The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

The Feasibility of a Individual Quick Freeze Operation in Vidalia Georgia

Christopher Ferland, Kent Wolfe, John C. McKissick, and Estes Reynolds
FR-01-28
June 2001
Vidalia Vegetable IQF Feasibility Study

Purpose

This study looks at the economic feasibility of operating an Institutional Quick Freeze (IQF) unit in the area of Vidalia, Georgia to assist the local onion producers receive income from their Number 2 (#2) onions. Currently, these onions are disked into the soil then limed and fumigated to control the acid and insects. This process costs the producers man-hours, tractor hours, fuel, insecticide, and negative community feedback. The proposed IQF plant would create additional income from this costly disposing operation of the #2 onions. The product offered by the proposed plant includes diced quick freeze onions and other vegetables.

This study examines the relevant economic issues surrounding IQF vegetables including onions, peppers, carrots and custom work. The economic analysis did not account for the negative cost associated with the previous disposal of the onions. However, it is important to remember that cost do exist for the disposal of the onions.

Institutional Quick Freeze Vegetable Market (Including Onions)

The frozen vegetable market is a $1.599 billion category with mixed vegetables accounting for one third of the segment ($520 million). The frozen vegetable industry has struggled lately with negative growth in sales and volume. However, these numbers may not be truly reflective of the industry, as meal-starter-frozen vegetables are included in frozen vegetable data. Excluding the meal-starter vegetable products, the frozen vegetable market actually grew in 2000.

The United States Department of Agriculture cold storage report shows a storage decline on most vegetables. The vegetables are being packaged and sold at a quicker pace and require less long-term storage. One can estimate from this report that demand is stronger than in the past or supplies are lower. Either way is a positive interpretation for the sake of starting a quick-freeze operation.

Even with this decline in cold storage, the pounds stored are significantly large in the spring with gradual reductions occurring by the fall. This appears to emulate the production season of many of the frozen crops. It also shows that if the plant can freeze the vegetables at a cost efficient level there should be limited difficulty in finding a location for them in the marketplace.

There are two primary markets for frozen vegetables, retail and food service. The retail markets appear to purchase vegetables from brokers or contract with independently owned and operated farms. This may be a possible option for the Vidalia group if enough volume can be produced. The food service market, hotels, hospitals, schools, and prisons purchase large quantities of vegetables from assorted buyers.
Supermarket sales for frozen vegetables have increased steadily over the past six years. The food service industry is expected to increase its use of frozen foods for a number of reasons, reduced labor costs, year-around availability, consistency, reduced prep-time, portion control, high quality ease of storage, price stability and low cost. Technological changes have increased the quality of frozen food to the point that consumers have a hard time distinguishing products made with frozen produce and products made with fresh produce.

General wholesalers and distributors are not the target market for IQF frozen produce. After contacting over 10 wholesalers and distributors operating in Georgia, it was determined that brokers or wholesalers servicing the ingredient or institutional markets are more likely to be interested in IQF produce. Additional research into these groups is needed to gain an understanding of the market.

One reason for targeting the food service sector rather then the retail market is the reduced expense in marketing. The time and money used establishing a brand name for frozen vegetables in the retail market makes it cost prohibitive. The food service or wholesale market will purchase frozen vegetable without brand name recognition.

Frozen Vegetable Demand

The frozen vegetable market grows annually due to increased technology in both the production and packing. Assisting this growth is the American desire for ready-made meals and quick meals. Looking into the freezer case one can see the pre-packaged meals with the only meat being the missing ingredient. The pasta, vegetable and seasoning are all included. This microwave and quick age has brought changes into the vegetable market. According to the Food Institute, demand for canned vegetable has declined and frozen vegetable demand increased.

In general, demand for all vegetables, fresh or frozen, has increased due to reports showing the benefits of consuming large quantities of fruit and vegetables. The old food pyramid has been redesigned with increased portions of fruit and vegetables and reduction in the meat and bread categories.

Investigation into the frozen vegetable market, specifically for IQF Vidalia Onions, revealed that the industry is in a situation where demand is exceeding supply. This information is based on a conversation with one food ingredient broker, Carl Deveries with Vanderin Farms.

According to Carl, there is a significant opportunity to and he indicated the market could easily absorb 1.2 million pounds of diced IQF Vidalia Onions. He further indicated that the bulk of these IQF onions would be utilized by companies that manufacturer various types of sauces. The current price for diced IQF Vidalia Onions is $0.75 per pound and the onions are typically packaged in 40 pound bags.
Again, these results are based on a conversation with one broker. The center has contacted a number of brokers and Vandern Farms was the only broker that dealt with IQF Vidalia Onions.

