

**Department of Agriculture, Trade and Consumer Protection**  
**Division of Agricultural Development**  
**Agricultural Development & Diversification Program (ADD)**  
**Grant Project Final Report**

Contract Number: 18065

Grant Project Title: A new technique for adding grower value to raw cranberries for the Wisconsin Sweetened and dried cranberry market

Amount of Funding Awarded: \$15,500

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Please use the following questions as a guide for writing your grant project final report. In your final report, please answer each question as it relates to your grant project.

- 1) What did you want to accomplish with the grant? We needed to learn if we could add value to regular raw cranberries for the emerging sweetened and dried cranberry market. Growers need to enhance the quality of their fruit and this industry just uses process grade fruit for their finished product. We were investigating whether growers could improve the quality of the raw fruit and provide a value-added product.
- 2) What steps did you take to reach your goal? We conducted a series of studies where we value-added the fruit and compared it to traditional uses.
  - What worked? We found that the traditional fruit worked best for the sweetened and dried market. We found that we could get a higher yield for the customer but it is most likely more expensive than they'd be willing to pay. The customer did like the fact that the fruit was sorted a couple more times, removing more trash and yielding less debris in the finished product.
  - What did not work? We couldn't use fresh fruit for the SDC market.
  - What would you do differently? This study was rather complete and no alternatives are available at this time for growers to improve the quality for this market segment.

- 3) What were you able to accomplish? We know that growers should not focus on improving their raw fruit via IQF for the sweetened and dried market. We did find out however that the fruit was of superior quality if sold into the food service industry. However early indications suggest that there is not a premium price for this fruit, even though quality is improved. IF oversupply hits the market, this type of value adding may provide an edge for additional sales.
- 4) What challenges did you face? Logistics was a problem. There are very few IQF facilities in Wisconsin. Private vegetable companies own their own units and only two units in Beaver Dam, WI were available to process cranberries.
- 5) What do you plan to do in the future as a result of this project? We may try to focus on purchasing a small IQF unit for quick freezing fruit for the boxed industry. Oversupply will hit this industry, as it does all agricultural commodities. We will be ready with a unit in central Wisconsin, but only if we can find a used unit that is cheap enough.
- 6) How should the agricultural industry or the State of Wisconsin use the results from your grant project? Other growers will learn from this study, and learn that we tried this new avenue. It was not entirely successful.

Contract #18065

Last fall we began this project by sending a 40,000 lb. load of high quality Stevens cranberries to Beaver Dam WI for instant quick freezing (IQF). We received the fruit back to our central Wisconsin freezer and held it until this spring for processing.

We decided to conduct this study with our biggest customer, Atwater Foods. They have a sweetened and dried facility in Lyndonville, NY, and secure fruit from all over the nation. Atwater Foods agreed to conduct the study because they wish to provide their customers with a higher quality product.

Working with Atwater we tested our three different “types” of fruit for infusion. We sent fruit that was unfrozen in late October and infused it without an initial freeze. Secondly, we held a load of fruit in the Gardner Cold Storage freezer that was slowly frozen over a 40-day period. Third we had a semi load of fruit frozen via IQF.

#### Infusion and Drying Cranberries

Sweetened Dried Cranberries are produced by slicing frozen cranberries and then infusing them in a sugar solution. The sugar solution permeates into the cranberry and at the appropriate time, the solution is drained and the infused cranberries are dried in kilns. When dried, they are packaged into finished form for sale to customers.

#### Results:

Fresh Fruit: Atwater Foods attempted to infuse and dry fruit that was harvested fresh and never frozen. The experiment was not successful. Although the fruit sliced nicely, the infusion sugar solution would not soak into the cranberry. When the cranberries are soaked in the sugar solution, darker berries tend to lose some of their color and whiter berries will soak up the color from the solution. In the end you typically have a uniformly colored product. However with the fresh fruit infusion, the whitish berries did not soak up the color or sugar very well, and as a result the quality of the finished product was poor.

On March 18 through March 20, 2004, I flew out and visited Atwater Foods. The week prior to flight we shipped 20,000 lb. of IQF fruit and 20,000 lb. of slow frozen fruit from the central Wisconsin freezer. The fruit arrived and was sliced, infused, and dried. During the testing process we gathered information on yield and quality. Samples were evaluated for quality parameters.

Infusion Syrup. We found that IQF fruit had a more difficult time soaking up the color. It was important and quite interesting to note that the brix level of the fruit was the same as slow frozen fruit. We did not expect sugar to be infused but color infusion restricted. Although it wasn't as bad as the fresh fruit experiment completed in the fall, which had a wide variance in its uniformity. The fruit that was slow frozen had the best absorption and most uniform color.

Why the problem with infusing syrup in IQF fruit? When we decided to attempt this project, our biggest concern was infusion efficiency. We learned last October that fresh fruit would not readily soak up infusion syrup. We determined that the cells must be broken through the freezing process to allow the syrup to get into the fruit. We did not know how an IQF frozen berry would react. The IQF

procedure quickly freezes the fruit, minimizing cellular damage and creating a higher quality fruit. We hypothesized that IQF berries would be slower to absorb the infusion syrup because they most likely had less cellular breakdown as compared to a bulk slow frozen fruit, which has been documented to break most of the cells in the fruit. However we found that the sugar infused normally but the color in the solution did not permeate the cells which led to high color variance.

#### Yield Results:

We repeated the infusion process through multiple batches and came to the statistical conclusion that there was a higher yield from IQF than slow frozen fruit. We determined that there is a 5.75% yield increase when using IQF fruit. Typically it takes two pounds of fresh fruit to equal one pound of SDC fruit. With a 5.75% yield increase at current market prices of 50 cents per pound, the break-even price increase would be 1.4 cents per pound of raw fruit.

#### Quality parameters:

Samples of the block and IQF fruit were compared for quality parameters. Upon initial inspection it is clear that the IQF fruit is “plumper” than the slow block frozen fruit. Closer evaluation revealed that there was significantly less cellular disruption and the fruit was less “mushy”. When shown to five other people in a blind taste /quality test study, all picked the IQF fruit as having better quality. They noted that the IQF infused fruit was not clumpy, meaning that pieces didn’t stick together. They appeared to flow individually. The slow block frozen fruit was stickier and pieces stuck together in 2’s or 3’s. This product did not flow as well either.

#### Conclusion from this project:

We determined from this project that cranberries are unique in their infusion process. With other crops such as cherries, fresh cherries are best for infusion and drying. Nobody does IQF cherries, so it is not known how this procedure affects color and sugar infusion. When using cranberries we found that fresh cranberries cannot be infused and dried, while maintaining a high quality standard. It appears that IQF cranberries have the potential to produce a higher quality product from the consumers perspective. The biggest obstacle is the high cost of IQF freezing. With volume contracts, IQF freezing costs could possibly be reduced to \$0.05/lb. However it takes two pounds of frozen cranberries to produce one pound of dried and infused cranberries. As a result, prices would need to be increased at least \$0.10 / lb to make the project worthwhile. At this time we do not know if the market is available for this type of fruit product with higher price tag.







IQF



SLOW  
FROZEN