Robert M. Kerr Food & Agricultural Products Center

2008 Annual Report

Keith's Butcher Shop

A product of the FAPC, page 8

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Adding Value to Oklahoma

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About the cover...

Keith Schneberger, owner of Keith's Butcher Shop in Burns Flat, Oklahoma, is no stranger to the FAPC. A former student employee of the FAPC, Schneberger learned necessary skills to help start his own food business.

Message to our Stakeholders

The Robert M. Kerr Food & Agricultural Products Center is a research and development, business and marketing, and technical assistance resource for the Oklahoma food and agricultural industries. 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 recently celebrated its eleven-year anniversary, and has continued to contribute significantly to the Oklahoma economy.

A study was completed recently on the economic impacts of the FAPC on Oklahoma. The FAPC was shown to impact more than $6 billion in annual sales revenue and impacted more than 52 million jobs, cumulative, in Oklahoma.

In this reporting year, the FAPC operated with ten faculty members, fifteen professional staff members, five clerical staff members, and five technical staff members. It made significant contributions because of its faculty and staff in value-added processing in all food processing sectors of Oklahoma and this food processing was supported at the FAPC by food processing engineering, food microbiology, food sensory analysis, food harvest and processing technology, total quality management, communications and media support, and finally by 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. This year, the chairman of the committee was Mr. John Griffin (President and CEO of the Griffin Food Company, Muskogee, Oklahoma), the vice chair was Mr. John Williams (President and CEO of Chef's Requested Foods, Oklahoma City, Oklahoma) and the secretary was Mr. David Howard (President and CEO, Unitherm Food Systems, Bristow, Oklahoma).

Current trends in Oklahoma and across America in food processing and food marketing are being driven by the retail and foodservice consumer base. These trends include food safety, food quality, 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.

Dr. J. Roy Escoubas
FAPC Director
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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 will bridge 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.

Vision

The FAPC has programs, projects, and activities that support innovation and growth of the food and agricultural business sectors of Oklahoma, increase food safety for consumers, assist in the development of students for careers in the Oklahoma food industry, and support and enhance the impact of the center on the state, region, and nation.

Mission

Discover, develop, and deliver technical and business information that will stimulate and support the growth of value-added food and agricultural products and processing in Oklahoma.

Industry Advisory Committee

In Oklahoma Statute 2-5-60, the Oklahoma State Legislature established the Industry Advisory Committee to serve as an advisory board for the FAPC. The committee is to assist, counsel, and give leadership to the FAPC in the discovery, development, and delivery of technical and business information that will stimulate and support the growth of value-added products and processing in Oklahoma.

Front Row:
David Howard, Unitherm Food Systems (IAC Secretary)
Jill Stichler, Redland Juice Company
Virgil Jurgensmeyer, J-M Farms
Charles Nichols, Davison & Sons Cattle Company
John Williams, Chef's Requested Foods (IAC Vice Chair)
David McLaughlin, Advance Food Company

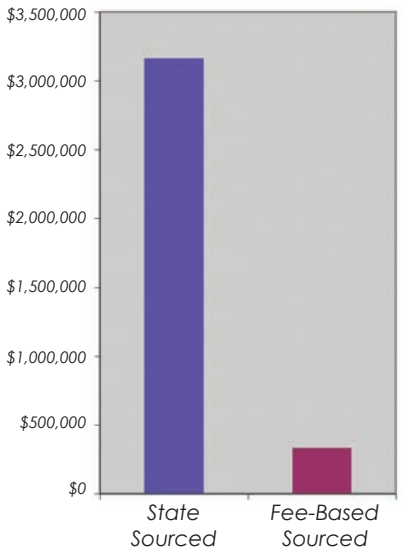
Back Row:
Roy Escoubas, FAPC
John Griffin, Griffin Food Company (IAC Chair)
Gary Conkling, Producers Cooperative Oil Mill
Rodger Kerr, Southwest Technology Center
Bill Wiley, Oklahoma Refrigerated Services
Paul Schatte, Head Country Bar-B-Q
Danny Dupree, Bar-S Food Company
Gary Crane, Ralph's Packing Company

Not Pictured:
Jay Cowart, Plains Cotton Cooperative Association
Tommy Kramer, Durant Industrial Authority
Robert Whitson, OSU's Division of Agricultural Sciences and Natural Resources

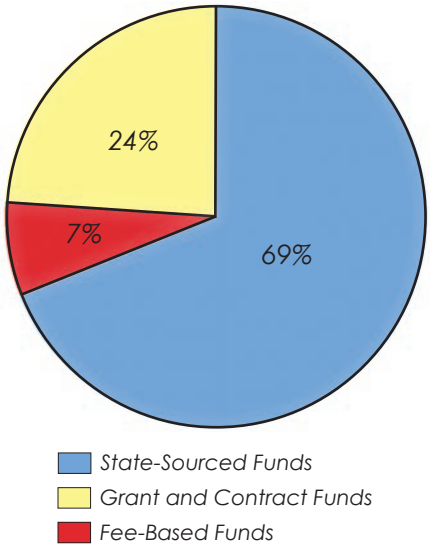
Financial Highlights

Working Funds	**$3,496,463**
State Sourced	$3,161,735
Fee-Based Sourced	$334,728
State-Sourced Funds	**$3,161,735**
Research	$2,285,935
Extension	$875,800
Fee-Based Funds	**$334,728**
Conference & Training Accounts	$51,078
Small Projects & Applied Development Accounts	$57,683
Pilot Plant Processing Accounts	$225,967
Grants and Contract Research Funding	**$1,115,000**
Total Available Funds	**$4,611,463**
State Sourced	$3,161,735
Fee-Based Funds	$ 334,728
Grants and Contracts	$1,115,000
Description of Funds	
State-Sourced Funds	69%
Fee-Based Funds	7%
Grant and Contract Funds	24%
Disposition of Funded Activities	
Research and Product Development	72%
Outreach Activities	28%
Disposition of Budgeted Resources	
Salaries and Benefits	76%
Maintenance and Operational	8%
Facility and Equipment Expense	13%
Small Projects	2%
Market Development	1%
Description of Fee-Based Funds	
Conferences and Training Programs	15%
Pilot Plant Processing Programs	68%
Small Projects and Applied Development Projects	17%
Foundation Focus	**$172,266**
Endowed and Non-Endowed Gifts	$52,118
In-Kind Gifts	$120,148

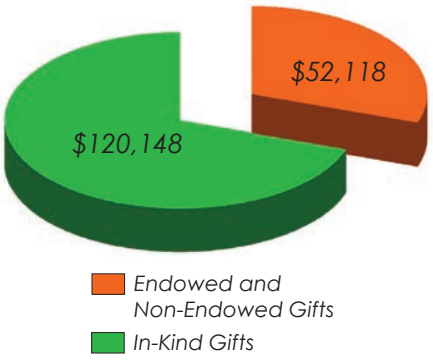
Working Funds



Description of Funds



Foundation Focus



Foundation Focus

An FAPC team was developed to support and enhance the programs that carry out the mission of the FAPC through the donations of individual and industry partners. The team's purpose is to guide development and recognition of private donations to the FAPC. The FAPC would like to recognize the following 2008 donors:

Roy and Judy Escoubas

FoodProtech

H2 Zero, LLC

Head Country Food Products, Inc

Maxx Performance, Inc.

Reneé Nelson

Oklahoma Beef Council

Oklahoma Pork Council

Oklahoma Texas Meat Processors Association

Oklahoma Vegetable Association

Perten Instruments

PetSci, LLC

Poultry Federation

Patricia Rayas-Duarte

Proilant Meat Ingredients

Joshua P. Schatte

Ralph's Packing Company

Thomas Brothers Produce

Unitherm Food Systems

Vaughan Foods

Mazie E. Will

Chuck and Susan Willoughby

Jason Young

Jaymee Zabienski

Thank you ... We greatly appreciate your support!

A prod

Many Oklahoma entrepreneurs look to the Robert M. Kerr Food & Agricultural Products Center to help start their businesses. Keith Schneberger is one of those entrepreneurs.

A native of Burns Flat, Oklahoma, Schneberger owns and operates Keith's Butcher Shop in his hometown, which offers a retail store and wide variety of custom butchering and prides itself with providing top-notch service.

"It feels pretty good to own my own business," Schneberger said. "I knew I wanted to come back home after college graduation, and I knew there was business to be had in the food industry."

Keith's Butcher Shop opened for business on July 7, 2008, and a grand opening was held September 1, 2008.

Laying the Groundwork

Schneberger graduated from Oklahoma State University in July 2007 with a bachelor's degree in animal science with a food industry option. During his time at OSU, he was a member of the 2005 OSU Meat Judging Team and worked at the FAPC in the meat pilot plant from January 2004 to July 2007.

Jake Nelson, FAPC value-added meat specialist, said Schneberger quickly exhibited himself as a top student employee and possessed the unique ability to recognize the needs, tasks, and other operational requirements associated with the FAPC pilot plant that required regular planning and attention.

