

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

Contract Number: 20023

Grant Project Title: Finding New Market Opportunities for End-of-Season Strawberries

Amount of Funding Awarded: \$12,000

Name of Principal Contact Person: Anna Maenner

Organization: Wisconsin Berry Growers Association

Email Address: info@wiberries.org

WEB Address: www.wiberries.org

Report Submitted on: September 3, 2008

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 was the original intent of the grant?

The original intent of this project was to explore the feasibility of harvesting strawberries, not currently being harvested for the fresh market, for the production of value-added products.

- What did you want to accomplish with the grant?

With this grant, we wanted to determine if there was an economically feasible market for end-of-season strawberries. In other words, was there some way to utilize strawberries, that were not suitable or not economically feasible to harvest for the fresh market, in some other manner to bring more income and profit to the grower.

- How was it expected to benefit Wisconsin Agriculture?

It is currently estimated that between 2,040,000 and 3,060,000 pounds of strawberries are never harvested in Wisconsin. These strawberries come at the end-of-the season when there aren't enough strawberries to make it economically feasible to harvest them with our current methods for the fresh market. Currently the only large-scale way strawberries are sold in Wisconsin is through the fresh market and these are harvested by individual pickers by hand.

This project hoped to find a market for these end-of-season strawberries that would make it economically feasible to use some type of mechanical harvester to take them from the fields thereby providing additional income to the grower and providing a use for these strawberries that are now wasted.

- What makes this project work important or significant?

If we could find a way to harvest strawberries more economically for a value-added product, it would first provide additional income to current growers and would also open the door to larger commercial production of strawberries for the value-added market. We could see an economic gain in this area from \$2 million to \$5.5 million per year.

2) What steps did you take to reach your goal?

This grant was broken down into two parts: 1. Was there a market for Wisconsin strawberries in some other form than fresh? 2. Is it economically feasible to harvest strawberries in Wisconsin in some other manner than by hand for use in some other market?

To address the first point, WBGPA partnered with Jonathan Smith of Alpine Foods in Nekoosa to explore the market side of the equation. Jonathan received an Agricultural Innovation Center grant to identify and explore market and product opportunities for Wisconsin strawberries.

For point two, research was done to determine what is being done elsewhere in the world and across the U.S. to utilize strawberries, how are they used, how are they harvested and how does their system compare to Wisconsin's. And, growers were contacted and surveyed to determine their interest in pursuing some other options for their strawberry crop.

- What worked?

Our numbers were accurate and labor was confirmed as a major factor in cost.

Some growers were interested in pursuing other marketing options for their fruit.

During the 2006 harvest, Jonathan Smith took a crew into a strawberry field to pick. after the grower had already picked and abandoned the field. He reported harvesting 1,500 pounds/acre. Labor cost him \$.75 per pound and he was charged \$.70 per pound for the berries for a cost of \$1.45 per pound as an outside business coming into harvest.

In the spring of 2007, strawberry growers were surveyed about their 2006 crop. 15% of growers surveyed responded. All stated that their berries were picked by paid laborers or by customers through U-pick operations. When laborers were paid, the cost per pound to pick strawberries was reported to range from \$.40 to \$.83 per pound. Most growers reported that some strawberries were left in the field in 2006. Commercial growers with more than 1 acre of strawberries, reported they left between 1,000 - 10,000 pounds of berries per acre unharvested in 2006. This proved that our estimate in our grant proposal of what was left unharvested was a realistic number. Also 6 growers indicated they would be interested in working with Jonathan Smith on a processing project.

Wisconsin fruit garnered a premium price.

We always thought Wisconsin strawberries tasted better, but Jonathan's market research determined that Wisconsin strawberries yielded a better quality puree than our competition.

A strawberry/cranberry combination had the most market interest.

This combination would be a truly Wisconsin product that couldn't be easily copied by other strawberry states. Strawberry/cranberry sauces, purees and dressings seemed to get the most interest from the marketplace. Buyers wanted high quality, small container sizes, emphasis on flavor and the ability to personalize a product. We could deliver on those wants if they were willing to pay the price.

- What challenges did you face?

Price, Price & Price.

