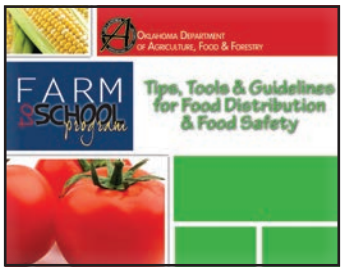
2009 Annual Report



A collection of 2009 accomplishments and highlights for Oklahoma State University's Robert M. Kerr Food & Agricultural Products Center.

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FAPC Director
J. Roy Escoubas

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Communications Services

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FAPC Communications
Graduate Assistant

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of $2,793 for 700 copies. 0210 MHG.

Message to our Stakeholders

The Robert M. Kerr Food & Agricultural Products Center (FAPC) is a research, product development, business and marketing, and technical assistance resource for the food and agribusiness industries in Oklahoma. This 96,000-square-feet stand-alone facility has animal harvesting, food manufacturing, sensory profiling, food microbiology, and analytical laboratory facilities. The FAPC has conference facilities and applications laboratories for demonstration and prototype testing.

It truly is a state-of-the-art facility and is available to help you.

The FAPC has moved into its second decade of service to Oklahoma with 12 years of service. The FAPC has continued to contribute significantly to the Oklahoma economy, and the continuing impacts following the 10-year economic impact study has demonstrated the number of jobs in those companies assisted by the FAPC increased by 180 jobs and the annual sales revenue increased by $217 million.

In this reporting year, the FAPC operated with 10 faculty members, 13 professional staff members, 5 clerical staff members, and 7 technical staff members. The FAPC is proud of the diversity profiles of its faculty and staff, having 60 percent of its employees listed as "diverse" by the Oklahoma State University official Diversity Ledger.

The economic impacts made by the FAPC were due to the hard work of its faculty and staff in value-added processing in all food-processing sectors of Oklahoma. Food processing support by the FAPC was primarily made in food processing engineering, food microbiology, food sensory analysis, food harvest and processing technology, total quality management, communications and media support, and finally, marketing and business management.

The FAPC has an Industry Advisory Committee appointed by agencies of the state of Oklahoma and meets with the FAPC twice per year. This team of industry executives provides oversight and leadership in activities and programs of the FAPC. This committee gives the FAPC a strong industry linkage to ensure programs and services are useful, effective, and the FAPC is accountable for its resources. The FAPC is truly grateful for the work and contributions of the Industry Advisory Committee.

Photo by Todd Johnson

This year, the chair of the committee is Mr. John Williams (president, Chef's Requested Foods Inc., Oklahoma City, Oklahoma), the vice chair is Mr. David Howard (president and CEO, Unitherm Food Systems, Bristow, Oklahoma), and secretary is Mr. Paul Schatte (general manager and co-owner, Head Country Foods, Ponca City, Oklahoma). The immediate past Chair was Mr. John Griffin (owner, president, and CEO, Griffin Foods and Griffin Holdings Inc., Muskogee, Oklahoma).

The retail and food service consumer base is driving current trends in Oklahoma and across America in food processing and food marketing. These trends include food safety, food quality and locally grown foods, sustainability, convenience, and cost. These consumer demands continue to create opportunity for food processors and food ingredient and equipment suppliers in Oklahoma. Oklahoma is positioned well geographically, and the food industry continues to make solid growth. The FAPC is prepared and ready to assist the Oklahoma food processing and agribusiness industries to realize the growth that is available to them. Contact us and allow us to help you grow.

While the FAPC worked hard to meet the needs of the Oklahoma food industry, it lost a true pioneer, colleague, and friend. Dr. Stanley E. Gilliland lost a very short fight with cancer, but left a strong and long lasting legacy of accomplishments for the food industry. All of his family, colleagues, and friends were very saddened by his passing, but we have a vivid memory of his contributions. During this year, we will be publishing notes about his contributions to teaching, research, and outreach. Be watching for these notes.

Dr. J. Roy Escoubas
FAPC Director

About the FAPC

The purpose of the FAPC is to help develop successful value-added enterprises in Oklahoma; to bring the products, the jobs, and the dollars back home. The FAPC bridges the gap that sometimes exists between academics and the private sector by offering large and small businesses, producers, and entrepreneurs access to faculty and staff with expertise in business and technical disciplines. The FAPC also offers pilot processing facilities, research laboratories, and outstanding educational programs.

Photo by Mandy Gross

Industry Advisory Committee

The Oklahoma State Legislature established the Industry Advisory Committee to serve as an advisory board for the FAPC. The 16-member committee is composed of Oklahoma agricultural and business leaders, and they are appointed by the highest positions of the Oklahoma state government. The committee assists, counsels, and gives leadership to the FAPC.

Members of the 2009-2010 Industry Advisory Committee include (front row) David Howard, Unitherm Food Systems (IAC Vice Chair); Charles Nichols Davison & Sons Cattle Company; John Williams, Chef's Requested Foods (IAC Chair); Jill Stichler, Redland Juice Company; John Griffin, Griffin Food Company; Jay Cowart, Plains Cotton Cooperative Association; (back row) Roy Escoubas, FAPC; Gary Conkling, Producers Cooperative Oil Mill; Gary Crane, Ralph's Packing Company; David McLaughlin, Advance Food Company; Paul Schatte, Head Country Bar-B-Q (IAC Secretary); Rodger Kerr, Southwest Technology Center; and Bill Wiley, Oklahoma Refrigerated Services. Not pictured are Danny Dupree, Bar-S Food Company; Virgil Jurgensmeyer, J-M Farms; Tommy Kramer, Durant Industrial Authority; and Robert Whitson, OSU's Division of Agricultural Sciences and Natural Resources.

Foundation Focus

The FAPC Foundation Focus Program is designed to enable the center to accomplish its mission with increased financial support from private donors. With these funds, the FAPC is able to focus on delivering even greater economic impact to Oklahoma as it continues to serve the state's value-added agricultural industry. The FAPC would like to recognize the following 2009 donors:

3M Microbiology
Paloma Cuesta Alonso
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Yahmed Arocho
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Jen Bailes
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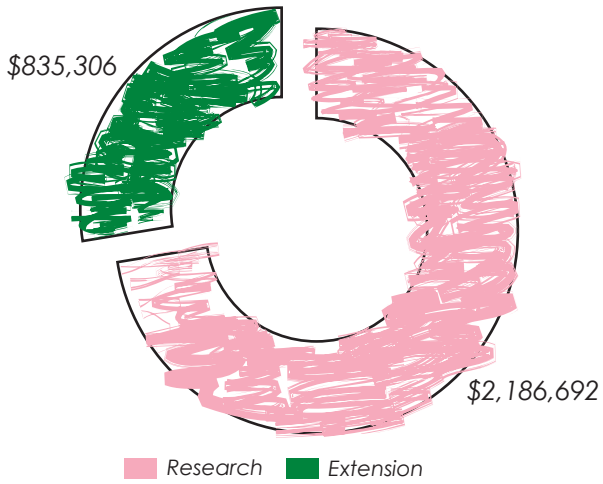
Aihua Su
Zachary Trask
Unitherm Food Systems
Lyndsey Vaughn
Vinyard Fruit & Vegetable Company
Warren Voshall
Meizhen Xie
Windsors Foods
Chuck and Susan Willoughby
Jason Young
Yan Zhu