"Those traits are normally taught and mentored to our student employees, but Keith possessed those abilities almost from the first day of employment," Nelson said. "He was passionate about learning the processes and as a result, he was a true asset to the function of the meat pilot plant. I think his virtues were rooted in his desire to one day own and operate his own meat processing business."

Schneberger said working at the FAPC influenced him in deciding his career path. He enjoyed working at the FAPC so much that he decided to major in food science.

"I picked up all the skills that I needed to open a butcher shop by working at the FAPC," Schneberger said. "I think I learned more at the FAPC than I did in the classroom."

Seizing the Opportunity

Schneberger's relationship with the FAPC did not end just because he graduated from college and started his own career.

While preparing to open his business, Schneberger attended the FAPC Basic Training Workshop. The training benefits new food business entrepreneurs by providing individuals with the basics of launching a food product into the market.

While there is not a specific food business-starting formula, there are some common topics every potential food processor should consider, such as business planning, health regulations, product evaluation and marketing, labeling, patents and trademarks, and much more, said Erin Early, FAPC business and marketing client coordinator.

"Keith saw the opportunity in attending Basic Training and started off on the right foot with his business," Early said. "Through the workshop he found the information to start his business in one location and resources he needed to succeed."

Basic Training participants also learn about technical assistance available to individual companies from the FAPC, including product testing and evaluation, process scale-up, pilot processing, engineering, and analytical services.

Schneberger said attending Basic Training was very helpful in starting his business.

"The class is very useful for anyone who is interested in opening up any kind of food business," he said.

Building a Business Plan

Schneberger also received assistance from an OSU graduate agribusiness class, taught by Rodney Holcomb, FAPC agribusiness specialist. The class helps develop business plans for small, start-up businesses in Oklahoma.

Kyle Flynn, food science graduate student and FAPC meat pilot plant manager, and Krista Smith, former ag-

uct of the FADC

ricultural economics graduate student, worked on the project for Schneberger.

"Kyle and I took this project very seriously because we knew that our client depended on us and having a personal relationship with the client increased our dedication," Smith said. "I definitely felt like having a 'real' scenario instead of a made-up one made everyone take their projects more seriously."

Not only did the students benefit from this class project, but also Schneberger benefited from having a business plan developed for him. The business plan included a feasibility template, target market, ways to market Schneberger's services, business goals and strategies, and ways to achieve those goals.

"I think Keith benefited from the course because we were able to include some things that Keith had not yet thought of in his business plan," Smith said. "Also, showing Keith the feasibility template and identifying where we expected him to be financially for the next 10 years was very beneficial to Keith."

Schneberger said although he had already developed a business plan, the information that Flynn and Smith provided were very helpful and gave him some ideas that were not originally in his business plan.

Fostering Future Plans

Schneberger said that owning his own business has been everything that he had hoped and more.

"I want the business to continue to stay strong," he said. "My goal is to develop a good product, while making a good living doing it."

Agribusiness Economics

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Business Planning and Marketing

Cereal Chemistry

Communications

Food Chemistry

Food Engineering

Food Microbiology

Horticultural Processing

Meat Science

Oil/Oilseed Chemistry

Pilot Plant

Product Development

Quality Control and Assurance

Value-Added Wood Products

Feasibility spreadsheet template developed for cellulosic ethanol plant

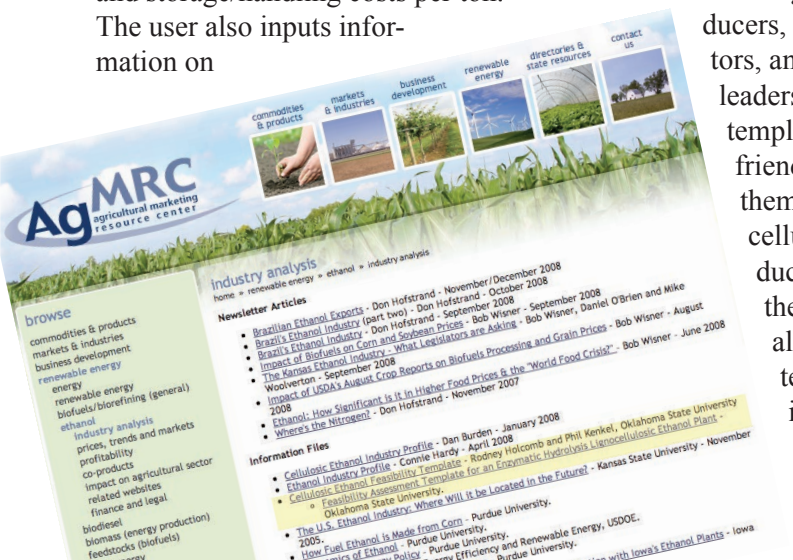
Objective

The primary objective of the spreadsheet-based template was to give users the opportunity to assess the economics of a commercial-scale cellulosic ethanol plant given specific capital expenditures, financing scenarios, feedstock requirements, and various input and output prices.

Approach

Several previous and ongoing studies related to cellulosic ethanol production were utilized to develop an economic engineering model for an enzymatic hydrolysis lignocellulosic ethanol plant. A user-friendly Microsoft® Excel® spreadsheet template was derived from this study for use by economic development specialists, project coordinators, and agricultural producers interested in the operational economics and regional impacts of a cellulosic ethanol plant.

Users of the OSU Cellulosic Ethanol Feasibility Template are directed to input information on building and equipment costs, number and wages/salaries of personnel, and the feedstocks (up to four) in the green-shaded cells at various places in the template. Feedstock procurement costs can be segmented into the market (farm) value, shipping/transportation costs, and storage/handling costs per ton. The user also inputs information on available state and federal tax credits for ethanol production, expected inflation rates for input and output prices, and even adjust project financing to account for local and/or state rural development incentives. The template then uses this information to generate such necessary items as quantity and value of feedstock requirements, depreciation schedules for the plant and equipment, loan amortization schedules, profit/loss statements, and estimates of annualized cash flow during a ten-year span.



Benefits

Although cellulosic ethanol has received significant media attention and federal support, the costs of building and operating a commercial-scale facility are not publicly known, and the companies developing and utilizing the processing technologies are not inclined to reveal their projections until technologies can be tested on a commercial scale. Unlike grain-based ethanol, where processing technologies are highly standardized and feedstock procurement is as simple as participating in the grain marketing system, cellulosic ethanol projects may have a wide range of technical efficiencies, conversion rates, and feedstock logistics. Decision-makers, including agricultural producers, potential investors, and rural community leaders benefit from this template by having a user-friendly model to help them determine whether cellulosic ethanol production is feasible in their area. The template also allows them to determine the economic impacts to their region from feedstock procurement, job and income generation, and property tax revenues.

Economic Impact

The research itself does not create jobs or revenue, but it does allow interested parties to estimate the jobs and income generated from proposed cellulosic ethanol ventures.

Continuing Work

The project was completed in September 2008, and the template was introduced to the Agricultural Marketing Resource Center (AgMRC) Web site, under "Biofuels," in October 2008.

Publications

The template, itself, is a published online software item. An *FAPC Flash* and an AgMRC bioenergy online article have been published as a result of this project.

Funding

This project was funded by the USDA through an AgMRC program designed to create agribusiness planning tools that will benefit agricultural producers and agribusiness planners.

Collaborators

Dr. Rodney Holcomb, FAPC agricultural economist, was the principal investigator for this project. Dr. Phil Kenkel, agricultural economics professor and Fitzwater Endowed Chair for Cooperative Studies, was a collaborator.

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Analyzing fatty acid composition of commercial and organic ground beef

Objective

For a healthy diet, nutritionists recommend increasing intake of the health-beneficial ω-3 series of polyunsaturated fatty acids (PUFA) and of the *cis*-9, *trans*-11 isomer of conjugated linoleic acid (CLA). Beef is considered an excellent source of these fatty acids; however, no compositional information on the health desirables of ω-3 PUFA and CLA for ground beef is available. For this reason, the objective of this study was to analyze the fatty acid composition of commercial ground beef and compare it with organic ground beef samples.

Approach

Commercial ground beef samples were obtained from local stores. Certified organic ground beef samples were obtained from Cattle Tracks, LLC, of Fairview, Oklahoma. FAPC Analytical Chemistry Laboratory staff analyzed the total fat and the fatty acid composition of the samples.

Benefits

In contrast to organic ground beef, commercial ground beef had a higher total fat content, which was accompanied by higher amounts of ω-6 PUFA and lower concentrations of both ω-3 PUFA and CLA. Additionally, the ratio of ω-6 PUFA to ω-3 PUFA in commercial ground beef was much greater than the recommended beneficial ratio of ≤ 4. Consequently, more compositional information was needed for commercial ground beef, and for organic ground beef even though organic beef has limited availability for consumption. Therefore, consumers benefit from having information for total fat content, as well as for contents of the health-desirable fatty acids ω-3 PUFA and CLA.