Jonathan Smith reported, "The strawberry project had a hard time getting off the ground. There is a slight premium for Wisconsin fruit, but China undercut everybody last year. You could (and still can) buy strawberries for \$.68/lb. Wisconsin growers wanted \$1 to \$1.25/lb to pick them. I sent out offers to brokers at \$1.75/lb and received a laughable reply...there wasn't that much markup."

No economical alternative to hand picking.

It seems the search for a mechanical strawberry harvester has been going on for many years to no avail. The fruit does not ripen all at the same time so any type of mechanical harvester would need to be able to harvest fruit without damaging the plants and be able to identify ripe and non-ripe fruit. Each strawberry cultivar varies in size and color so trying to develop a machine that can sort and harvest for all these different criteria has been elusive. The human eye and hand are still the best options.

So enters the machine-aided system. These systems vary in size and capacity but the concept is that they serve as a collection point for strawberries being picked by hand pickers or they carry workers through the field, in a prone position, to alleviate the bending over aspect of picking. With this system workers can work more efficiently and for those that carry workers for longer periods of time without the physical strain.

The collection point harvesters are being adopted in large commercial areas i.e. California which grows 83% of the nation's annual harvest of strawberries. California's 10-month season helps the return on investment for a \$125,000+ machine.

The harvesters which transport pickers are more popular in areas similar to Wisconsin in strawberry acreage. The harvesters tend to reduce the number of workers needed as pickers can work for longer periods of time and are more efficient. Start up costs for small machines that hold two or three pickers range from a homemade model of \$5000 to a Drangen commercially produced in Sweden for \$9,455.

With the startup costs of the machine and the fuel and maintenance required both in inputs and personnel we were unable to determine (as no machine was available to evaluate) if there was a net gain in the operation's bottom line. Growers were not willing to invest in a machine that they would only use the six weeks of strawberry harvest. Some Drangens are being used in Wisconsin but primarily on fresh market vegetable farms that can utilize the machine all throughout the planting, weeding and harvesting season.

We even tried to contact the universities at River Falls and Platteville to see if their ag mechanic classes would be interested in developing a machine more economically feasible for Wisconsin growers. There was no interest in the project.

- What would you do differently?

I believe we pursued every avenue we could on this project.

- 3) What were you able to accomplish?

We learned that under the current economic conditions the best return to Wisconsin strawberry growers continues to be the fresh market. As long as the large producers i.e. California, China can harvest and ship in strawberry puree and concentrate and as long as our growers can receive the premium price for their fresh strawberries we will not be able to justify a strawberry processing industry in Wisconsin.

- 4) What conclusions can you make based on project work the analysis of collected data?

We have concluded that it is not currently economically feasible to start up a strawberry processing industry in Wisconsin. If economic conditions change, the possibility of such an undertaking could be considered again.

5) What do you plan to do in the future as a result of this project?

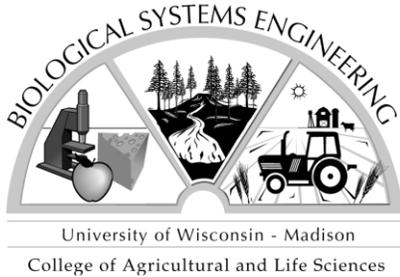
WBGA will focus its attention on the fresh market and continuing to help growers sell fresh product to consumers. We'll need to monitor the labor issue and look at possibly buying harvesting aides as a cooperative project for growers use across the state.

6) What information or additional resources are needed to commercially develop this enterprise?

Not feasible at this time.

7) How should the agricultural industry use the results from your grant project?

As an industry we should use this information to focus on how we can increase the fresh market sales of strawberries; create protocols that will increase the shelf-life of our premium fresh product; examine ways of getting more fresh product into other mass markets i.e. grocery store chains, institutions; look for ways that growers can cooperatively attract and utilize workers or harvesting aides.



460 Henry Mall • Madison, WI 53706
608/262-3310 • FAX:608/262-1228
e-mail: bse@facstaff.wisc.edu
Web site: <http://bse.wisc.edu/>

Anna Maenner
211 Canal Rd.
Waterloo, WI 53594

March 6, 2006

Analysis of Lay-Down Tractors or Workstations

The UW Healthy Farmers, Healthy Profits Project
Astrid Newenhouse, Ph.D.
astridn@wisc.edu (608) 231-2622 (home office)

The Drängen (Dreng-gen, which means “farm hand” in Swedish) Creeper Tractor is highly suitable to strawberry harvesting. See photo at <http://www.bse.wisc.edu/hfhp/> go to “tipsheets” then to “for berry farmers”, then go to “motorized laydown work carts” and choose pdf or html file to download.