Frozen vegetable consumption data compiled by the Economic Research Service of the USDA shows per capita consumption rising at a rate of 48% between the years of 1970 to 2000. The last five years consumption data is flat. In 2000, approximately 84.1 pounds of frozen vegetables were consumed per capita. The major vegetables consumed were lima beans, snap beans, broccoli, carrots, sweet corn, green beans, and potatoes. Georgia grows all of these vegetables and has a potential of entering into the frozen market with the #2 vegetables.

**Vegetable Production Area**

Agriculture in Georgia is changing and many farmers have begun to grow more vegetables. Based on conversations with wholesalers in the Atlanta Farmers Market the vegetable market has grown faster than the supply. Many wholesalers talked about the need to import vegetables from out of state. This slight deficit in vegetables from Georgia opens a window for Georgia farmers to increase acreage. Each time the fresh market acreage increases the frozen market also gains supply.

Many of the vegetables used in the frozen market come from the #2’s in the fresh market. Therefore, increased demand in the fresh market creates increased supply in the frozen market. It has not been seen if this creates a serious problem in the price of frozen vegetables in the market.

The proposed quick freeze operation will be located in Vidalia, Georgia. Vidalia is in a concentrated vegetable area, including onions, carrots, snap/pole beans, yellow squash, collards, southern peas, zucchini, okra, lima beans, hot peppers, eggplant, and broccoli. An estimate of the acreage was obtained for these crops from the 2000 Farmgate publication from the Center for Agribusiness and Economic Development, at The University of Georgia.
The following chart shows the total acreage of the vegetables mentioned above. Many vegetable crops yield 30% #2’s, with some crops yielding more and others less.

**Chart 1.** Potential Vegetables for Freezing Acreage.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Qty Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onions</td>
<td>8,515</td>
</tr>
<tr>
<td>Carrots</td>
<td>1,810</td>
</tr>
<tr>
<td>Snap/ Pole Beans</td>
<td>1,484</td>
</tr>
<tr>
<td>Yellow Squash</td>
<td>1,267</td>
</tr>
<tr>
<td>Sweet Corn</td>
<td>1,062</td>
</tr>
<tr>
<td>Collards</td>
<td>720</td>
</tr>
<tr>
<td>Southern Peas</td>
<td>620</td>
</tr>
<tr>
<td>Zucchini</td>
<td>92</td>
</tr>
<tr>
<td>Okra</td>
<td>59</td>
</tr>
<tr>
<td>Lima Beans</td>
<td>37</td>
</tr>
<tr>
<td>Hot Peppers</td>
<td>25</td>
</tr>
<tr>
<td>Eggplant</td>
<td>23</td>
</tr>
<tr>
<td>Banana Peppers</td>
<td>5</td>
</tr>
<tr>
<td>Broccoli</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,721</strong></td>
</tr>
</tbody>
</table>

This chart indicates approximately 16,000 acres within a 50 miles radius of Vidalia grow vegetables. Estimating a #2 yield of 30% leaves 4,800 acres of vegetables available for processing and freezing.

The next graph shows the states’ total acreage for Y2000 of the vegetables providing the best chances in the frozen market. These vegetables include onions, carrots, snap/pole beans, yellow squash, collards, southern peas, zucchini, okra, lima beans, hot peppers, eggplant, and broccoli. The circle represents a fifty-mile radius to the proposed freezing location.
Graph 1. Select Vegetable Acreage for IQF, Georgia 2000.

Select Vegetable Acreage for IQF, Georgia 2000

The radius does not indicate that vegetables from other parts of the state will not be considered for freezing. If successful the plant will consider taking vegetables from any location until the maximum capacity is obtained.

Competition

A number of firms exist throughout the state providing quick-freeze processing. The nearest firm to the proposed Vidalia location is Claxton Cold Storage. This firm refuses to IQF onion due to a transfer problem of the smell into poultry, their main income source. Claxton Cold Storage will blast freeze most other vegetables, but do not
provide the initial washing, peeling, and cutting process. They usually receive the product ready to be frozen in large drums or bins.

The other firms are at considerable distance from the proposed sight. After speaking with two of these firm neither process Vidalia onions. One did process white onions, so has the capability to enter the market. The discussion with brokers and competition suggest few place process any type of onions beside green onions. The researcher was lead to believe from these groups that the market would bear increased competition for processing of Vidalia onions and even vegetables.