Economic Impact

Because many consumers today are fat-conscious, it is important for them to have more information with which they can make smart food choices and better understand the nutritional benefits of favorite foods.

Continuing Work

These preliminary results of ground beef samples created a motivation to continue the study. In the future, FAPC staff will evaluate the fatty acid composition of different ground beef categories, such as lean, extra lean, etc., which vary in total fat content.

Publications

As a result of this study, a journal supplement abstract will be published. Research results also will be presented at a professional meeting.

Funding

The FAPC provided funding for this project.

Collaborators

Dr. Guadalupe Davila El-Rassi, FAPC analytical services manager, was the principal investigator for this project. Other collaborators included Cattle Tracks, LLC of Fairview, Oklahoma; Ee Chin Ng, FAPC graduate student; and FAPC analytical chemistry research specialists Dr. Veneta Banskalieva and Angie Lathrop.

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Pure Prairie Creamery ...
Producing high quality goat cheese

Objective

The primary objective of the project was to manufacture high quality goat cheeses from natural, grass fed, and wholesome goat milk from small, local, independent dairies.

Approach

In February 2008, brothers Bill and Todd Clark, along with business associate Ron Tidwell, purchased a cheese manufacturing facility in Ada, Oklahoma, from Haystack Mountain. Purchasing the cheese operation provided local ownership, and the company was given a new name – Pure Prairie Creamery.

The long-term approach was to recruit several small, local farmers to sell milk to Pure Prairie Creamery, based on established quality criteria relating to natural and wholesome cheese products. The objective was to form a cooperative of local farmers who raise, feed, and milk specific types of goats for consistency and quality in cheese production.

Benefits

The health benefits of goat cheese are significant in comparison to cow-milk products, as goat cheese is lower in fat, calories, and cholesterol. Goat cheese also provides more calcium and fewer carbohydrates than cow cheeses.

Generally, people who are allergic to cow's milk or who are lactose-intolerant can use goat-milk products instead. The high digestibility of goat-milk products primarily is due to shorter fatty acid chains and smaller fat molecules than those in cow's milk. Statistics state that 47 percent of the world population is allergic to cow milk in one way or another, but only three percent have an allergic reaction to goat's milk.

Economic Impact

Pure Prairie Creamery initially will offer seven varieties of goat cheese, all of which are named after Oklahoma native prairie flowers. Gary Huffstutlar, manager and head cheese maker for Pure Prairie, has been expertly trained in the process of making quality goat cheese. Bill Clark said he hopes the business will employ eight to ten individuals as the business grows the next two years.

Continuing Work

The client is currently negotiating with a specialty foods distributor in Moore, Oklahoma, who would purchase and sell the goat cheese to an existing customer base. There also are potential sales opportunities in health food stores, retail grocery stores, and restaurants offering natural, wholesome products.

Funding

The client provided funding for this project.

Collaborators

Jim Brooks, FAPC business and marketing services manager, was the principal investigator for the project. Other collaborators included Darren Scott, FAPC food scientist and sensory specialist, and Guadalupe Davila El-Rassi, FAPC analytical services manager.

Dream Catcher Salsa ...
Marketing an award-winning salsa

Objective

The primary objective of this project was to commercialize and market an award-winning gourmet salsa.

Approach

Dream Catcher Salsa has been entered in many competitions since 1999 and has taken first place in at least one category at every showing. The salsa's latest honor was first place winner of the 2008 International Scovie Award, Fresh Habanero category, which is the most prestigious award given at the annual Fiery Foods Show in Albuquerque, New Mexico.

The FAPC's contribution to Dream Catcher Salsa's efforts included business plan review, market evaluation and analysis, strategic market planning, pricing strategy, nutrition analysis, label review, and co-packer identification. Essentially, FAPC served as adviser for business and technical needs of the company.

Benefits

A major emphasis in the business plan was that the salsa was not only award winning, but also not cooked. Fresh, refrigerated salsas have not yet saturated the market, which gives Dream Catcher Salsa a strong point of differentiation for consumers who perceive fresh salsas as higher quality than those on the shelf. Additionally, consumers are looking for healthier eating options and are achieving greater consumption of fruits and vegetables. No matter how health-conscious consumers become, however, flavor and taste remain the No. 1 attributes consumers seek when making food purchases. Dream Catcher Salsa offers a flavorful way to help deliver "5-A-Day" to consumers.

Economic Impacts

Currently, Dream Catcher Salsa employs two people on a part-time basis. Moreover, the business's co-packer provides employment for nine people. Total estimated full-time employment of this project is ten FTE jobs.

Utilizing input-output analysis to estimate the employment multiplier effect, these ten jobs contribute to an additional 4.5 jobs in the local economy. Thus, the business activities of Dream Catcher Salsa provide a total economic impact to the local economy of fifteen jobs. The estimated income multiplier is 2.19; therefore, for every $1,000 in sales Dream Catcher Salsa achieves, the local economy experiences a total sales impact of $2,190.

Continuing Work

This project is complete; however, FAPC is ready to provide any additional assistance required for Dream Catcher Salsa's success.

Publications

As a result of this project an article titled "FAPC Basic Training Graduate Catches Dream" was published in the Fall 2008 issue of *Oklahoma Country* magazine.

Funding

The client and the Citizen Pottawatomie Development Corporation provided funding for this project.

Collaborators

Chuck Willoughby, FAPC business and marketing relations manager, was the principal investigator for this project. Other collaborators included Erin Early, FAPC business/marketing client coordinator; Mandy Gross, FAPC communications services manager; and Darren Scott, FAPC food scientist and sensory specialist.

G's Chili Company ...
Assisting with heat-and-eat chili

Objective

The primary objective of the project was to assist Glen Franklin in further marketing of his heat-and-eat chili, and to increase sales in the food industry's retail sector.

Approach

Oklahoma City resident Glen Franklin has been selling chili for several years through his catering company, where it is the main dish and receives rave reviews.

After attending the FAPC Basic Training in February 2007 with the goal of marketing his chili to the food industry's retail sector, and upon completion of several steps in the Client Success Path, Franklin's product was a demonstration at four food shows. At each of the shows, potential customers were excited about the product and asked to carry it in their stores. The next step for the client was getting a warehouse or distributor to agree to carry the product.

Following the first product run at a co-packer, the product was presented in the FAPC booth at both the Associated Wholesale Grocers Show and the Convenience Store Show. Franklin presented the product to several warehouse decision makers at both shows, and scheduled meetings to discuss the details of his product's housing in their warehouses. Currently, Franklin's heat-and-eat chili is being sold in several Oklahoma City–Metro grocery stores. During cold months, the product is predicted to do very well.

Benefits

By getting the product on store shelves for consumer purchase, this project will benefit G's Chili Company's economic standing. Franklin's heat-and-eat chili also will benefit consumers by providing another option in frozen, single-serving meals.

Economic Impact

Because of FAPC marketing assistance, this product will enter the food industry's retail sector and, hopefully, transfer dollars from Oklahoma customers to an Oklahoma company. This will benefit the state's economy by keeping state dollars in Oklahoma.

Continuing Work

Given that this product is a new addition to the market, most consumers are unaware of its existence. Continuing FAPC assistance will help move this product in consumer markets by assisting with store demonstration set-up and tasting. These in-store displays will encourage initial consumer purchases.

Funding

The FAPC and the client funded this project.

Collaborators

Erin Early, FAPC business and marketing client coordinator, was the principal investigator for this project. Other collaborators included Chuck Willoughby, FAPC business and marketing relations manager, and Jim Brooks, FAPC business and marketing services manager.

Restaurateur Basic Training ...
Providing resources for restaurateurs

Objective

The primary objectives of this project were to provide multiple resources and education for potential restaurateurs and to increase the odds of the individuals' opening of a successful new restaurant in Oklahoma.

Approach

FAPC Restaurateur Basic Training workshops were limited to 25 participants, which encouraged participant interaction and networking. Presentations were given by food service professionals on numerous topics, and were geared toward participants' needs and business goals. Restaurateur Basic Training participants received workbooks that included presentation handouts, supplemental materials, and speaker contact information.

Benefits

An investment in developing successful foodservice businesses, the Restaurateur Basic Training workshop provided Oklahoman's with the knowledge and resources for their entrepreneurial pursuits. The information presented by accredited professionals in the industry was an immediate benefit for all workshop participants, providing economic profitability tips and time management techniques.

Economic Impact

With completion of two Restaurateur Basic Training workshops, graduates have shown that they are taking time to properly plan their new businesses.

Continuing Work

Seeking new promotional opportunities and brochure development are two projects aimed at increasing future workshop attendance. The FAPC will continue to review participants' evaluations to accommodate future restaurateurs.

Publications

Current promotional pieces include informational mailers and news releases, an *FAPC Flash*, and two guest appearances by Andrea Graves on the Guerilla Gourmet radio show. Additionally, this FAPC workshop was featured in the winter 2008 edition of the Oklahoma State University Department of Agricultural Education, Communications and Leadership's *Cowboy Journal*.

