli production in Southwestern Virginia unites many small growers who pool their resources to be a marketable force at wholesale markets. The reason is that individual growers cannot accumulate enough marketing power and produce the quantity needs for the entire industry in this location. This support of the industry may incur additional costs and may reduce costs at the farm level. Detailed planning and budgeting will be required to control the flow of the products to market.

Taking Costs Out of the System

The ultimate success of the Crown-Cut industry depends on carefully taking costs out of the system in order to be competitive. The produce industry is dynamic. Improvements in local farm and industry productivity should be made each season and corresponding reduction in costs sought. The very survival of the new Crown-Cut broccoli industry depends on estimating and achieving an annual industry cost reduction objective.

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