Working Funds	**$3,220,289**
State Sourced	$3,021,998
Fee-Based Sourced	$ 198,291
State-Sourced Funds	**$3,021,998**
Research	$2,186,692
Extension	$ 835,306
Fee-Based Funds	**$ 198,291**
Conference & Training Accounts	$ 41,538
Small Projects & Applied Development Accounts	$ 42,958
Pilot Plant Processing Accounts	$ 113,795
Grants & Contract Research Funding	**$ 613,715**
Total Available Funds	**$3,834,004**
State-Sourced Funds	$3,021,998
Fee-Based Funds	$ 198,291
Grants & Contracts Funds	$ 613,715

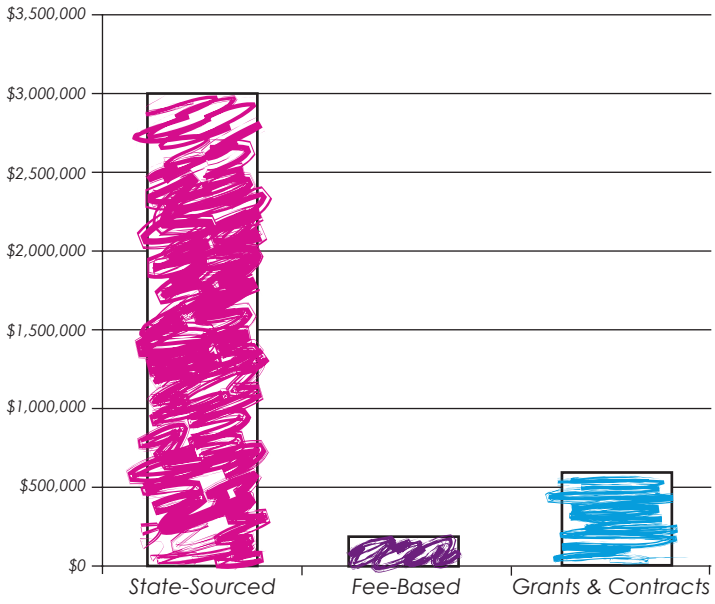
Description of Funds	
State-Sourced Funds	79%
Fee-Based Funds	5%
Grant & Contract Funds	16%
Disposition of Funded Activities	
Research & Product Development	72%
Outreach Activities	28%
Disposition of Budgeted Resources	
Salaries & Benefits	91%
Maintenance, Operational, & Facility	8%
Small Projects & Market Development	1%
Description of Fee-Based Funds	
Conferences & Training Programs	21%
Pilot Plant Processing Programs	57%
Small Projects & Applied Development Projects	22%

Foundation Focus	**$ 28,847**
Endowed & Non-Endowed Gifts	$ 26,831
In-Kind Gifts	$ 2,016

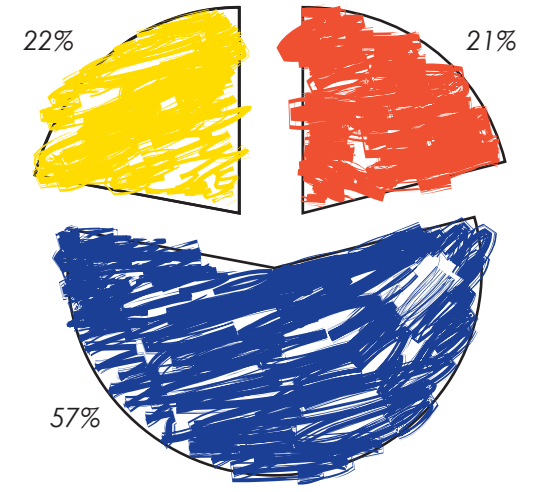
State-Sourced Funds



Total Available Funds



Description of Fee-Based Funds



FARM to SCHOOL program

Objective

The primary objective of this program was to identify distribution possibilities for getting locally grown produce marketed through the Farm-to-School (FTS) program.

Approach

To determine demand potential for FTS, Oklahoma school districts were surveyed to determine their past or present participation in the FTS program, obtain information on their school nutrition programs (including overall budgets and allocations for fresh produce), ascertain their fresh produce purchasing habits and policies, and to identify the distributors they use to obtain fresh fruits and vegetables. A logistic model was used to predict the impacts of school district characteristics on the probability of program participation.

To assist producers in determining the economic feasibility of becoming a FTS supplier, a transportation cost template was developed in a Microsoft® Excel® spreadsheet. The template allows producers to examine different distribution options: direct delivery to the school(s) as an individual or as a cooperative effort, delivery and sale to a distributor, or direct delivery to the school using a contracted delivery service. The template calculates delivery vehicle operating costs per mile, costs per trip, distribution costs per unit of produce, and the farm gate margin. This template, along with other helpful hints, "how to" information, food safety protocol, and helpful tools, were combined and published as a FTS instruction manual.

Benefits

The resulting manual will provide information to help farmers, FTS program administrators, food distributors, and school districts identify their potential for FTS participation. The manual walks interested parties through the steps each should take to meet food safety protocol, work with the other members of the FTS food marketing chain, and assess the economics of participating in the FTS program.

Economic Impact

Economic impacts are yet to be determined, but the emphasis on marketing Oklahoma-grown fruits and vegetables is expected to have some statewide benefits. Economic impacts may be observed in the returns to farmers participating in the FTS program and increased food marketing opportunities and handling revenue for Oklahoma food service distributors. In addition to economic impacts, the FTS program hopes to promote healthy eating habits by encouraging Oklahoma school children to consume more fresh fruits and vegetables.

Continuing Work

The project is completed, and the FTS manual debuted in January 2010.

Publications

One master's thesis, Oklahoma Farm-to-School Economic Viability and Efficiency, was completed from this project, and one FTS manual, Tips, Tools, & Guidelines for Food Distribution & Food Safety.

Funding

The project was funded by the U.S. Department of Agriculture through a Federal-State Market Initiative Program (FSMIP) grant and by support from the Charles Browning Endowment at the FAPC.

Collaborators

Dr. Rodney Holcomb, FAPC agricultural economist, was the principal investigator for this project. Other collaborators included Chris Kirby, FTS program coordinator, and Rick Maloney Market Development Division director for the Oklahoma Department of Agriculture, Food, and Forestry; Dr. William McGlynn, FAPC horticultural products processing specialist; Dr. Lynn Brandenberger, Extension horticulture specialist for OSU's department of horticulture and landscape architecture; Brooke Clay, FAPC communications graduate assistant and Mandy Gross, FAPC communications services manager.

Photo by Todd Johnson

Analytical Services receives national accreditation

Objective

The objective of this project was to create and implement a Quality Management System for the FAPC Analytical Services, resulting in accreditation in accordance with the recognized International Standards ISO/IEC 17025:2005 General Requirements for the Competency of Testing Laboratories, thus allowing Analytical Services to best serve Oklahoma food industry clients.

Approach

In order to seek ISO/IEC 17025:2005 Accreditation, the Analytical Services created and implemented a Quality Management System that met every requirement of C204 - Specific Checklist - Combined ISO-IEC 17025 and Food and Pharmaceutical Testing Laboratory Accreditation Program. This checklist included the ISO 17025 requirements, along with the specific AOAC requirements for food testing laboratories.

The Quality Management System included a detailed quality manual, 40 standard operating procedures, 10 test methods, and numerous forms, outlines, and binders allowing the FAPC Analytical Services team to strictly monitor and control every aspect of the system as well as laboratory operations.

Following the creation and implementation of the system, Analytical Services completed the lengthy application for accreditation and began preparing for the initial assessment by perfecting all aspects of the Quality Management System by searching for deficiencies and maintaining records as evidence that the system was being followed.