Funding

Workshop participants funded this project.

Collaborators

Andrea Graves, FAPC business and marketing specialist, was the principal investigator for this project. Other collaborators include Chuck Willoughby, FAPC business/marketing relations manager; Jim Brooks, FAPC business/marketing services manager; Erin Early, FAPC business/marketing client coordinator; Mandy Gross, FAPC communications services manager; Karen Smith, administrative support specialist/workshop coordinator; and various members of the OSU Hotel and Restaurant Administration, the Oklahoma State Department of Health, the Tulsa County Department of Health, and the Oklahoma Restaurant Association.

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Comparison of rheological properties of wheat cultivars and breeder lines

Objective

The primary objectives of this study were to assess the introduction of three methods of evaluating the viscoelastic properties of gluten and dough into the wheat-breeding program, as well as to compare the potential of breeder lines taking into account their viscoelasticity and extensibility properties.

Approach

Modern industrial bakeries demand a balance of dough strength, extensibility and viscoelastic properties – characteristics that indicate machine-ability and baking performance. The rheological properties of two sets of U.S. hard winter wheat from 2006 and 2007 crop years were analyzed for viscoelasticity, extensibility and mixing properties, wet gluten content, gluten index, sodium dodecyl sulfate sedimentation, and baking.

Principal Component Analysis (PCA), which enables visualization of two-dimensional relationships in an otherwise complex, multi-dimensional data set, was used to compare methods of quality assessment, including Creep-Recovery, micro-Extension, and Glutomatic, with traditional (TRAD) methods used in wheat breeding laboratories.

Partial PCA with adjustment for protein content variation evaluates the extent of variation of each property as affected per protein unit. Both non-adjusted and adjusted PCAs for CREG methods give the best discrimination among the wheat cultivars by explaining the highest percentage of the sample variation (with an average of 70 percent in 2006 samples and 66 percent in 2007 samples) compared to the PCAs for TRAD and ALL (TRAD and CREG) methods. PCA for traditional and CREG methods improved visualization of the interrelation between distinctive properties (variables) of wheat quality and thus predicts the usefulness of introducing new analytical tools to the breeding program.

Benefits

The quality analysis would improve the selection of wheat cultivars, taking into account a multivariate analysis in which the viscoelastic properties of gluten and dough are included.

Economic Impact

Derived from the release of new wheat cultivars with specific improvement in the viscoelastic properties of dough, this project is a potential contributor to the overall revenue of the Oklahoma Agricultural Experiment Station. These properties are key to processors in the baking industry.

Continuing Work

Project collaborators plan to apply these methods to the elite lines in Dr. Brett Carver's wheat breeding program. Then, analysis of the effect of different crop years using the same multivariate analysis will begin.

Publications

Output from this project includes one master's thesis and two international meeting presentations.

Funding

The Oklahoma Wheat Commission and Oklahoma Wheat Research Foundation provided funding for this project.

Collaborators

Dr. Patricia Rayas-Duarte, FAPC cereal chemist, was the principal investigator for this project. Other collaborators included PauWei Yeap, FAPC graduate student; Dr. Steve Mulvaney, Cornell University food science professor; Dr. Brett Carver, plant and soil science regents professor; and Connie Shelton, plant and soil science research technician.

Helping to manufacture a McPuff pastry for BAMA Companies

Objective

The primary objective of this project was to manufacture a pastry for BAMA Companies, Inc., under USDA Federal Inspection, to be showcased at Media Days in Chicago and Japan.

Approach

BAMA contacted the FAPC for help in producing the McPuff pastry in order for the product to be manufactured under USDA Federal Inspection. Arrangements were made for BAMA to use the FAPC's facility.

This project entailed two aspects. The first aspect was to manufacture McPuffs by hand because large-scale equipment was not available. Two hundred fifty McPuffs were manufactured one production day and 500 McPuffs another production day. The second aspect of the project was to acquire label and shipment approval from the USDA. FAPC staff ensured that BAMA had everything needed to make a quality product and helped make the pastries.

Benefits

This FAPC project provided the food industry with support, by supporting BAMA's needs to maintain a well-respected reputation and stay a viable Oklahoma company.

Economic Impact

One of the main topics in national headlines pertains to keeping or creating jobs in America. The potential economic impact of this project was assisting an Oklahoma-based company, keeping its jobs pumping into Oklahoma's economy.

Funding

The client provided funding for this project.

Collaborators

Renee Albers-Nelson, FAPC milling and baking specialist, was the principal investigator for this project. Other collaborators included Chuck Willoughby, FAPC business and marketing relations manager; David Moe, FAPC pilot plant manager; Jake Nelson, FAPC value-added meat processing specialist; Darren Scott, FAPC food scientist and sensory specialist; Jason Young, FAPC quality management specialist; Erin Early, FAPC business and marketing client coordinator; and FAPC student employees Joe Cragun and Krista Smith.

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FAPC Media Day generates publicity of the FAPC

Objective

The primary objective of this project was to provide an opportunity for media professionals to learn about the FAPC's contributions as a research, development, business, and technical resource for food and agricultural industries through a Media Day.

Approach

Representatives from weekly and daily newspapers, industry publications, radio, television stations, and Oklahoma legislature were invited to attend the Media Day to learn about the FAPC. The 2008 Media Day featured FAPC's Industry Advisory Committee, composed of Oklahoma agricultural and business leaders who serve as an advisory board for the FAPC. The members displayed a booth representing their company and participated in a panel discussion. In addition, attendees witnessed three demonstrations of projects performed at the FAPC, including the production of chicken nuggets, packaging of Hottie Pickles' single-serving packets, and conversion of sweet sorghum to ethanol.

Benefits

The event provides an opportunity for media representatives to learn more about the FAPC and distribute information throughout the various media outlets in Oklahoma.

Economic Impact

More people are aware of the services the FAPC provides because of the publicity during the Media Day, which could cause more entrepreneurs to open start-up businesses and create jobs in Oklahoma.

Continuing Work

Planning will continue for the next FAPC Media Day.

Publications

An information booklet was prepared and distributed to the Media Day participants. A news release also was disseminated following the event.

Funding

The FAPC provided funding for this project.

Collaborators

Mandy Gross, FAPC communications services manager, was the principal investigator for this project. Other collaborators included Stacy Patton, FAPC communications graduate student; Jim Brooks, FAPC manager of client services; Chuck Willoughby, FAPC manager of client relations; Erin Early, FAPC business and marketing client coordinator; Andrea Graves, FAPC business planning and marketing specialist; Scott Grumbles, meat pilot plant assistant coordinator; Dr. Danielle Bellmer, FAPC food engineer; Dave Moe, FAPC pilot plant manager; Bill Gray; owner of Hottie Pickles; and FAPC's Industry Advisory Committee.

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Detecting SOY in foods

Objective

The primary objective of this project was to determine if real-time polymerase chain reaction (PCR) could be utilized to reliably detect the presence of soy in various commercial soy products.

Approach

Evaluation was conducted on soybean protein concentrates, soybean protein isolates, soybean flour, and soybean protein-fiber-lecithin products obtained from commercial suppliers. The DNA from each product was extracted using a Qiagen QIAamp DNA Stool Mini Kit. DNA integrity then was visualized using agarose gels, and real-time PCR was performed with primers designed for the lectin gene (Le1) in soybean. Extractions were diluted to 1000 nanograms DNA.

To determine the detection limit of real-time PCR, the initial 1000 nanograms was serial diluted 10 fold to .001 nanograms DNA (10^{-7}) and standard curves were constructed. The response showed an average R_2 value of 0.996 for all products. DNA extractions were carried out three times for each soy product. There were no significant differences in detection limit in the replicated extractions. The detection limit using the real-time PCR was repeatable for all products through the fifth dilution. This suggests a detection limit of 0.1 nanograms DNA. Thus, the quality of the DNA did not have any effect on the detection limit.

Benefits

Because soy is a common functional ingredient added to a wide array of foods, companies needed a test that could reliably confirm and document whether contaminating sources of food had sufficiently been removed after a line change. Results of the project suggest that the DNA from highly processed soy products is detected reliably using real-time PCR.

Economic Impacts

As real-time PCR soy detection becomes more efficient, food companies will employ greater preventative measures for misbranding food items or causing serious, potentially life-threatening illnesses in consumers.

Continuing Work

The next step for this project is improving the sensitivity of soy detection. This involves identifying alternative, more robust sampling techniques.

Publications

As a result of this project, a poster was presented at the Institute of Food Technologists annual meeting, and an oral presentation was given during OSU Research Days.

Funding

The College of Agricultural Sciences and Natural Resources' Team Initiative Project provided funding for this project.

Collaborators

Christina DeWitt, FAPC food chemist, was the principal investigator for this project. Other collaborators included Tyler Tate, undergraduate student, and the entire Team Initiative Project food safety team.

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Enzymatic Hydrolysis of Sweet Sorghum Bagasse

Objective

The primary objective of this project was to determine the ease of hydrolysis of sweet sorghum bagasse as affected by variety and maturity of the plant.