- Lay face down on a padded workstation that looks like a massage chair.
- Can buy multiple workstations, from 1-3 on a single machine, so 3 people can pick at once. Can add more workstations up to six.
- One person controls speed and direction with their feet; both hands free to pick.
- Motor is in back so workers don't breathe exhaust fumes.
- Drive and work at same time; no need to lose a worker to driving tractor.
- Travels slowly over the crop rows.
- Drives on tracks instead of wheels, so less soil compaction and therefore able to work in more soil moisture conditions than a tractor with wheels.
- Accessories available such as attached conveyers for harvested fruit, weeding brushes, seated unit with toolbar for seeding and cultivating.
- 5.5 hp Honda engine (5.5hp up to 13.5hp) plus hydraulic pumps and track motors.
- Invented and made by Mats Anderson, a vegetable grower in Sweden, used initially for cukes.
- In 2004 a one person model cost approx \$6000. Note exchange rate has gone up since then, so will be more expensive today.
- Lightweight and easy to handle, frame is aluminum tubing.
- Adjustable height and width to fit crop: 3'-8' wide, 12" high and up.
- WI farmers have made own options such as vacuum salad harvester, water dibble, sun canopy.

Disadvantages:

- Takes a while to get one; comes from a small manufacturer in Sweden.
- Won't know exact cost until day of sale since exchange rate fluctuates between Swedish krona and American dollar.
- Machine has no “road gear” so it travels very slowly from field to field or barn to field. Recommend trailering it for transport.
- Takes approx. 10 minutes to adjust your workstation to fit you. If improperly adjusted, worker feels neck pain, headache, arm pain, or other aches.
- Needs quite a bit of space to turn around at end of row.

University of Wisconsin-Madison provides equal opportunities for admission and employment.

Notes:

In 1998-2002 we researched available lay-down carts and tools for field work. We saw “ironing board” types of platforms pulled behind a tractor and other homemade versions. Both Drängen and the Finnish machine Crawler stood out because of worker productivity and benefits for worker health and safety. The strength of Drängen and Crawler are in their massage-chair-like workstations which can be adjusted to fit the worker. Limitations of tractor pulled versions are that workers tend to lie on a solid flat board and breathe exhaust fumes. Also one worker is lost to being the tractor driver.

When we did our research Crawler was not yet available for rent or sale, so we rented a Drängen for our trials and brought it to farms in 1999-2001. Some Wisconsin berry growers tried it for weeding, de-blossoming, and harvest. Some of these growers were Stan Kirschbaum, John Pinkston, Wendy Nelson, and Cindy Rhinehart. Our trials confirmed the research literature on these machines. Using the Drängen made weeding, harvest, and deblossoming faster by 23-24%

We also trialed Drängen with vegetable growers and several of them bought a machine. The list of Wisconsin people who own a Drängen includes Dave and Barb Perkins and Joe Schmidt of Vermont Valley Farm in Blue Mounds (have 2 Drängens), John Oosterwyk in Madison, and Robert Witte in Cedarburg. We (the UW Healthy Farmers, Healthy Profits Project in the Ag Engineering Department in Madison) currently own the Drängen that we rented previously. It has two workstations.

Now there is a US distributor for Drängen in Madison:

Gunnar Josefsson
Nova Innovation
5716 Old Middleton Rd.
Madison, WI 53705
(608) 661-9034
gunnarjo@merr.com

There is another European lay-down tractor called Crawler, made in Finland

- <http://personal.inet.fi/yritys/elomestari/english/crawler.htm>
- Galvanized steel frame, adjusts in width and height (from 7.5” high up).
- Holds one or two workers.
- Lay down workstations very similar to those on Drängen.
- 4 wheels with 16.5” dia tires and all wheel drive.
- Additional “wheelbarrow wheel” used for transport.
- Runs on 12V electric motor.
- In 2004, base price was \$2600.
- We have not seen one nor trialed it, since at the time it was not available.