Graph 2. Frozen Vegetable Processors, Georgia 2000.
Institutional Quick Freeze Feasibility

This section will explore the components necessary for operating a quick freeze line Vidalia, Georgia. The Baylor Group supplied the quick freeze equipment prices: Food Plant Supply Division, phone 210-340-1541. All prices are for new equipment FOB and do not include sales tax. The equipment was based on a daily maximum rate of 20,000 pounds of vegetable material to be frozen. All components supplied can be used for all other vegetables except corn. To freeze corn, a segmentor will need to be added. The cost data and other numbers were supplied by various private groups, the University of Georgia’s Department of Food Science, University of Georgia’s Department of Biological and Agricultural Engineering and University of Georgia’s Department of Agriculture and Applied Economics. Before the Vidalia onion group decides to operate or relinquishes existing quick-freeze contracts the breakeven of establishing a new quick-freeze line needs to be established. This allows for a profit/loss margin to be determined.

Equipment Costs

Equipment cost figures came from The Baylor Group, Food Science Department at the University of Georgia and various private equipment sales firms. The mandatory pieces of equipment include dump vat, peeler, blancher, dryers, Urschell, hopper (bagger, scale & dump), model B-1000 IQF, refrigeration skid, product loading elevator, oscillating de-watering conveyor, and fork lift. This equipment provides a complete set up to take the raw product to a sealed bagged finished product. The total price of the equipment is $518,536 adding 7% sales tax of $36,298 the grand total becomes $554,834.

Fixed Costs

Fixed costs associated with this packing shed include the depreciation on the building, equipment, and interest on the investment funds. The projected fixed costs for this project is $107,000 or approximately $.09 per pound of finished product.

Income

Calculated income came from the estimated pounds of onions multiplied by the sales price per pound. The packaged price per pound was given to the researcher by the cooperative at $.70 per frozen pound. The estimated yield is 1,200,000 pounds. A shrink reduction figure of 20% was used from the 1,500,000 pound of raw product. This shrinkage is due to the removal of the crown and steam reduction in the onions size. Creating an income of $840,000.

Direct Costs

The figure for the direct costs stem from delivery of the #2 onions from the field or packing sheds to the quick freeze location. An estimated price of $.005 per pound was used for delivery. This figure comes from the $200 delivery charge currently being used for 40,000 pounds of onions. No purchase price for the #2 onions was used at this time.
The #2 onions in most cases should be considered a negative cost by eliminating the cost associated with disposing of the onions by the disking method.

**Direct Labor**

Labor cost calculations include the salaried and hourly labor to run the quick freeze line. The labor figures are automatically adjusted with an increase in pounds. The regular hours of operation are 8 hours per day, for 110 days of the harvest season. The wages for the laborers are calculated at $10 per hour for 22 weeks of fulltime (8 hour days). The cooperative manager/salesperson receives an annual salary of $35,000 with the potential of commissions. This person is responsible for scheduling delivery of the #2’s to the freeze line, ordering input supplies, and creating contacts for direct sales. The manager will be the only employee to receive benefits, estimated at $8,750. A part-time bookkeeper, with an estimated salary of $7,500, will be hired to assist the manager. The total labor cost is $167,410 or $.14 per pound of finished product. If the operation decides to run a custom vegetable processing line additional labor figures will need to be calculated.

**Variable Costs/ Other Direct Costs**

Variable costs associated with this project include labor, utilities, insurance, repairs, rental agreements, disposal, and operating costs. Operating costs include: boxes, cleaning supplies, and bags. All of this will change depending on the pounds of product quick-frozen. Positive relationships exist among the pounds processed and the variable costs. The total for this category is $91,300 or $.08 per finished pound. The largest component of this cost is the boxes and bags. The boxes were quoted at $.85 a piece and the bags at $.075. If the cooperative sells the finished product in bulk bins the operating cost will be reduced.

**Total Cost & Profit/Loss**

Adding the variable and fixed costs together gives the total cost of operating the quick-freeze line for the 110 days with approximately 1,500,000 pounds of raw product to $363,910. In order to break even, the packing shed operation needs to sell 519,871 pounds of frozen onions at $.70 per pound. The processing line earns $466,790 or $.39 per pound of finished product. The operating efficiency appears excellent for an agricultural-based product at 56% but this should increase dramatically if different vegetables can be processed during the off season. The operating efficiency refers to the amount of the income kept in the company, out of every dollar the packing shed earns $.56 and is retained and $.44 covers expenses.
**Institutional Quick Freeze Processing Line Profits**

*Profit versus Budgeted Cost*

Assuming the figures used in the economic feasibility section are closely related to actual numbers used to operate a quick freeze processing line, the profitability for just the onions will be on the following chart.