Following the initial accreditation assessment, Analytical Services responded to the audit deficiencies by revising documents, generating records, writing reports, and various other activities.

The Analytical Services will undergo the one-year follow-up assessment while continuously performing all of the actions required by ISO including audits, meetings, proficiency testing, instrument checks, document revisions, and training.

Benefits

When analyzing products in an accredited lab, clients have the assurance of the high quality of service, which allows customers to advertise and market their product with additional confidence.

Economic Impact

Advertising product analysis performed by an accredited lab offers an opportunity for more competitiveness in the market, which enhances the positive effect on business.

Continuing Work

The Quality Management System is a living document, which means implementation and continuous improvement. For example, the FAPC Analytical Services Laboratory will continue with participation in the proficiency-testing program, perform annual internal audits, and complete the analytical services one-year follow-up assessment from the American Association for Laboratory Accreditation.

Publications

A news release and FAPC Flash were disseminated following the accreditation.

Funding

The FAPC provided funding for this project.

Collaborators

Dr. Guadalupe Davila - El Rassi, FAPC analytical services manager, was the principle investigator on this project. Other collaborators included Angie Lathrop, FAPC senior research specialist; Dr. Veneta Banskalieva, FAPC senior research specialist; Eechin Ng, FAPC graduate student; Jason Young, FAPC quality management specialist; and Reneé Nelson, FAPC milling and baking specialist.

To view the accreditation certificate and scope of the accreditation visit www.a2la.org/scopepdf/2790-01.pdf.

Basic Training

The first step on a path to success

Objective

The objective of the Basic Training Workshop is to provide potential food business entrepreneurs with a basic understanding of what it takes to start a food business. It is the first step on a path of success for the few who choose to proceed.

Approach

The need for a program reaching out to potential food business entrepreneurs was realized early in FAPC's history. Frequently, entrepreneurs with similar questions and needs would call or visit the center. While many issues could be addressed by the FAPC, some issues needed to be addressed by other agencies, such as the Health Department, Patent & Trademark Library, etc. A team from the FAPC led by Dr. Rodney Holcomb began formulating an outline based on the most common basic needs expressed by clients.

Representatives from other agencies were recruited to be a part of the training staff. Having these agency experts committed to being a part of this program is a major reason this program is unique from any other entrepreneurial program offered at other universities. Additionally, these representatives live their respective topic on a daily basis and add credibility to the curriculum being covered.

Benefits

Potential benefits include more Made In Oklahoma options for consumers and graduates with a better chance of succeeding than those entrepreneurs who have not had training like this. The untold story is the number of graduates who do not pursue a new food enterprise and avoid unnecessary risk in an already highly competitive industry. Basic Training graduates, therefore, are able to make a more informed decision.

Economic Impact

From July 1999 to November 2009, 882 people have attended Basic Training. Of these, 81 have started a new business. Many of the start-ups utilize the services of co-packers, thus, employment in small food manufacturing firms is somewhat sustained.

Continuing Work

The workshop continues to be a success and is scheduled for February, April, June, August, and October of 2010.

Publications

Basic Training has been recognized in many facets. It won the Oklahoma Cooperative Extension Service Outstanding Group Award in 2007. Also, Chuck Willoughby presents a workshop titled Blueprints for Economic Development and a FAPC Flash has been distributed.

Funding

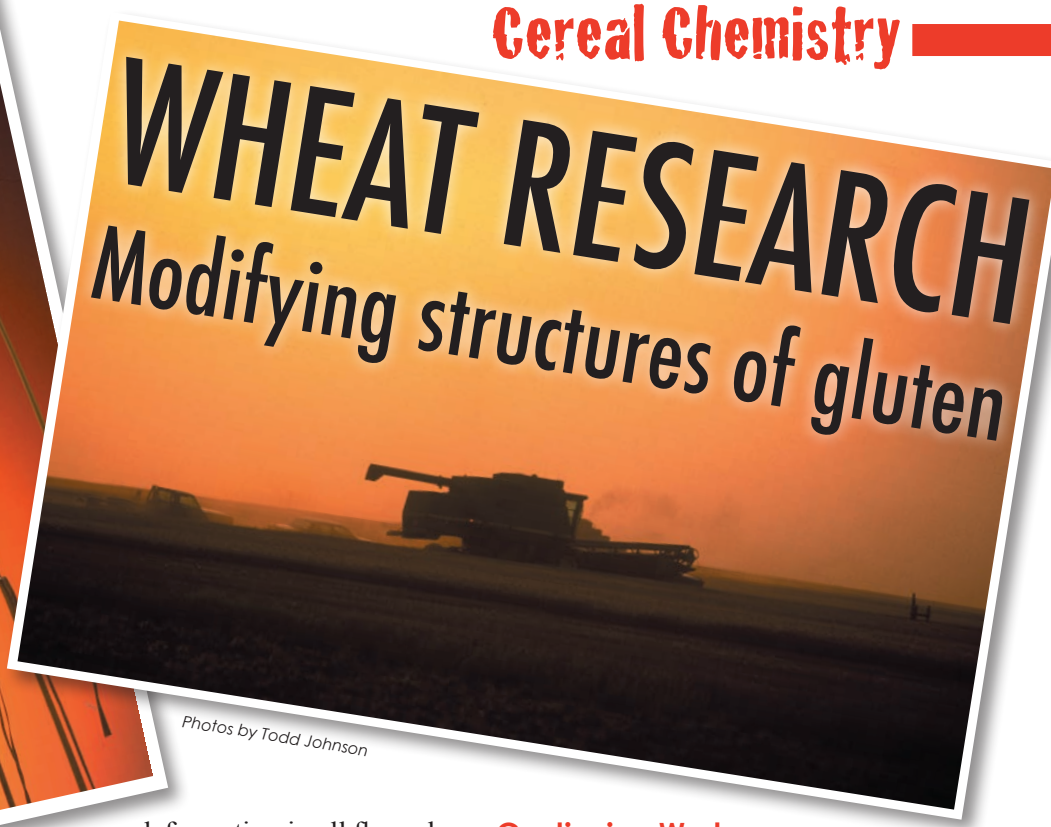
The workshop is funded by participant registration.

Collaborators

This project requires the hard work of many individuals from varying specialties. Collaborators include Chuck Willoughby, FAPC business and marketing relations manager; Jim Brooks, FAPC business and marketing services manager; Andrea Graves, FAPC business and marketing specialist; Erin Early-Johnson, FAPC business/marketing client coordinator; Rodney Holcomb, FAPC agribusiness economist; Glenn Muske, Family and Consumer Sciences home/micro-business specialist; Suzanne Reinman, OSU Patent & Trademark librarian; Mike Rockey, Oklahoma City-County Health Department senior environmental specialist; Tyler Hicks, Oklahoma Department of Agriculture, Food, and Forestry – Weights & Measures State Program administrator; Julie Fitzgerald, ODAFF Market Development State Program coordinator; and Karen Smith, FAPC conference coordinator.

WHEAT RESEARCH

Modifying structures of gluten



Photos by Todd Johnson

Objective

The objective of this project was to quantify the effect of changes in surface tension and oxidative state on the visco-elastic (small verses large deformation) properties of gluten extracted from commercial hard red winter wheat flours containing different protein content and protein quality.

Approach

This study involved changes in surface tension and the oxidation state of isolated gluten and the effect of such changes in the visco-elastic properties of gluten. Three levels of surface tension modifications and four oxidative states were obtained with an emulsifier (diacetyl tartaric acid ester of monoglycerides, DATEM) and ascorbic acid treatments, respectively.