With kind regards,

Astrid Newenhouse
astridn@facstaff.wisc.edu

Agricultural Innovation Center Producer Assistance Proposal

FINAL REPORT

Project Title: **Finding New Market Opportunities for Wisconsin-grown Strawberries**

Full Legal Name of Applicant: Berry Works, LLC

Applicant's Address: 321 Hwy 13 South

Name of Primary Contact and Title: Jonathan D. Smith, Ph.D.

Cell Phone: 715-213-2764

Ph: 715-325-7140

Fax: 715-325-7160

Email: jonathan@berryworks.com

Web: www.berryworks.com

Project Start Date: Nov. 1, 2005

Project Completion Date: Mar. 31, 2006

Name and Title of individual(s) that can execute a contract for the Applicant:

Jonathan D. Smith, Ph.D.

Routing for payments: Make checks payable to Berry Works, LLC EIN# 69-0510650

Proposal Introduction

The purpose of this project was to identify and explore market and product opportunities for Wisconsin grown strawberries. If successful, Wisconsin Berry Growers could increase their income with additional sales whereby end-of-season or other harvested strawberries could be used in the production of value-added strawberry products.

Strawberry growers in Wisconsin derive most of their primary income from pick your own operations. Based on conversations with Anna Maener from the Strawberry Growers Association, gross income from an acre of pick-your-own strawberries can be around \$10,000 per acre. After the fruiting season is over there is still a significant amount of fruit that rots in the field. Conservative estimates put this number at 2-3 million pounds for the state of Wisconsin.

In this project, we identified four distinct objectives that need to be fulfilled to determine if there is an opportunity for additional value-added products.

Identify Opportunities

In the first part of this project we worked to identify market opportunities for strawberry fruits and other small fruits like blueberries and cherries. We found a small but significant niche in wineries, small canneries, and bakeries right here in Wisconsin. Several companies bought a small volume of Wisconsin fruit, but most of it was purchased through distribution channels, with a majority originating from the west coast. In January and February we focused our efforts to identify valid niche opportunities for Wisconsin crops. We found that the cost of commodity-type products from the west coast were very low, due to cheap labor, but also realized that the product lacked character, consistency, and local flavor. Although there is an opportunity to capitalize on product quality, pricing from large processors in the US and Chile were going to pose a financial challenge.

Market Potential

Our goal was to determine if there is a value-added component for this lost fruit. After completing our initial marketing study we found that it will be nearly impossible to compete with the large strawberry processing facilities that make commodity products such as strawberry juice, concentrate, IQF, 4+1, or puree. The details of this study are outlined in Appendix A.

In May we traveled to the Fancy Food Trade Show to continue our market research for Wisconsin-grown strawberries. We noted that the number of sauce, glaze, and vinaigrette companies has exploded since my last visit four years ago. The packaging ease of private label has allowed small producers to expand their product line and co-pack for individual shop owners. We discussed the needs of their industry and realized that there may be a very good 'fit' for our end of season Wisconsin strawberries.

Many of the requirements for the sauce industry parallel what we can provide with our strawberries:

- Robust flavor profile
- Not from concentrate
- Fresh frozen at peak of ripeness
- Need for a Marketing Buzz word: Wisconsin Strawberries
- Desired packaging is a 5 gallon bucket
- Reduced shipping cost as a Midwest supplier
- Average annual purchase 150,000 –250,000 lbs

A Potential New Market Opportunity

While at the Fancy Food Show we also conducted market research on the use of cranberries in the sauce industry. We discovered that it is difficult to get a high quality desirable cranberry product because of several reasons:

- All juice is in the form of concentrate
- Purees are typically concentrated
- Sales are typically bulk truckload quantities
- Typically provided in 55 gallon drums or bulk tankers only

We talked to one buyer in detail about the development of a blended puree for the sauce industry, blending Wisconsin Cranberry and Wisconsin Strawberry, for pallet quantity sales. The idea was well received because it provided a unique product opportunity for the buyer that could not be purchased commercially today.

Market Philosophy for blended Strawberry / Cranberry products

- Cranberry products are more expensive than strawberry products. Thus, if we blend the products to a standard concentration of each, we can get added value for the strawberries.
- Providing product in small volumes and small package size is beneficial because we don't have a lot of strawberries growing in the state, so volumes can match sales.
- Unique product: We will utilize two Wisconsin products, cranberries which are typically sold in large volumes and restricted to smaller buyers, and Wisconsin strawberries which are highly desirable but not available on the market.