Approach

Sweet sorghum bagasse is the solid biomass remaining after pressing juice from the stalks. The bagasse has been evaluated as a potential feedstock to a lignocellulosic conversion process for making ethanol. Before enzymatic hydrolysis can occur, pretreatment is required to disrupt the cell wall and the crystalline structure of the plant material, which makes the cellulose accessible. After pretreatment, cellulose is hydrolyzed into glucose by cellulase enzymes, which can then be fermented into ethanol by yeast.

A dilute acid pretreatment process was chosen to break down the lignocellulosic structure of the bagasse. The treatment parameters of temperature, time, and acid concentration were evaluated based on their ability to produce fermentable sugars from the solid bagasse, and the optimal parameters were selected for further study.

Next, five different varieties of sweet sorghum each were harvested at three different times and subjected to the previously chosen time and temperature acid pretreatment process. The pretreated samples then were hydrolyzed using a commercial cellulase enzyme to evaluate the effects of variety and plant maturity. The total amount of sugar released from the solid biomass is directly related to the amount of ethanol that can be produced from the bagasse.

Benefits

Developing a viable ethanol production system utilizing sweet sorghum as a feedstock was the goal of this project. In addition to the juice pressed from the sweet sorghum stalk, the solid bagasse that remains also can be used to produce ethanol. The potential uses of this bagasse play an important role in the development of biofuel production processes. Furthermore, once cellulosic processing facilities become a reality, the ability to use bagasse as an input to a lignocellulosic ethanol process will tremendously increase the value of the sweet sorghum crop.

Economic Impact

Because of the expanding market for biofuels, sweet sorghum, an ethanol-producing feedstock, could provide tremendous economic gains for the state of Oklahoma. Additionally, because the proposed ethanol production process is on-farm, it helps decentralize energy production and could result in tremendous economic input for rural America.

Publications

As a result of this study, a master's thesis is being developed.

Funding

The Division of Agricultural Sciences and Natural Resources Team Initiative Project provided funding for this project.

Collaborators

Dr. Danielle Bellmer, FAPC food process engineer, was the principal investigator for this project. Other collaborators included Vania Pradipta, FAPC graduate student, and biosystems and agricultural engineering professors Mark Wilkins and Ray Huhnke.

Optimization of jerky drying time without affecting final product quality

Objective

The primary objective of this project was to identify factors that reduce dehydration time of beef jerky without noticeably affecting the flavor or texture of the final product.

Approach

Four factors were tested for their effect on the dehydration time of beef jerky slices: pH, orientation, freeze-thaw cycling, and chemical tenderization. Product pH was adjusted to the isoelectric point by the addition of a small amount of a flavorless acidulant. Meats are known to hold the least amount of moisture at the isoelectric point. Drying the jerky horizontally, on perforated trays, or vertically, from wire hooks, changed the product orientation, which is known to have a significant effect on dehydration time. The freeze-thaw cycle is understood to reduce moisture levels in raw meats and results in a decreased water-holding capacity after thawing. Researchers then exposed raw jerky meat to repetitive freeze-thaw treatments. Because chemical tenderization breaks down proteins, it was hypothesized that the results might open up freer paths for water movement to enhance dehydration.

The four factors were tested using a factorial experimental design and repeated in triplicate. A full-scale dehydrator outfitted with live-weigh pans was used to conduct the experiments. The live-weigh pans recorded the weight of the beef jerky slices throughout the dehydration process and provided dehydration curves for each product treatment condition.

Benefits

Several perceived benefits that can be concluded from this study, including decreased overhead costs for jerky manufacturers, increased product throughput potential because of reduced production time, and lower product cost to consumers.

Economic Impact

This research could result in a maximum twenty percent reduction in energy costs, as well as a maximum twenty percent increase in production, due to shorter dehydration times.

Continuing Work

The experimental phase of the project is currently underway.

Publications

An FAPC fact sheet outlining this project is in development, and there are plans to publish a forthcoming manuscript in a peer-reviewed journal.

Funding

The FAPC and a USDA Cooperative State Research, Education, and Extension Service Special Needs grant provided funding for this project.

Collaborators

Dr. Tim Bowser, FAPC food process engineer, was the principal investigator for this project. Other collaborators included biosystems and agricultural engineering professors Dr. Paul Weckler and Dr. Scott Frazier, and graduate students Stacey Kowalski and Ahmed Al-Sakini.

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Diagnostic method to identify strains of Staphylococcus aureus

Objective

The primary objective of this study was to examine the nucleotide sequence of the enterotoxin gene and the amino acid sequence of the actual enterotoxin produced by various strains of *Staphylococcus aureus* for variations, using enterotoxin A as a model.

Approach

Several cultures of enterotoxigenic *Staphylococcus aureus*, along with several obtained from the American Type Culture Collection, were isolated from different sources and tested for the production of enterotoxins. Those that produced enterotoxin A were selected for use in this study. Two sets of primers were developed to amplify the *entA* gene of several isolates of *Staphylococcus aureus* using PCR. The PCR products then were compared to find variations in the nucleotide sequences among the strains of *S. aureus*. The DNA sequences also were translated into proteins, which were compared to see if any variations in their amino acid sequences could be observed.

Variations were observed in both the nucleotide and amino acid sequences of many of the isolates of *S. aureus*. However, a few isolates exhibited identical nucleotide and amino acid sequences. In these cases, the PCR products were of differing lengths; thus, there could have been sequence variations outside of the amplified region of the gene.

This study indicates that it may be possible to identify a strain of *S. aureus* based on the nucleotide or amino acid sequence of its enterotoxin. Further research is required to determine if this method is applicable to serotypes of staphylococcal enterotoxin other than type A.

Benefits

The results from this study may prove useful in diagnostic investigations relating to outbreaks of staphylococcal food poisoning or food found to contain the enterotoxin but containing no viable cells of enterotoxigenic *Staphylococcus aureus*. These results could be important in tracing the source of an organism or in forensic investigations of an intentional addition of enterotoxin to the food supply.

Economic Impact

At this point, the economic impact is not known. However, the results from this study could have ramifications in determining responsibility for foodborne illnesses or, in some cases, recalls of products due to the presence of the toxin.

Continuing Work

There is a need to isolate and purify enterotoxin produced by several strains and then determine the amino acid sequence to see if the method works well. Adding the purified enterotoxin to a food matrix and then re-isolating the toxin for analyses also should test this method.

Publications

One master's thesis has been completed as a result of this project.

Funding

The USDA Cooperative State Research, Education, and Extension Service grant, Food Safety: Farm to Table, and Royalty Funds provided funding for this project.

Collaborators

Dr. Stan Gilliland, FAPC food microbiologist and Sitlington Endowed Chair in Food Microbiology, was the principal investigator for this project. Other collaborators included Mindy James, food science graduate student; Udya DeSylvia, animal science professor; and Charaka Fernando, animal science graduate student.

Sensitive detection of Staphylococcus aureus heat-stable enterotoxins

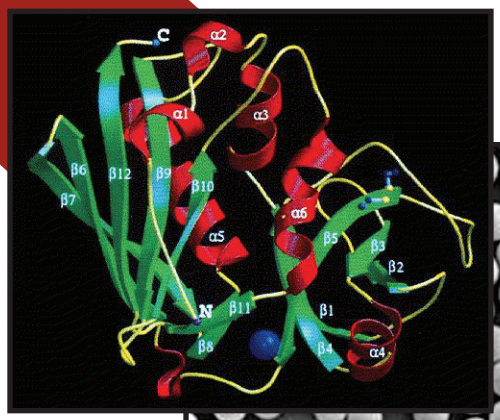
Objective

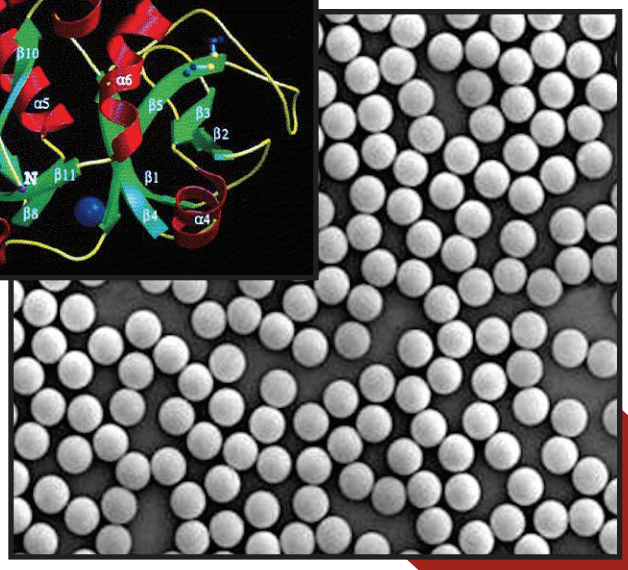
The primary objective of this research project was to develop a rapid, sensitive method of detection of staph enterotoxins A and B (SEA, SEB).