Six commercial hard red winter wheat flours with different protein quantity and quality were used. The gluten was isolated from the flours and their visco-elastic properties were analyzed by two methods using small and large deformations. The levels of surface tension modifications used decreased the compliance of small deformation in all flours by 31 to 50 percent, strengthening the gluten.

While the decrease in small deformation compliance of gluten with modifications in their oxidative state was lower (19 to 35 percent) and observed in a reduced number of samples, changes in surface tension modifications showed significant increase in specific volume (density) of loaves at all levels of DATEM and flours ranging from 12 to 23 percent. The results of this study suggest that changes in surface tension were more effective in increasing the elastic response of gluten compared to the oxidative changes.

Benefits

The direct comparison of the changes in gluten protein will allow the baking industry to use treatments more efficiently and selectively, depending on changes needed for specific product demands. This will translate into input (ingredients) savings.

Economic Impact

The economic impact will be the use of more quantitative amounts of modifiers to obtain a desired change in gluten quality performance, which translates into production cost savings.

Continuing Work

Protein solubility is affected when changes in surface tension and oxidation state of gluten occurred. FAPC specialists are interested in the insoluble gluten fraction, which is important in the quality of baked yeast-leavened products. The change in amount and molecular size of the monomeric and polymeric gluten protein fractions associated with changes in surface tension and oxidation state of gluten are being quantified and recorded.

Publications

One Ph.D. dissertation was written, one presentation was given at the AACC International Annual Meeting, and an article was published in Cereal Foods World 2009.

Funding

The Oklahoma Wheat Research Foundation funded this project.

Collaborators

Dr. Patricia Rayas, FAPC cereal chemist, was the principle investigator. Collaborators included Amogh Ambardekar and Sengwooi Lim, doctoral graduate students; Palgunan Kalyanaraman, FAPC wheat research specialist; and Dr. Steven Mulvaney, Cornell University.

using social media to promote the fapc

Objective

The objective of this project was to develop a "virtual community" of fans, followers, and members to disseminate news, events, and videos to promote the FAPC. Using social media as a mean of distribution is in addition to what the center is already currently doing to market itself. The FAPC is using Facebook, Twitter, LinkedIn, and YouTube to develop this "virtual community."

Approach

The new world of social networking provides opportunities for everyone to remain informed about ongoing FAPC projects, events, news, and publications. Statistics from Nielsen Online show that by the end of 2008, social networking had overtaken e-mail in terms of worldwide reach. According to the study, 66.8 percent of Internet users across the globe accessed "member communities" last year, compared to 65.1 percent for e-mail.

The FAPC joined Facebook, Twitter, LinkedIn, and YouTube as a way to further promote the FAPC and to listen and engage with the clients who are connecting with the FAPC on these social media sites. The FAPC hopes to connect with these clients instead of generating "buzz" by following four steps: 1) Listen, 2) Share, 3) Build Relationships, and 4) Repeat Steps 1, 2, and 3.

Benefits

Not only does having a presence on the social media sites benefit the FAPC, but it also benefits those who are connecting with the FAPC. More people are learning about the center through the promotion on the social media sites; however, clients who are connecting with the FAPC on these sites are receiving information that will help them with their food and agricultural products businesses.

Economic Impact

The purpose of the FAPC is to help develop successful value-added enterprises in Oklahoma - to bring the products, the jobs, and the dollars back home. The FAPC is reaching a new audience through the social media outlets; which in turn, will attract new clients to the FAPC, including start-up businesses. The center can help these new businesses get started in industry, which could lead to more products and more jobs in Oklahoma.

Continuing Work

The FAPC will continue to post news releases, articles, projects, upcoming events, videos, etc. through social networking and increase fans (Facebook), followers (Twitter), members (LinkedIn) and subscriptions (YouTube) through social media.

Publications

No specific publications have resulted because of this project; however, a report was created for FAPC faculty and staff and the FAPC Industry Advisory Committee to keep them up-to-date on the status of the social media efforts.

Funding

FAPC provided funding for this project.

Collaborators

Mandy Gross, FAPC manager of communications services, was the primary investigator for this project. Stacy Patton-Pearce and Brooke Clay, former communications graduate assistants, assisted in the project.

Working with dehydrated pork stock

Objective

The objective of this project was to determine the impact of Proliant Inc. dehydrated pork stock (DPS) protein on purge when injected into center-cut pork loin.

Approach

DPS was evaluated for its ability to improve the retention of water in salt (NaCl) injected pork loins. Two brines were prepared: one contained only 3 percent NaCl in cold water while the other contained 3 percent NaCl and 3.6 percent DPS in cold water. Both brines were brought to a final temperature of less than 36 degrees Fahrenheit prior to injection.

In order to strengthen comparisons and to minimize the effect of animal-to-animal variability, this experiment was conducted on 6 paired pork loins. To ensure left or right sidedness did not confound the results, each injection treatment had equal numbers of left and right sides from the pairs. Loins were injected with the assigned brine.

Cutting of loins into chops was initiated 30 minutes after they were injected. Then, each chop was placed in a tray and over wrapped with Omni-Film stretch film (18 inch Pliant Corp., Schaumburg, Illinois). Trays were placed in a cold room at 4 degrees Celsius (39.2 degrees Fahrenheit) under fluorescent lights for 6 days to mimic retail conditions.

Loins were evaluated for the amount of brine retained 0 minutes and 30 minutes after injection. Purge was evaluated in randomly selected chops each day they were in retail case storage. Cook loss was measured on day 6 of retail case storage.

The average loin weight after injection for both treatments was 7 pounds. Loins injected with just salt brine lost 2.4 percent weight within the first 30 minutes. However, the loins injected with the brine containing both salt and DPS only lost 0.77 percent weight. These differences were determined to be statistically significant. Once chops were cut, the amount of brine purged from the chop over time did not differ as a result of the type of brine injection treatment the loin received. There was also no difference in the cook loss measured at day 6.

Benefits

This study demonstrated that significant improvements in brine retention can be made by adding DPS to a NaCl-based brine.

The Centers for Disease Control made recent announcements that 70 percent of all Americans will likely suffer from hypertension (a significant contributor to cardiovascular diseases) at some point in their lifetime. Of all diseases, hypertension and cardiovascular disease, because they are chronic conditions, contribute the highest economic burden in the U.S.

These results provide processors a viable option for significantly reducing the amount of sodium being added to injected pork products.

Economic Impact

This study demonstrated that DPS can be added to improve performance of salt-based brines and reduce yield. Current retail prices for center cut boneless chops are $3.25/pound. The yield losses seen in this study would equate to about $0.05/pound.

This does not, however, take into account the cost differential associated with replacing a phosphate-based ingredient with DPS to the brine. In order to calculate this, the difference, with respect to purge and shelf-life/quality, in salt brines containing phosphate and those containing salt and DPS, which was not considered in this study, would have to be known.

However, processors may find in the future the pressure to reduce sodium in their products may significantly influence the cost/benefit evaluation of ingredients in injection brines.

Continuing Work

In the area of meat functionality, the FAPC Food Chemistry Laboratory is continuing to look at altering brine conditions to reduce sodium content of brine injected meats.

Publications

A final report was sent to Proliant Meat Ingredients Inc.