R&D on strawberry / cranberry blends

We conducted juicing and puree studies to develop a range of strawberry and cranberry blends. The procedure is quite simple and it is easy to modify the procedure to attain different concentrations of each ingredient. We found that it takes very little strawberry to overpower the flavor profile of cranberry, meaning that as little as 20% strawberry/ 80% cranberry can give puree a distinct strawberry flavor.

Market Conditions

Based on our marketing research, there is a demand for the products we can develop using Wisconsin strawberries. Our biggest obstacle is determining how much fruit will be available from growers to supply the sauce industry. Sauce makers can still get commodity strawberry products from distributors throughout the US, so our pricing must be competitive, but with value-added blending, we should be able to command a premium price. However if it is too far out of line, sauce manufacturers will have no choice but to purchase a lower cost item to stay in business, even if some of the marketing needs are not met.

We will construct detailed financials for the most highly demanded berry products, including current market pricing, processing procedures and fees, as well as shipping and transportation. When this assessment is completed, we will be able to present to the WI berry growers a proposal for utilization of their excess process-grade fruits. The feasibility of this entire project will then depend on their ability to harvest the fruit, and store it for further processing.

2006 Pilot Project

A field and processing pilot project was conducted to gather feasibility data. Fruit was harvested on a small growers farm about 20 miles from the processing facility. Fruit was harvested by hand, capped in the field, shipped to the processing plant where it was washed and immediately frozen. After frozen the fruit was used to conduct process tests at Alpine Foods, LLC.

We have identified three major budget area that will dictate success of this project. These are only rough estimates that will need to be refined over time with real-world data.

Payment to the grower for the fruit: \$0.20/lb

Payment to the harvest prep company: \$0.25 / lb

Payment to the processing facility processing and sales \$0.25 / lb.

Given this rough assessment, we need to sell our finished product for a minimum of \$0.65 / lb. At this time, IQF sliced strawberries are selling on the market for \$0.67 / lb, although pricing can be quite variable over the season.

From the grower scenario, with an average loss volume of 1500 – 3000 lb / acre, a grower return could be from \$300 - \$600 / acre, with no additional inputs.

New Company opportunity

Recovering Strawberries from the Field

Strawberry growers in Wisconsin are typically pick-your-own and do not have process harvest equipment for an end-of-season cleanup harvest. And given the small size of the operations, it is most likely not economical for a grower to invest time and effort in manufacturing harvest equipment and hiring temporary labor. There is really only one option available at this time for harvesting strawberries.

I envision that a strawberry harvesting company is started that will do nothing but process harvest for growers at the end of their season. This company works with a processor to establish a set price for the fruit and then establishes a set payment price to the grower. The company will travel from farm to farm throughout the strawberry harvest season and pick the fruit, and deliver it to the process facility. The company will be such a size that they can work in an area that has a concentrated volume of strawberries to minimize travel. And with a larger acreage for harvest, they can get larger equipment to rapidly harvest the fruit needed by the process facility.

In this scenario, the grower has no process harvest responsibility, except for a contractual arrangement by the strawberry harvesting company. The processor will work with this company to ensure that the berry quality is acceptable, and then purchase the fruit. It would be extremely valuable to have an existing strawberry grower start this company since they are familiar with strawberry culture.

Project Title: **Finding New Market Opportunities for Strawberries**

APPENDIX A

Progress Report: March 15, 2006

In the first part of this project we worked to identify market opportunities for small fruits such as strawberries, blueberries, and cherries. We found a small but significant niche in wineries, small canneries, and bakeries right here in Wisconsin. Several companies bought a small volume of Wisconsin fruit, but most of it was purchased through distribution channels, with a majority originating from the west coast. In January and February we focused our efforts to identify valid niche opportunities for Wisconsin crops. We found that the cost of products from the west coast were also very inexpensive, due to cheap labor, but also that the product lacked character, consistency, and local flavor.