Approach

Researchers combined immunomagnetic bead recovery of enterotoxins from foods with enhanced detection provided by signal amplification using PCR (iPCR-SA). Staph anti-SEA and anti-SEB antibodies were coated onto 2.8-µm magnetic bead particles as the primary capture agents. Anti-SEA or anti-SEB coated magnetic beads were mixed with food slurries using either purified enterotoxins or foods in which enterotoxin-producing strains were inoculated. A semi-automated Bead Retriever™ was used to recover magnetic particles from the sampled foodstuffs.

If enterotoxins were present, they would bind to the antibodies/magnetic beads and be removed from solution. After washing, a secondary antibody with tethered oligonucleotides was added, which also recognized the captured toxin. After another washing cycle, the captured toxin complex was subjected to PCR amplification of small portion of the oligonucleotide that would have been present if toxin molecules were captured. Using this method, researchers were able to detect staph enterotoxins down to 7.5 femtograms/gm of food, which was 103-106 more sensitive than commercial kits currently available.





Benefits

Staphylococcal enterotoxin foodborne poisoning is one of the largest causes of foodborne poisoning in the world. Staph enterotoxins are heat stable and can survive cook temperatures if toxin is preformed in the food. The organisms often are harbored in the warm nasal passages of humans who often are the sources of contamination of processed/ready to eat foods during handling. Detection of contaminated/suspect foods requires the detection of the protein enterotoxins. The method is partly sensitive because of its ability to capture and concentrate toxin molecules from a larger volume than is normally used in commercial ELISA assays. The PCR signal amplification adds immensely to the sensitivity obtained by magnetic bead capture alone. The procedure is fairly rapid (three to five hours) and can be used to detect other toxins as well as those being considered as biological threat agents by terrorists. The method is robust and was used to detect toxin at high sensitivity from not only liquid samples of broth media and milk, but also from solid/semi-solid samples such as tuna salad, ready to eat turkey, lemon cream pie, and ground turkey.

Economic Impact

The project possibly could result in a commercialized product based on the method deployed herein.

Publications

One master's thesis and one research poster have been published as a result of this study. An additional research report also has been generated.

Funding

The Division of Agricultural Sciences and Natural Resources Team Initiative Project provided funding for this project.

Collaborators

Dr. Peter Muriana, FAPC food microbiologist, was the principal investigator for this project. Other collaborators included Leenalitha Panneerseelan, FAPC graduate student; Dr. William McGlynn, FAPC horticultural products processing specialist; and Dr. Christina DeWitt, FAPC food chemist.

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Assessing the risk of in-field microbial contamination of leafy greens

Objective

The primary objective of this project was to understand how *Escherichia coli* bacteria survive in the soil and to estimate the risk that those bacteria will be transferred onto or into leafy greens during plant germination and growth.

Approach

Field plots at the Vegetable Research Station in Bixby, Oklahoma, were inoculated with a generic, non-pathogenic strain of *E. coli*. The inoculation methods used included incorporating previously inoculated mulch into the soil and mixing bacteria/water mixtures directly into the soil. The goal was to simulate likely avenues whereby soil might naturally become contaminated with bacteria, for example, by contaminated soil amendments or contaminated runoff water. Spinach then was planted into the inoculated soil. Samples of soil and spinach leaves then were collected at regular intervals, and *E. coli* populations were enumerated for both soil and leaves. Results to date have demonstrated that viable *E. coli* may persist in inoculated soil for a matter of several months, at least. Thus, contaminated soil may create persistent risks for in-field contamination of fresh produce. This suggests that additional prevention and treatment methods may be necessary to enhance the safety of ready-to-eat leafy greens.

Benefits

Both consumers and the food industry will benefit from better understanding the risk factors involved with in-field contamination of leafy greens by disease-causing bacteria. Knowing more about how bacteria survive and move from soil to plant will enable researchers to design and test intervention strategies for preventing in-field contamination.

Economic Impact

This study has the potential to save both consumers and the food industry a large sum of money by helping reduce the number of food-borne illness outbreaks and product recalls. This project also will assist food safety professionals in the design of efficient and effective in-field food safety management techniques.

Continuing Work

Microbial population data is currently being collected for the fall/winter 2008-2009 growing season. This data will be compiled, analyzed, and used to complete a master's thesis. Results also will be used as preliminary data in subsequent, larger-scale grant proposals.

Publications

Several regional meeting presentation abstracts and a Vegetable Research Station research report have been completed as a result of this project.

Funding

Hatch and a USDA special grant provided funding for this project.

Collaborators

Dr. William McGlynn, FAPC horticultural products processing specialist, was the principal investigator for this project. Other collaborators included Dr. Lynn Brandenberger, horticulture and landscape architecture professor; Dr. Stanley Gilliland, FAPC food microbiologist; Emilia Paloma Cuesta-Alonso, FAPC food microbiology research associate; and graduate student Jessica Ong.

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Oklahoma Culinary Research Alliance

Objective

The primary objective of this project was to synergize the core competencies of the FAPC and OSU Institute of Technology Culinary Arts Program, CAP, into relevant deliverables for the food processing and hospitality sectors of Oklahoma.

Approach

Through the Oklahoma Culinary Research Alliance, OKCRA, the FAPC and CAP developed a strategy for creating end-use ideas that utilize innovative, non-traditional ingredients; novel raw materials; novel processing technologies; or ingredients and raw materials that could result in newly created or improved products; expanded product lines; and potential product label claims in the Oklahoma food processing and food service industries.

To fulfill this strategy, the FAPC exploited its access to agricultural commodity sectors and new processing technologies to then stimulate and present new concepts to the culinary sector. In partnership with the FAPC, the CAP incorporated a Food Processing and Technology course into existing curriculum. Only senior students are eligible for enrollment in the course, which serves as a capstone to their education.

For each OKCRA concept, the FAPC developed manufacturing parameters and the CAP optimized preparation and serving styles. The deliverable then was published as a profile of the concept or product. For example, the 2007 FAPC Annual Report contained a section titled "Beef Chuck Innovations and Value Opportunities." Those research outcomes flawlessly became an OKCRA concept, and newly identified versions of the beef chuck were profiled in the first OKCRA publications.

Benefits

Food processors often are hesitant to implement new processing technologies, new ingredients, or different raw materials when manufacturing standardized products. Additionally, food processors often are not conscious of label-claim opportunities that could put new life and sales growth into their core business products. Through demonstration of professionally prepared food service or retail food products made from new technology and raw materials, this program will be of tangible value to the Oklahoma food service and processing industries.

Economic Impact

The beef chuck roll was used for the first OKCRA profiling work; however, it is not available in a form that can be utilized. Accordingly, opportunities for start-up companies or service expansion of existing companies will be realized and exploited.

For reference, previous value-added applications for beef chuck shoulder clod, another beef subprimal, have estimated an incremental increase in live beef value by $50 per animal. New food service uses of the beef chuck could continue to increase this live value realized by producers.

Continuing Work

OKCRA is a continuous endeavor for FAPC and CAP. Obligations realized by the FAPC include identifying those ingredients, raw materials, and processing technologies that have opportunity for alternative use, improvement, or alternative applications that directly enhance the food-service sectors of the food industry, thereby improving the economic culture of the Oklahoma food processing sector.

Publications

Output from this project includes five FAPC *Product Profiles*, five product sell sheets published by the NCBA-Beef Innovations Group, and recipe portfolios published by the CAP.

Funding

The FAPC and CAP provided funding for this project.

Collaborators

Jake Nelson, FAPC value-added meat processing specialist, was the principal investigator for this project. Other collaborators included Andrea Graves, FAPC business and marketing specialist; Mandy Gross, FAPC communications services manager; Dr. William McGlynn, FAPC horticultural products processing specialist; and Dr. Roy Escoubas, FAPC director. CAP faculty and staff Rene Jungo, Scott Sherill, Jason Marsh, Laura Roets, Anita Gordy-Watkins, and Dr. Bob Klabenes also were collaborators.

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Effect of canola oil quality on biodiesel conversion efficiency and properties

Objective

Many small biodiesel producers use feedstock oils, which vary in quality and degree of refining and range from crude to highly refined, in their operations. There are claims that mechanically extracted oil makes better biodiesel as compared to that from hexane-extracted oil. However, there was no comprehensive study evaluating the effect of oilseed extraction and refining techniques on biodiesel production efficiency and properties, specifically products derived from canola.

Therefore, the main objective of this study was to examine conversion efficiency and quality of biodiesel produced from canola oil obtained by both hexane and mechanical extraction methods.

Approach

Hexane extracted crude, degummed, refined-bleached-deodorized, and mechanically extracted canola oils were converted to biodiesel using the traditional transesterification method. Sodium methoxide in methanol was used as a catalyst. Material balances for conversion of hexane and mechanically extracted oils to biodiesel were calculated. Viscosity, flash point, storage stability, cloud point, moisture, free and total glycerol content, differential scanning calorimeter cooling curves and energy content of biodiesel samples were determined. The results from the quality tests were compared with European (EN-14214) and ASTM (D6751-08) standards. Hexane extracted crude oil had the lowest biodiesel conversion efficiency among the samples examined in the study. The degree of oil refining had a significant effect on biodiesel quality.