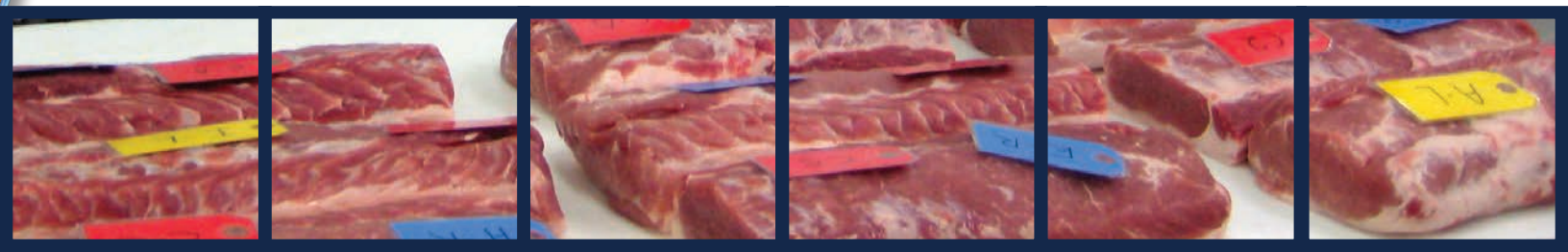
Funding

Proliant Meat Ingredients Inc. provided the funding for this project.

Collaborators

Dr. Christina DeWitt, FAPC food chemist, was the principal investigator for this project. Other collaborators included Lin Koh, FAPC food chemistry research specialist; Proliant Meat Ingredients Inc.; and Seaboard Foods Corp.

Photo by Dave Palkovic, Proliant Inc.



Photos by Mandy Gross

THE REVELATION

A revolutionary new coffee bean roaster

Objective

The objective of this project is to optimize and improve the energy saving features of the Revelation coffee roaster, manufactured by Roasters Exchange in Oklahoma City. A minimum of a 40 percent improvement over competitive units and 100 percent improvement over competitive units that utilize an afterburner to reduce air emissions experimentally will certify the energy efficiency of the Revelation coffee roaster compared to competitor units for advertising and marketing. Coffee roasted in the Revelation coffee roaster will be tested and compare to coffee roasted in competing equipment using sensory testing methods and in-home taste testing. Furthermore, a safety analysis of the Revelation coffee roasting system will be conducted and required improvements will be identified and implemented. Finally, project collaborators will develop a worldwide marketing and sales campaign for the Revelation coffee roasting system designed to reach all of the Americas and the top 25 wealthy European and Asian coffee-consuming countries.

Approach

Use of air-to-air heat exchangers will be explored to improve waste heat recovery and system operation. The test standard CSA 4391 (Standard Laboratory Methods of Test for Rating the Performance of Heat/Energy-Recovery Ventilators) will be used as a model for efficiency tests.

New burners, burner controls, and oxygen and fuel sensors will be incorporated into the process/control scheme, combined with the heat recovery system, and tested to improve lean burning efficiency to produce a reduced oxygen environment that is favorable for roasting. New air flow control valves will be added to the system. Improved air flow control and measurement are essential for more precise control of the roaster, which will result in increased product quality and efficiency of operation.

Efficiency of the catalytic unit will be tested to optimize the catalyst, its operating temperature, and gas flow parameters. Catalyst performance will determine by estimating cost effectiveness and measuring particle emissions, gas flow, gas composition, system temperature, and fouling.

Coffee brewed by beans processed in the Revelation coffee roaster will be tasted and compared with coffee brewed from beans roasted in competing equipment. Coffee testing methods will follow existing international standards. A third-party firm specializing in coffee testing will be hired to serve as independent testers and to help develop test protocols. In-home testing methods also may be used to evaluate coffee. Roasted beans will be bagged and delivered to homes for brewing and evaluation. Each bag will be delivered with instructions, a data sheet, and a return envelope. Feedback from in-home evaluations is important, since individual coffee brewing machines and household water supplies vary greatly and may have a significant effect on perceived coffee quality and flavor.

Benefits

This project will benefit consumers by providing an improved, more sustainable product at lower cost. It also will lower cost of processing coffee beans, increase coffee roasting quality and safety, and reduce air pollution and energy costs. This project also can provide new equipment that could be used to roast/dry other food and agricultural products.

Economic Impact

This project will create 15 to 25 new manufacturing jobs in Oklahoma, producing high efficiency coffee roasters and adding $1.5 million increased revenue for an Oklahoma business per year.

Continuing Work

The two-year project is just getting underway with a start date of October 1, 2009.

Publications

An FAPC Flash and a news release announcing the OCAST award and the initiation of the project were published.

Funding

This project is funded by an OCAST matching grant for $209,833. Overall project budget (including contributions from the corporate sponsor) is $422,233.

Collaborators

Dr. Tim Bowser, FAPC food process engineer, is the principle investigator on this project. Collaborators from Roasters Exchange include Dan Jolliff, president; Camron Jolliff, project coordinator; Barbara Woods, office manager; and seven staff persons in engineering, drafting, and shop departments. Other collaborators include R. Scott Frazier, biosystems and agricultural engineering assistant professor; Andrew Brown, BAE graduate student; Darren Scott, FAPC food scientist/sensory specialist; Andrea Graves, FAPC business planning and marketing specialist; Mandy Gross, FAPC communications services manager; and an FAPC communications graduate student.

HOT Diggity DOG

Validation study helps hotdog manufacturer in Oklahoma

Objective

The objective was to provide validated proof that a process used by an Oklahoma hotdog manufacturer was providing sufficient lethality of *Listeria monocytogenes* to be considered as a "post-process lethality step."

Approach

The FAPC Microbiology Laboratory performed in-house thermal processing of inoculated product simulating the commercial process.

Benefits

This project includes several benefits. First, the company benefited from the project because FAPC was able to provide proof that the manufacturer's current process was indeed a "post-process lethality step," which prevented USDA-FSIS from closing the plant and product not being sold. Also, in addition to the current commercial conditions, the FAPC tested additional conditions, including lower temperature and less processing time, and determined that lower processing conditions than the company was currently using would still be effective in reducing *L. monocytogenes*. Finally, consumers would benefit from this project because the lower processing conditions also improve the quality of the product while still maintaining safety, based on the validation trials.

Economic Impact

The identification of lower processing conditions that the manufacturer could use will lead to savings for the company. The FAPC helped identify that both a shorter processing time and lower temperatures would still provide a "post-process pasteurization," which in turn will save the company money.

Continuing Work

The project is completed.

Publications

No information has been published; however, a final report was submitted to the manufacturer.

Funding

Sigma Processed Meats in Seminole, Oklahoma, funded the project.

Collaborators

Dr. Peter Muriana, FAPC food microbiologist, was the primary investigator for this project. Other collaborators included Jake Nelson, FAPC value-added meat processing specialist, and Jeff Gruntmeir, former FAPC food microbiology research specialist.

WINE ANALYSIS

Photos by Richelle Stafne

determining antioxidant activity in Cabernet franc wine and pomace

Objective

This project was created to determine the antioxidant profile of Cabernet franc wine and pomace (waste skins and seeds) during and after wine making. The overall goal was to evaluate the potential value of antioxidant compounds in pomace, which is a large component of winery waste.

Approach

Cabernet franc wine and pomace, generated by pressing the grapes, were evaluated for antioxidant activity. The pomace was extracted using simplified, rapid extraction methods developed in a previous study in one of the FAPC labs. Measures of antioxidant activity using Oxygen Radical Absorbance Assay (ORAC) were performed and correlated with total phenolic content (TPC). High Performance Liquid Chromatography (HPLC) analysis also was conducted to identify major phenolics present.