We identified four different types of products that have appeal to commercial users of Wisconsin fruit products:

1. Sliced / sugared
2. Puree; Standard or slightly concentrated
3. Juice
4. Powdered

Sliced Fruit: We found that several wineries purchase their strawberries IQF and sliced, usually combined with sugar 4:1. The strawberries are capped and frozen quickly (IQF: Individual quick freeze) then sliced. The sliced fruit is placed in a plastic bucket with a ratio of 4 lb. strawberries and 1 lb. sugar. The product is then frozen and remains frozen until thawed for use in the winemaking process. Several bakeries also purchase fruit in the same units of measure.

Puree: Puree is produced by grinding up the entire fruit and squeezing it through a very fine sieve, producing a consistency of a 'Smoothie'. Depending on the size of sieve screen, the puree can have varying amounts of 'pulp'. Puree is sold based on weight, but there is also a standard sugar content, brix. Fruit converted to a puree with nothing removed is considered a 'standard' puree. This same puree can then be pumped through a reverse osmosis unit, driving off some water and increasing the thickness and the brix level. It is common for a puree to double its brix content and be sold as a concentrated puree.

Juice: Those industrial customers that produce natural fruit juice drinks are very interested in Wisconsin juices. Most wanted the juice pasteurized and concentrated to ensure safety and reduce shipping cost, but most also conceded that these two actions reduced the flavor profile and quality of the juice. Given a local supplier for natural juices, shipping costs could be minimized and additional value could be achieved by the customer with a higher quality product.

Powdered: We found that several health bar manufacturers like to have their fruits in the form of concentrated puree or powder. Powdered fruits seem to be a market that may conform well to our type of product reception.

Marketing Dilema. When contacting these companies, they immediately asked for samples and pricing. Neither of these two requirements can be achieved without a facility to run the product. With none to be found we decided to expand our pilot plant from one particular item to as many of the four items as financially possible. We decided to invest in a puree system since purees are the first step and can easily be converted to powders or even juice. Over the continuation of this project to a pilot run in June, we will define as many opportunities as possible around our state to create these products for further market testing.

Build a pilot plant.

From early January through March we have been buying and rebuilding equipment to use to demonstrate the feasibility of these niche products. We have found no facilities that can be used to make small runs of our niche products. I realized in the marketing research that none of these products are similar or inter-changeable. For example, a company that utilizes puree cannot substitute juice or powder. None of the markets in Wisconsin were huge, but they were indeed markets, and I feel have a lot of potential.

Puree: We purchased a grinder and puree machine that is capable of producing up to 20tons/hr of puree from small fruits such as strawberries. The unit is in the initial stages of product testing and will be ready for full-scale use this Spring. At this time we have not yet purchased a reverse osmosis unit to increase brix levels, but that piece of equipment is currently being actively sought. A pasteurizer is being rented from a North Carolina company and will be shipped on site within the next two weeks for installation and initial testing.

Sliced fruit: We have recently acquired a slicer / dicer for use in this project. The slicer can process up to 5,000 lb per hour of strawberries or other small fruit. Within the next week we may successfully purchase an IQF machine to freeze the strawberries. We already have the vacuum dewatering unit and singulator to accompany an IQF machine. If we cannot purchase an IQF machine, we will rent line time during the pilot project in Beaver Dam, to run the batch.

Juice: At this time we have not found a location to make fresh juice. We will attempt to find a small juicer somewhere in the state who can help us with this pilot project, given the demand is there for juice. We have placed a bid on an entire juicing line but have not received word of an acceptance of our bid. Most of the juicing operations in and around Wisconsin, process about 500,000 lb of fruit per 8 hr shift, which is too large for our scope of work.

Powder. We can contract with a company to produce powder from our puree for a set fee. Since this is a the smallest niche opportunity, we do not plan to invest heavily into this technology.

Development of business financials

At this time we have begun to put together financials for processing, transportation, marketing, and sales. Until we run a pilot project, develop an appreciable volume of product, and attempt to sell this product, we cannot get accurate with our numbers. We feel that there is an incredible marketing opportunity for Wisconsin small fruits. Customers realize the flavor and quality of locally grown fruit (just bite into a tasteless California strawberry or tomato). We have collected pricing from the large suppliers along the coast, but we feel that there is more value and price in a locally grown product. Several customers were intrigued with an opportunity to label their product as Wisconsin-grown. We cannot yet establish a value for this niche product but see opportunity for a larger marketing campaign in the state.