Benefits

Data generated from this study will be helpful for small, on-farm biodiesel producers when making decisions on the level of oil refining required to achieve good conversion and biodiesel quality.

Economic Impact

The findings of this study will help farmers and small processors improve the economic feasibility of biodiesel production operations and improve final product quality. These improvements will lead to economic savings and cleaner biodiesel for farm vehicle use.

Continuing Work

Currently, there are biodiesel characterization and quality tests and data analysis underway.

Publications

Two abstracts regarding this research were prepared for oral presentations at the American Oil Chemists Society Annual Meeting and Expo in Orlando, Florida, and American Society of Agricultural and Biological Engineers Annual International Meeting in Reno, Nevada.

Funding

The Division of Agricultural Sciences and Natural Resources Team Initiative Project provided funding for this project.

Collaborators

Dr. Nurhan Dunford, FAPC oil/oilseed chemist, was the principal investigator for this project. Aihua Su, FAPC oil/oilseed chemistry research specialist, also was a collaborator.

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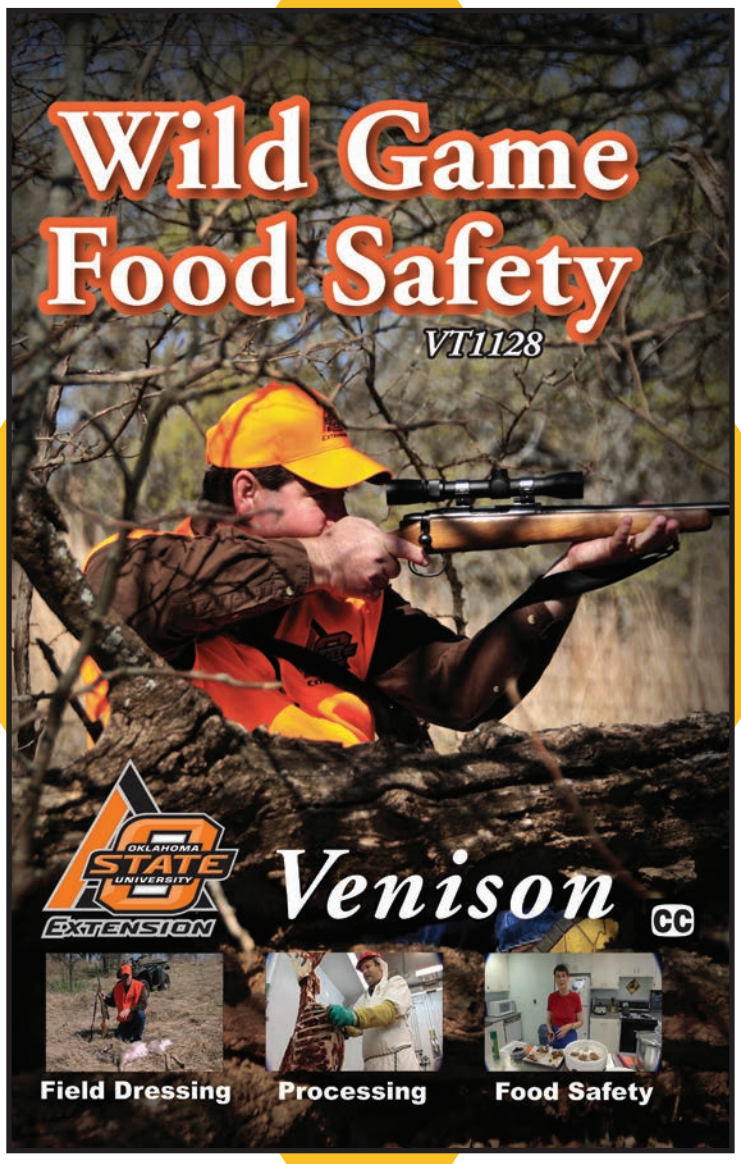
Teaching food safety to hunters

Objective

The primary objective of this project was to teach the general hunting public about food safety when processing.

Approach

After obtaining a deer carcass, a video showing proper field dressing techniques was created by Dr. Gene Parker, Oklahoma Cooperative Extension Service veterinarian and food animal quality and health specialist. In the video, Parker demonstrated the proper way to eviscerate a deer after harvest, including the use of good sanitary practices and what to look for when providing a wholesome product for food processing. Demonstrations were done regarding correct carcass processing once it was skinned and chilled, which included examples of discarding wound and blood shot areas, as well as carcass contamination inspection. By following the techniques suggested, hunters can deliver a safe, wholesome product to meal preparers.



In addition to proper field dressing techniques, the video includes demonstrations by Barbara Brown, Family and Consumer Sciences food specialist, on cooking venison and offers many recipes. The DVD has been distributed through Oklahoma Cooperative Extension Service offices around the state.

Benefits

This video gives deer hunters, as well as family members who may cook venison, basic training in deer processing and recipes to use when cooking.

Economic Impacts

Watching this DVD may prevent food poisoning; thus, reducing health care costs and providing the state of Oklahoma with a healthy workforce.

Publications

Output from this project was a DVD distributed across Oklahoma.

Funding

The Division of Agricultural Sciences and Natural Resources Team Initiative Project provided funding for this project.

Collaborators

Kyle Flynn, FAPC meat pilot plant manager, was the principal investigator for this project. Other collaborators included Dr. Gene Parker, Oklahoma Cooperative Extension Service veterinarian and food animal quality and health specialist; Dee Cooper, OSU Cooperative Extension northwest district director; Chuck Willoughby, FAPC business and marketing relations manager; Recia Garcia, family and consumer sciences northwest district program specialist; Barbara Brown, family and consumer sciences food specialist; and Craig Woods, agricultural communications services senior TV producer-director.

Entering the food chain

Objective

The primary objective for this project was to scale recipes for commercial processing.

Approach

Entrepreneurs continually contact the FAPC for assistance in getting food products and/or ideas to market. While some bring experience to the venture, most are at the start-up phase. Each new client is required to attend the FAPC's Basic Training seminar before entering the client success path. One of the first services provided is recipe scale-up, or converting a home-style recipe into a commercial recipe for large scale processing. During this process, the recipe is converted from the language of cookbooks into the language of processing. During scale-up, the client is encouraged to consider cost; required label copy, including nutrition facts; ingredient sourcing and specifications; and product consistency.

A key objective of the entrepreneur is to keep the finished product characteristics close to their original product. However, in some cases, adjustments are needed to make the product commercially viable. During the past year, eighteen clients with more than thirty products have come to the FAPC for recipe scale-up. Products have included pizza and barbecue sauces, barbecue rub, salsa, granola, cake icing, pickles, cookies, bakery products, bread pudding, and meat marinade. Approximately eight products are currently in test market, or are being marketed on a limited basis.

Benefits

Providing an increasing variety of locally produced food products was the major benefit seen from this project.

Economic Impact

This project will provide an income stream for the entrepreneur, co-packer and/or distributor. During time, this will hopefully allow the client to expand and provide additional employment opportunities.

Continuing Work

Each project is considered a work-in-progress that requires continued support to achieve client objectives.

Funding

The FAPC and participating clients provide funding for these projects.

Collaborators

David Moe, FAPC pilot plant manager, was the principal investigator for this project. Other collaborators included Darren Scott, FAPC food scientist and sensory specialist; Reneé Albers-Nelson, FAPC milling and baking specialist; and FAPC business/marketing staff Jim Brooks, Chuck Willoughby, Andrea Graves, and Erin Early.

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Omega-3 fatty acid fortification of a prototype food

Objective

The objective of this project was to assist a client in fortifying a food with several forms of omega-3 fatty acids. The client then used the prototype to market an ingredient and demonstrate its ease of application to potential buyers.

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 food fortified with omega-3 fatty acids. The pilot plant product batches were manufactured to specifications provided by the client. By adding them to separate test batches, both powdered and liquid forms of omega-3 fatty acids were evaluated.

Then, they were monitored to determine how easily they could be introduced into the product, if there were any subsequent problems with separation, and if there were any issues with the formation of off-flavors and/or aromas. Additionally, the pH and fill temperature of the prototypes were monitored to determine if they would impact the stability of the omega-3 fatty acids.

Slight differences in initial solubility were observed between the two forms of omega-3s. However, they did not appear to be significant, no separation was observed, and the flavor of the product was sufficient to mask the flavor and aroma of the omega-3s. Additionally, pH and fill temperature did not appear to affect their stability.

Benefits

From this project, consumers will have additional food choices that provide them with the benefit of omega-3 fatty acids.

Economic Impacts

The client may be able to increase sales by demonstrating the ease of application/use of the ingredient and its compatibility with different types of food systems.

Funding

The client provided funding for this project.