The major compounds identified in the wine included gallic acid and epicatechin, with anthocyanins present in smaller amounts. Pomace extracts contained substantial amounts of catechin and epicatechin along with anthocyanins, primarily peonidin 3-O-glucoside and malvidin 3-O-glucoside.

Overall, results showed the Cabernet franc wine and the pomace retained good antioxidant activity throughout the course of the experiment, which correlated well with total phenolics content. The highest antioxidant activity was observed in the acetone extracts, which averaged about 83 µmoles Trolox Equivalents/gram pomace (TE/g). This compared to about 27µmoles TE/milliliter in the wine. Thus, weight for weight the pomace retained about three times the antioxidant activity of the wine. This suggests red grape pomace may be a good source of potentially valuable antioxidant compounds.

Benefits

This project demonstrated a typical red grape waste product contains relatively high levels of potentially high-value antioxidant compounds and a simple, single step extraction process may be used to extract these compounds. This opens the door to creating commercial-scale methods for creating extracts with health-promoting properties from what is now a simple waste product that is discarded by wineries. Thus, it may be possible to extract value from winery waste; therefore, this could provide wineries with an additional source of income. In addition, the pomace extracts could be employed to create safer and healthier foods for all consumers.

Economic Impact

This project has the potential to help wineries reclaim value from a waste stream that is currently a simple expense. Given the typical size of winery operations in this region, it may also help spur the creation of a specialized extraction business that could collect and process pomace from a number of wineries. Thus, this project has the potential to boost winery incomes and create new jobs in a novel, hi-tech business.

Also, there are potential economic benefits from reducing the incidence of oxidation-related diseases, such as heart disease and cancer, but these benefits remain speculative at the moment.

Continuing Work

Work is still underway to calculate extract yields and to characterize and quantify the actual antioxidant compounds present in the extracts.

Publications

One Ph.D. dissertation was published from research on this project.

Funding

Funding was provided from the Oklahoma Agricultural Experiment Station and the FAPC. In-kind support was provided by Oklahoma wineries.

Collaborators

Dr. William McGlynn, FAPC horticultural products processing specialist, was the primary investigator on this project. Other collaborators included Dr. Lynn Brandenberger, department of horticulture and landscape architecture commercial vegetable production specialist; Dr. Niels Maness, department of horticulture and landscape architecture postharvest physiologist; Dr. Christina DeWitt, FAPC food chemist; Yannis Oikonomakos and Lina Ramirez-Lopez, FAPC graduate students; Darren Scott, FAPC food scientist; Richelle Stafne, FAPC research specialist; and Akhila Vasan, food science graduate student.

FAPC helps a new, small-scale poultry processing facility

Objective

The primary objective of this project was to interpret, clarify, and deliver information about regulatory compliance for slaughtering, processing, and selling poultry under the jurisdiction of the United States Department of Agriculture Food Safety Inspection Service (USDA-FSIS) policies and regulations.

Approach

In July 2009, general manager Brian Hostick, who explained a new poultry facility was under construction in the town of Gideon, Oklahoma, contacted the FAPC. At that time, it was anticipated that slaughter could begin within two weeks, and the facility needed to secure a Grant of Inspection from the USDA-FSIS. The urgency of the situation was fully realized when it was learned that not only could slaughter operations begin in two weeks as a function of the construction process, but also that slaughter operations needed to begin as soon as possible because live chickens were already placed in the production (feeding) system. The projected growth and finishing of the chickens was the primary factor in determining the beginning of operations for the new facility.

Accordingly, the FAPC quickly facilitated the beginning of the application process for a Grant of Inspection. Subsequent to the initial inquiry, the FAPC made numerous on-site visits and facilitated teleconferences for the purposes of drafting and placing all regulatory requirements for poultry processing under federal inspection. Operations of the new facility were initiated on September 21, 2009. Subsequent to the start of operations, DARP personnel attended a Basic HACCP Workshop offered by the FAPC in order to receive accredited training in HACCP principles recognized by USDA-FSIS.

Benefits

Currently, the facility is offering whole, frozen or unfrozen carcasses for sale to the public. Additionally, the facility has initiated fabrication procedures and is offering individual cuts and pieces. Product characteristics and sales emphasis is placed towards customers who hold local raising, local processing, and virtues in sustainability as valuable attributes to pursue and support.

The result is a source of locally grown and processed chicken to meet growing consumer demands. Additionally, other growers of chickens in Oklahoma have access to a facility whose processing services are offered. Previously, Oklahoma growers were required to source their processing services out-of-state.

Economic Impact

A conversation with Hostick about the preliminary operations gave some insight on the potential economic impact of this facility.

"I have seen a strong preliminary demand for locally grown and processed poultry, and have also seen an interest from area growers for the private slaughtering services we provide," Hostick said. "I also get the sense that many growers are looking to expand their operations just from knowing we are there to take the long-standing burden of slaughter off their shoulders. So far, as the numbers are concerned, we have grown and slaughtered maybe just over 20,000 birds, selling the majority of them.

"We could easily double that output in the very near future as a reliable/consistent customer base comes together; and then triple that very quickly as our base grows."

Continuing Work

Currently, the facility is operating at full capacity. Processing logistics, product quality, and regulatory assistance continues to be delivered via telephone inquiries and conversations, as part of the normal service modules provided by the FAPC.

Publications

Numerous press releases were distributed following this project, including social media outlets and blogs.

Funding

Technical (regulatory) assistance was funded by the FAPC.

Collaborators

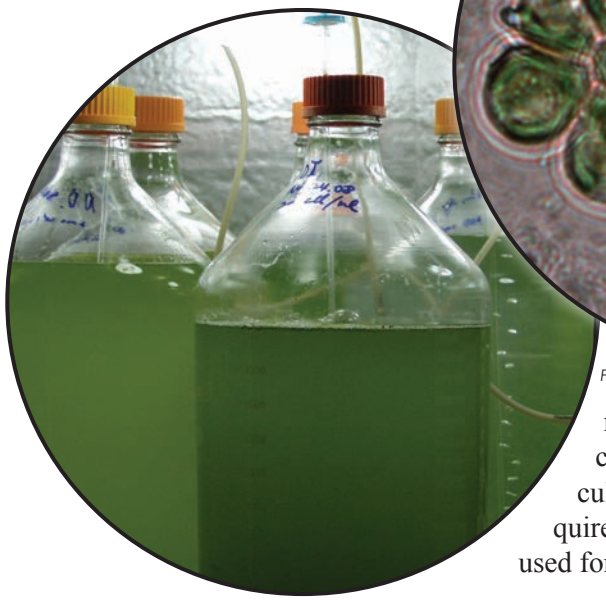
Jake Nelson, FAPC meat processing specialist, was the primary investigator of this project. Other collaborators included Priscila Blois-Amaral, exchange student from Sao Paulo State University, Brazil; Jason Young, FAPC quality management specialist; and Chuck Willoughby, FAPC manager for business and marketing relations.