The budget numbers include operating expenses (utilities, taxes, labor, supplies), fixed costs (interest on start up cost, depreciation) and income from sales of processed onions. Then the costs are subtracted from the income resulting in the remaining profit or loss.

The next graph shows the relationship between budgeted cost and profit. The cost estimates are moved incrementally at 5% intervals to see the results on profitability and risk.

**Chart 2.** Profit versus % Budgeted Cost

![Profit vs % Budgeted Cost](chart)

*Profit versus Percent Over/Under Estimated Sales Price*

This section shows how the changes in the sales price of processed onions affects the profitability of the plant. The obvious result is as prices decrease profits decrease, the next graph shows at what point the sales price decrease enough to make the plant a risky investment.
Financing, Operating, and Ownership Arrangements for an Institutional Quick Freeze Processing Line

Presently only one financing and ownership method is being considered for the packing shed in Vidalia, Georgia, a marketing cooperative. The main purpose of this quick freeze is to provide the local onion producers with an alternative market for their #2 onions besides disposal.

Cooperatives

A special type of producer cooperative called a “New Generation Cooperative (NGC)” or a “closed cooperative” combines solution to both financing and operating questions. Producers would raise an initial portion of the quick freeze equipment and working capital cost through stock or options on stock sales. Each share of stock would provide the right and obligation to market 100 pounds of raw onions through the processing line. The remaining capital could be raised through debt financing. Operation of the processing line could remain with the producer/owner. Raw onions could be priced to the producer through various arrangements including profit sharing of the final product. Any funds generated through an assessment per pound marketed through the packing shed would be used to retire debt and would increase the producer’s equity in the operation.

The recommended organizational structure would be an Institutional Quick Freeze cooperative formed as a value-added processing, closed cooperative of defined or selected membership whereby members invest through the purchase of shares of stock. These shares serve as a dual contract. Each producer has both the obligation and the right
to deliver to the cooperative. Likewise, the cooperative is obligated to accept delivery given quality standards are met. These delivery rights and obligations are transferable. Each member is still granted only one vote regardless of the number of shares owned.

The basic concept of this new type of cooperative is that producers capture profits that occur beyond the farm-gate by owning and controlling the local businesses that are positioned to earn those profits. The motivation of new generation cooperatives is more offensive than defensive—take control of your own destiny and be proactive rather than reactive. The main emphasis in cooperatives of this type has been on value-added processing, niche marketing, and producer/members viewing themselves as producing a finished food product rather than a raw commodity.

Producers tend to take greater interest in operations developed as a producer cooperative since they are also investors. The typical amount of member equity required is 50-60% of the initial equity needed for the project. This gives potential lenders the security of sufficient producer commitment. Banks for cooperatives have been the primary institutions that help in financing the remaining 40-50% needed by new cooperatives. Many commercial banks are also funding cooperatives. The USDA also has numerous financial programs that can assist cooperatives that meet certain criteria. Credit unions and the Farm Credit System have also actively lent funds to farmers to invest in new cooperatives. Other helpful support systems in the development of these new cooperatives include communities, regional economic development commissions, individual rural electric cooperatives, and university extension services.

New Generation Cooperatives retain many principles of traditional cooperatives such as democratic control through a one member, one vote policy; excess earnings are distributed among members as patronage refunds or dividends; and the board of directors is elected from the membership by the membership. The financing of NGCs allows for all, or almost all, net earnings to be returned to members at year-end since the members invest capital up-front. Future expansion is financed in the same way as original equity: members invest through the purchase of shares. In some instances, preferred shares may be offered to the community or general public. This allows communities to support the project while keeping control in the hands of the members. Some of the advantages of the New Generation Cooperatives include the ability of producers to react quickly to opportunities, the collective response of members to problems or opportunities, the creation of wealth within a community and local ownership keeps it there, stability for producers and efficiency for the packing shed through the restricted membership, consideration of the interests of the community through a diverse set of stakeholders, and commitment to the quality of the product by both the producers and processor.

One of the keys to success of a New Generation Cooperative is producer commitment. The group of producers must be motivated, determined and committed. Other keys to success include public policy that supports cooperative formation, financial institutions willing to finance the cooperative, and consultant or facilitators to help producer groups through the aspects of the process. These keys to success seem to be evident in Georgia. Georgia Produce Growers must take ownership of the concept and
drive the investigation into the possibility of operating a functional value added packing shed in Georgia.

The financing in terms of shares is calculated by taking the total cost divided by the total number of estimated units needed for a standard operating year. This will yield a share price for 100% financing by the producers. If the producers wish to lower their amount of equity the share prices will drop accordingly to the amount financed outside the operation.