Collaborators

Darren Scott, FAPC food scientist and sensory specialist, was the principal investigator for this project. David Moe, FAPC pilot plant manager, also was a collaborator.

Agribusiness Economics

Analytical Chemistry

Business Planning and Marketing

Cereal Chemistry

Communications

Food Chemistry

Food Engineering

Food Microbiology

Horticultural Processing

Meat Science

Oil/Oilseed Chemistry

Pilot Plant

Product Development

Quality Control and Assurance

Value-Added Wood Products

Developing a Quality Management Roundtable for the food industry

Objective

The primary objective of this project was to present, discuss, share, and disseminate information on current quality management, best practices, and customer-driven issues to the food processing industry in Oklahoma.

Approach

As the supplier criterion evolves, so has the need to establish more than the traditional food safety and sanitation programs. Because customers are looking for suppliers to provide ongoing and improving quality systems that enhance food safety and sanitation programs, companies are looking for resources and training to meet those customer programs.

The Quality Management Roundtable integrates industry representatives; OSU personnel; state and federal officials; food safety professionals; and industry vendors, such as third-party quality and food safety auditors. University, industry, consulting, in-state, and out-of-state specialists are invited to give presentations on topics related, but not limited, to new and emerging technologies, quality practices, sanitation, crisis management, statistical process control, validation and verification procedures, and current federal regulations pertaining to the food industry.

Benefits

These new workshops provide resources for quality management, process improvement, and programs to meet customer criteria.

Economic Impact

This roundtable provides in-state resources and presenters, thus eliminating out-of-state travel for such information. Furthermore, sharing Quality Management knowledge and best practices allows participants to go back to their respective establishments with new ways to implement customer programs, meet criteria, and achieve customer satisfaction.

Continuing Work

Quality Management Roundtable is facilitated every three months by FAPC personnel, and reviewed annually to identify improvement opportunities.

Publications

Information about this project has been published in an *FAPC Flash*.

Funding

Client-paid fees fund this project.

Collaborators

Jason Young, FAPC quality management specialist, was the principal investigator for this project. Other collaborators included Mandy Gross, FAPC communications services manager; Karen Smith, FAPC administrative support specialist and workshop coordinator; David Moe, FAPC pilot plant manager; and Dr. Guadalupe Davila-El Rassi, FAPC analytical services manager.

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Product Development

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Value-Added Wood Products

Manufacture of structural composite panels from Eastern redcedar

Objective

The primary objective of this project was to evaluate the physical and mechanical properties of structural composite panels from Eastern redcedar.

Approach

Eastern redcedar, *Juniperus virginiana L.*, is widely distributed in Oklahoma. With an estimated acreage of more than nine million acres, it is projected to have taken over about 12.6 million acres by 2013. If action is not taken, it is predicted that problems caused by Eastern redcedar invasion will cost Oklahoma $447 million by 2013.

This project directly addressed the development of value-added structural panel products from under utilized Eastern redcedar. Low-quality Eastern redcedar trees were cut into six-inch-long sections to produce strands. An average of six percent and six percent liquid phenolic exterior resin was used. Single-layer, hand-formed experimental panels with random distribution of strands were manufactured in a computer-controlled press. Both physical and mechanical properties of the samples were tested based on ASTM standards.

Benefits

This project provided initial data on Eastern redcedar experimental panel properties.

Economic Impact

As a result of this research, Eastern redcedar may be used to produce such panels in a small commercial mill.

Continuing Work

In the future phases of this project, three-layer panels with oriented strands of redcedar and southern pine in various mixtures will be manufactured as control samples, including 20:80 percent Eastern redcedar and pine, 50:50 percent Eastern redcedar and pine, and 100 percent pine. The results then will be subjected to an analysis of variance to test the effects of raw material and panel configuration against mechanical and physical properties.

Funding

The FAPC provided funding for this project.

Collaborators

Salim Hiziroglu, FAPC wood products specialist, was the principal investigator for this project.

Faculty and Professional Staff

"Much time and effort was committed to biofuels research this year, but I was also able to work closely with the many FAPC clients who served as projects for my Advanced Agribusiness and Innovation Education classes."

Rodney Holcomb, Ph.D.
Agribusiness Economic Specialist
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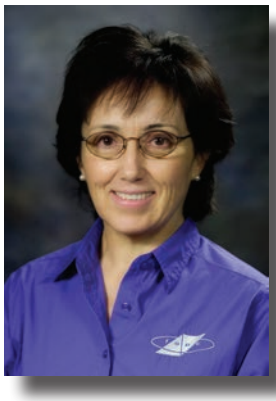
rodney.holcomb@okstate.edu



"2008 was an exciting and productive year, starting with new instrumentation for biofuel analysis, facing new methods of analysis and ending with a successful assessment for ISO-17025 accreditation."

Guadalupe Davila - El Rassi, Ph.D.
Analytical Services Manager
315 FAPC
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"2008 was a successful year for several of our clients whose products are now available to Oklahoma consumers. We continue to look for opportunities to assist the food industry in our state."

Jim Brooks
Business & Marketing Services Manager
143 FAPC
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"I feel like the satisfaction we get from successfully providing services and assistance to our clients – from small entrepreneur to major manufacturer – has inspired us daily to live out our mission: to add value to Oklahoma."

Chuck Willoughby
Business & Marketing Relations Manager
141 FAPC
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"Another great year of seeing Oklahoma Entrepreneurial Spirit hard at work."

Erin Early
Business & Marketing Client Coordinator
140 FAPC
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"A historic election year, volatile gas prices, and a difficult economy has definitely impacted food businesses in determining whether or not to start a new venture in 2008."

Andrea Graves
Business Planning & Marketing Specialist
142 FAPC
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Faculty and Professional Staff

"A study showed that the CREG methods were useful in predicting wheat cultivars with good machine-ability and baking performance and a balance of both factors."

Patricia Rayas, Ph.D.
Cereal Chemist
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"I have really come to admire the clients that come to the FAPC with this great pie or cookie recipe and have the gumption to follow through with their product all the way to it being sold in a store."

Reneé Albers-Nelson
Milling & Baking Specialist
105 FAPC
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"New to 2008, the FAPC started providing communications services to new start-up companies. I've enjoyed working with these new companies and helping with their communications needs."

Mandy Gross
Communications Services Manager
144 FAPC
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"Transferring to the FAPC has been both challenging and rewarding."

Christina DeWitt
Food Chemist
125 FAPC
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"The future is sweet!"

Danielle Bellmer, Ph.D.
Food Engineer
108 FAPC
danielle.bellmer@okstate.edu

"Rising energy and waste disposal costs coupled with global economic uncertainty brought significant challenges to the food and agricultural processing industry in 2008, and we are focusing our efforts to help."

Timothy Bowser, Ph.D.
Food Engineer
124 FAPC
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Faculty and Professional Staff

"The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' but 'That's funny...'"
–Isaac Asimov

William McGlynn, Ph.D.
Horticultural Products Processing Specialist
112 FAPC
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"During 2008, we have made great progress in understanding the function of probiotics in animals and in the detection of staphylococcal enterotoxin."

Stanley Gilliland, Ph.D.
Food Microbiologist
111 FAPC
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"It's frustrating when students are so valuable for the experiences they encounter during the course of their research that they get hired away before they can finish."

Peter Muriana, Ph.D.
Food Microbiologist
109 FAPC
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"FAPC Oil/Oilseed group is convinced that Oklahoma is ready to take the next step and build an oil refining facility to meet edible and industrial oil needs of food processors and biodiesel producers in the state."

Nurhan Dunford, Ph.D.
Oil/Oilseed Chemist
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"It's the economy."

Jacob Nelson
Value-Added Meat Processing Specialist
106 FAPC
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"Although 2008 was the year of the rat, we have been able to rise above it."

David Moe
Pilot Plant Manager
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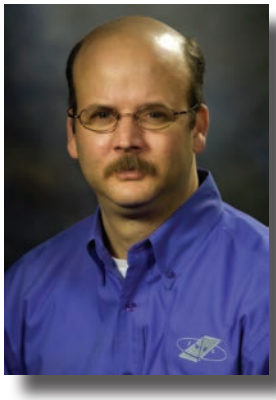
Faculty and Professional Staff



"Safety! Food and employee safety are our No. 1 priorities."

Kyle Flynn
Meat Pilot Plant Manager
205 FAPC
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"I am happy to be a member of the FAPC team."

J.D. Hathcock
Meat Lab Assistant Coordinator
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"Onward and upward."

Darren Scott
Food Scientist/Sensory Specialist
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"Continuous improvement is the result of empowered employees!"

Jason Young
Quality Management Specialist
102 FAPC
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"Tried to solve the redcedar problem in Oklahoma."

Salim Hiziroglu, Ph.D.
Value-Added Wood Products Specialist
303G Ag Hall
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"The FAPC took a step into its second decade of service. It has moved from its youth into a mature role of accomplishments for the food and agribusiness industries of Oklahoma."

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