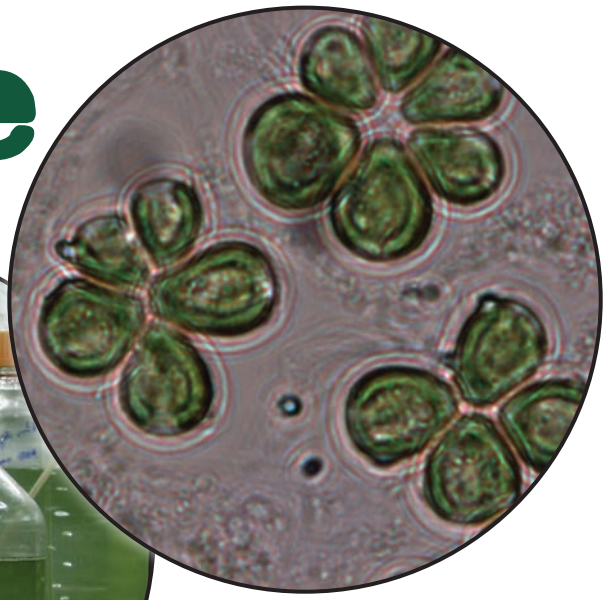
"So far, as the numbers are concerned, we have grown and slaughtered maybe just over 20,000 birds, selling the majority of them."

Brian Hostick
Facility General Manager

microalgae

for product development and oil production





Photos Courtesy of the Oil/Oilseed Chemistry Laboratory

Objective

The main objective of this project is to evaluate microalgae strains isolated from Great Salt Plains, Oklahoma, for their oil and high value chemical accumulation and processing characteristics.

Approach

The algae strains are obtained from UTEX The Culture Collection of Algae at the University of Texas at Austin, Texas. The strains under investigation include Botryococcus *braunii*, Dunalielia *tertiolecta*, and Nannoclopsis *oculata*. The algae strains isolated from Oklahoma, Picochlorum *Oklahomensis* and two Dunaliella sp. (B SP20 and B SP19 also are being characterized.)

The cultures are grown in 10-liter glass bioreactors. Optical density and pH of the samples are monitored and growth curve for each strain is being generated. Biomass concentration (gram dry biomass/Liter), oil content, and composition tests are carried on samples taken from the reactor everyday for four weeks. Oil content and lipid composition (tri, di, monoalcyl glycerides, phospholipids, free fatty acids) and fatty acid composition of the samples are analyzed by using standard analytical techniques. Cell density (number of cells) in culture is determined by direct counting in a hemocytometer. Biomass recovery (harvesting) and pellet formation characteristics of the strains also are being examined.

The data collected from this study will allow us to choose the best strain and growth conditions for scale-up.

Benefits

Microalgae can accumulate a wide range of commercially important products such as oils, sugars, protein, cellulose, and functional bioactive compounds. The potential benefits of microalgae production using wastewater and CO_2 emitted by ethanol production plants and power stations as a carbon source are tremendous.

Microalgae production ponds or closed reactors can be designed for using waste/effluent streams from farms. The integrated operations comprising effluent treatment, biomass production and biofuel conversion offer much better prospects of economic viability than single-purpose cultivation of algae for fuel production. Such operations would benefit the agricultural sector by reducing their reliance on fossil fuels while improving the soil, water, and air quality.

Training future experts, scientists, and engineers in the field is another benefit of this project. The education component of this project targets two groups: graduate and undergraduate students. The knowledge gained from this project will be incorporated into extension workshops and publications. Successful completion of this project will take researchers a step closer to a non-food feedstock source that can be produced on non-agricultural land with less space requirement than today's feedstocks used for biodiesel production.

Economic Impact

The findings of this study could lead to establishment of an algal-biomass based industry that could produce biofuels and high value-added products in Oklahoma.

Continuing Work

A pilot scale photobioreactor will be designed and optimized after the selection of microalgae strains that are acclimated to climate in Oklahoma and accumulate high amounts of oil and other valuable compounds in the biomass. The next step would be the evaluation of viability of a commercial scale microalgae processing facility and conversion of algal oil and biomass to biofuels and other high value products.

Publications

One master's thesis will be published as a result of this study.

Collaborators

Dr. Nurhan Dunford, FAPC oil/oilseed specialist, is the primary investigator on this project. Yan Zhu, FAPC graduate student, is a collaborator.

OKLAHOMA DEPARTMENT OF CORRECTIONS

vegetable processing

Photos by Mandy Gross

Objective

The primary objective of this project was to develop systems for processing vegetables to be grown and processed at the James Crabtree Correctional Center (JCCF) in Helena, Oklahoma, for use in the Department of Correction (DOC) facilities. The end products must be compatible with current kitchen and serving facilities.

Approach

The FAPC was contacted by Agri-Services in early 2009, and a meeting was scheduled to discuss the JCCF's objective of growing, harvesting, and processing vegetables. This pilot program would use mostly existing equipment to determine feasibility, including handling methods, economics, processing alternatives, and end-use scenarios for the finished products.

Products targeted for planting and processing included potatoes, tomatoes, peppers, carrots, beans, melons, onions, and cabbage. Priority was given to develop systems to add value and/or increase shelf life for potatoes and tomatoes. Other products would be utilized "fresh" or processed using conventional blanching and freezing systems for the 2009 season.

Test protocols were developed and evaluated for systems to process potatoes into frozen dices, wedges, and hash brown patties. The goal for tomatoes was to process into juice and package as a "shelf stable" pouch for later use as tomato broth. Processing systems were evaluated and sample products were made using FAPC pilot processing facilities. The hash brown patty was determined to be too complex for the existing equipment and facility, but may be considered later. End products were evaluated by Agri-Services personnel, processing methods outlined, and processing initiated at the JCCF facility growing season.

Benefits

This project will utilize seasonal locally grown vegetable within the DOC system, expand use of the JCCF corn dog processing facility during non-peak periods, and provide additional training options for inmates.

Economic Impact

Improved sustainability through more effective use of Agri-Services resources will be obtained through work with this project.

Continuing Work

The FAPC project objectives for 2009 were completed. Upon final review of actual results/benefits by Agri-Services, objectives for 2010 will be determined.

Funding

Agri-Services and the FAPC provided funding for this project.

Collaborators

David Moe, FAPC pilot plant manager, was the principle investigator for this project. Other collaborators included Chuck Willoughby, FAPC business and marketing relations manager; Darren Scott, FAPC food scientist/sensory specialist; Tim Bowser, FAPC food process engineer; William McGlynn, FAPC horticultural products processing specialist; and Brad Bailey and Scott Crowley, Agri-Services.

Photo by Mandy Gross

Client assistance

Producing pepper jelly

Objective

The objective of the project was to help the client in establishing a process for substituting dried pectin for liquid pectin in the product formulation.

Approach

After an initial meeting to determine the needed volume of the product, necessary equipment, and personnel, the FAPC worked with the client to manufacture several test batches of the jelly. The pilot plant batches were manufactured to specifications provided by the client.

The client's initial recipe utilized liquid pectin because it was easily obtained and was simple to use. However, the cost of liquid pectin made large-scale production of the jelly unfeasible due to the high cost. Therefore, liquid and dry forms of pectin were both evaluated in separate test batches of jelly to determine how easily the product could be manufactured.

The batches of jelly made with the dried pectin did require a little more pre-preparation than the jelly made with the liquid pectin. This included adding the dried pectin to hot water that was being rapidly agitated. However, the consistency of the finished jelly made with the dried pectin was comparable to the consistency of the finished jelly made with the liquid pectin.

Benefits

Consumers are able to enjoy an additional product in the market.

Economic Impact

Through the efforts of the FAPC and the client, this product will be manufactured at a lower cost.

Continuing Work

This product includes pieces of chopped ingredients to increase product attractiveness. The client would like for these pieces to be distributed evenly throughout the jelly; however, the ingredients are low density and tend to aggregate near the surface. A process to change the density of these ingredients to ensure they are dispersed throughout the jelly is currently being developed.

Funding

The client provided funding for this project.