**Share Price**

The next chart shows the estimated share price at various financing scenarios, 100% producer financing, 75% producer financing, 60% producer financing, 50% producer financing, and 40% producer financing.

**Chart 4.** Share prices at various financing options.

Another option for financing the plant is to contact the local development authorities and submit grant requests to them and the state. Often the development authorities will assist in part of the grant writing or organizing of application material to be submitted to larger state funds. Currently the Georgia is taking submission for funds through the Georgia Authority One.

**Return Per Share**

Each share shall receive a portion of the profits. These dividends or profit sharing will occur either quarterly or annually based upon the recommendation of the board of
directors. The following charts show returns per share for only the quick freeze onions. If custom vegetable work or other products are produced the returns will need to be recalculated.

**Chart 5.** Returns Per Share at Various Sales Prices.

![Graph showing returns per share vs. change in sales price, 1.5 Million Pounds]

**Impact Analysis**

An important part of any feasibility study is the direct and indirect economic effect of the venture on the surrounding community. The effects of the venture will affect retail sales, taxes. To estimate these impacts an input/output model for Georgia was developed with the computer program IMPLAN. This model was then stratified into different categories. IMPLAN works by capturing the relationship between industries in the state and showing the change in one industry in regards to the others. The model also shows changes in output, employment, and the impact on taxes. One limitation to this model is the backwards nature in which it calculates these figures. However, it is estimated this limitation is of minor significance to the overall model.

Assumptions were made before placing the model into the software package on the number of employees, total output, and delivery requirements. These assumptions were a unified decision by a multi-disciplinary team at the University of Georgia. The team perceives these assumptions to be to be a close to reality as possible.

The results of the model show the impact of the institutional quick-freeze processing line for vegetables on Georgia’s economy. Processing 1,500,000 pounds of onions annually will increase total community employment by 13 jobs. These jobs are of various sorts, the direct increase comes from the 5 people hired by the plant and the other 8 are from the increased retail sales in the community. The plant would generate $1,545,661 million in economic activity in Georgia and a tax increase of $57,879. The
additional spending by the plant’s employees would raise the community sales by an estimated $220,986. The indirect spending by the facility would create $484,676 being added into the economy. If the processing line increases the number of head or the state offers subsidizes a new impact model needs to be examined.

Conclusion

Based off the economic numbers provided in this feasibility study the quick freeze processing line for 1,500,000 pound of onions is profitable. Currently, the producers are contracting with other to process their onions. This needs to be taken into consideration when opting to start a new venture. Opening a new processing line increase risk on the producers in terms of debt, management issue, equipment, and the market. If the producer continue to use their present processor that firm assumes the risk associated with operating the quick-freeze line.

The market presently appears to be able to absorb more frozen vegetable then supplied. This situation, according to broker, should continue. Vidalia onions play an important role in the frozen vegetable industry. Due to their global reputation and limited availability many different food manufacturers require these onion. Vidalia onions can be found in salad dressing, sauces, mixed vegetables, and ready to prepare meals.

The co-operative needs to run efficiently and explore custom processing opportunities with other vegetables to obtain maximum efficiency. If the producers start charging the co-operative for the #2 onions the economic situation will have to be revisited, as the extra expense will affect profits.
The Center for Agribusiness and Economic Development

The Center for Agribusiness and Economic Development is a unit of the College of Agricultural and Environmental Sciences of the University of Georgia, combining the missions of research and extension. The Center has among its objectives:

To provide feasibility and other short term studies for current or potential Georgia agribusiness firms and/or emerging food and fiber industries.

To provide agricultural, natural resource, and demographic data for private and public decision makers.

To find out more, visit our Web site at: http://www.caed.uga.edu

Or contact:

John McKissick, Director
Center for Agribusiness and Economic Development
Lumpkin House
The University of Georgia
Athens, Georgia 30602-7509
Phone (706)542-0760
caed@agecon.uga.edu

The University of Georgia and Fort Valley State University, and the U.S. Department of Agriculture and counties of the state cooperating. The Cooperative Extension Service offers educational programs, assistance and materials to all people without regard to race, color, national origin, age, sex or disability.

An equal opportunity/affirmative action organization committed to a diverse work force.

FR-01-28 June 2001

Issued in furtherance of Cooperation Extension Acts of May 8 and June 30, 1914, the University of Georgia College of Agricultural and Environmental Sciences, and the U.S. Department of Agriculture cooperating.

J. Scott Angle, Dean and Director