Collaborators

Darren Scott, FAPC food scientist, served as the principle investigator for this project. Dave Moe, FAPC pilot plant manager, was a collaborator.

Peach Crest Farms develops food safety program plan

Photo by Chris Kirby, Oklahoma Department of Agriculture, Food, & Forestry

Objective

The primary objective of this project was to provide model Hazard Analysis and Critical Control Points (HACCP) plans for a small produce producer in Oklahoma.

Approach

Peach Crest Farms of Stratford, Oklahoma, needed a food safety program that would include Good Agricultural Practices (GAPs), HACCP, Sanitation Standard Operating Procedures (SSOPs), and several food safety pre-requisite programs.

This need came from the request of a supplier audit of the farm, which would include a food safety program. Then, the importance of food safety programs and implementation ideas for the farm were discussed.

Several model programs were compiled including hard copies as well as electronic documents. The project Peach Crest Farms owner, Susan Bergen, understood that a food safety program had to be dynamic and living. This is why electronic documents were provided, so that as the program evolved it could be modified.

The quality management specialist met with Bergen to explain the details of the model programs, teach her significant facts about food safety, and help her understand the purpose of a dynamic food safety program. During this time, programs were edited to fit the specific facility needs and research was provided for potential hazards and how to overcome them.

Benefits

Peach Crest Farms is taking advantage the emerging trend for locally grown food products by creating consumer choice and nutritional food. They provide a variety of locally grown organic and non-organic produce. These products naturally have several food safety concerns requiring a dynamic food safety program during growing and harvesting.

Food safety is a high priority to Peach Crest Farms, and produce must adhere to strict food safety programs. The program taught the farm what hazards might be present and how to overcome them, bringing safe food to her customers. She would not have been able to keep these customers without the food safety program.

Economic Impact

Peach Crest Farms has several full-time employees and hires additional employees for the harvest season. Having completed this project, the farm has increased its sales 400 percent for the months of October and November in 2009.

Additionally, the farm has increased its annual payroll more than 100 percent. This is in direct relationship to having the HACCP and SSOPs completed. Peach Crest Farms not only affects the local economy by providing jobs, but also provides quality fresh produce to 150 Oklahoma schools. The farm is demonstrating to other Oklahoma farms that it is possible to have an Oklahoma farm for all seasons.

Continuing Work

This project is completed, and Peach Crest Farms passed the food safety audit.

Publications

Several model programs for produce, which includes HACCP plans for cantaloupe, leafy greens, cucurbits, and tomatoes, have been created following the work on this project.

Funding

Extension funds through the FAPC funded this project.

Collaborators

Jason Young, FAPC quality management specialist, was the primary investigator on this project. Other collaborators included Dr. William McGlynn, FAPC horticultural products processing specialist, and Reneé Nelson, FAPC milling and baking specialist.

Understanding Eastern Redcedar Logs in Oklahoma

Objective

The overall objective of this study was to develop an initial data to understand characteristics of experimental exterior strand type structural panels from low-quality Eastern redcedar logs in Oklahoma.

Approach

Five low-quality Eastern redcedar trees, with an average diameter at breast height of 150 mm were, harvested in southern Oklahoma. Laboratory type disk flaker was employed to convert sections into strands. The furnish was dried to 3 percent moisture content in a laboratory-type oven prior to the adhesive blending process. Mats were compressed in a computer-controlled press using a pressure of 5.5 MPa at a temperature of 160 degrees Celsius for 8 minutes to a nominal thickness of 12 mm. A total of 20 panels, 10 for each density levels, were produced for the experiment. Average internal bond (IB) strength value was 0.81 MPa for the sample with 0.78 g/cm^3 density. The other samples with lower density had 0.77 MPa as corresponding value, which was 5.2 percent lower than that of panel type-B. Modulus of elasticity (MOE) and modulus of rupture (MOR) of the samples were also tested. Panel type-A (0.78 g/cm^3) and type-B (0.65 g / cm^3) had 3,331 MPa, 2,845 MPa, 21.3 MPa, and 17.5 MPa for MOE and MOR values, respectively. With above mechanical properties, it seems Eastern redcedar strand may have a potential to produce structural panel with acceptable mechanical properties.


Photo by Salim Hiziroglu


Photo by Salim Hiziroglu

Benefits

Wood products industry in Oklahoma is characterized by a large number of small companies using rather labor-intensive operations to transform hardwoods, such as oak, into different wood-based products. Currently, there is no reported price for low quality Eastern redcedar in Oklahoma, due to in part to this specie status as a pest and overwhelming availability of virtual free redcedar. However, if landowners make use of state and federal program to remove redcedar trees from their property, the costs of delivery inputs to a centralized panel product facility maybe only short-distance transportation cost. If certain action is not taken to solve Eastern redcedar invasion, it is predicted that problems caused by this species will cost $447 million by 2013. The importance of this work lies in its potential to expand the use of low-quality Eastern redcedar in exterior structural composite panel manufacture, which may result in the development of an environmentally sound way to utilize such resource in Oklahoma.

Economic Impact

Converting under-utilized Eastern redcedar trees into such panels in a small size commercial mill may potentially produce around 10 new jobs.

Continuing Work

Future work includes the production of the panels with oriented strands of redcedar and pine.

Publications

A journal article about this project was published in Materials.

Funding

McIntire Stennis and the FAPC provided funding for this project.

Collaborators

Dr. Salim Hiziroglu, FAPC value-added wood products specialists was the primary investigator of this project.

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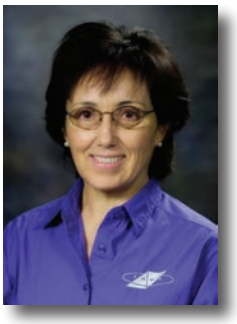

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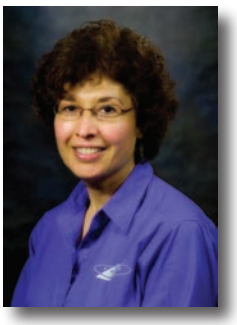

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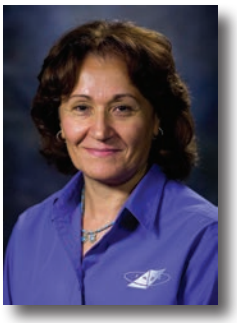

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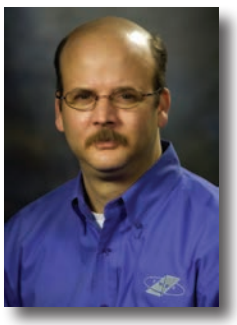

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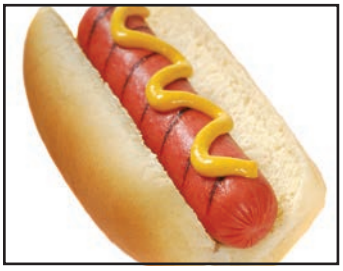

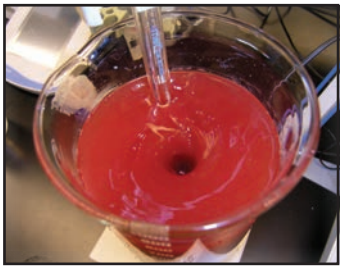

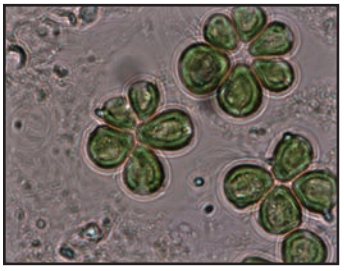

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