Food & Agricultural Products Center • Adding Value to Oklahoma

Annual Report 2005

Division of Agricultural Sciences and Natural Resources • Oklahoma State University

Sorganol

Converting Sweet Sorghum to Ethanol

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Issue Printed in 2006

Food & Agricultural Products Center

Annual Report 2005

Adding Value to Oklahoma

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About the cover...

The FAPC is investigating the process of in-field ethanol production in which juice from sweet sorghum is collected, fermented, and distilled in the field. This is just one of the projects featured in this Annual Report.

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A Message to Our Stakeholders

The Oklahoma Food and Agricultural Products Research and Technology Center is a research and development and business and technical assistance resource for the food and agricultural industries. This 96,000-square-foot stand-alone building has animal harvest, food manufacturing, grain milling, sensory profiling, food microbiology, and analytical laboratory facilities. The FAPC has conference facilities and applications laboratories for demonstration and prototype testing. It is a state-of-the-art facility and is available for scheduled work with you.

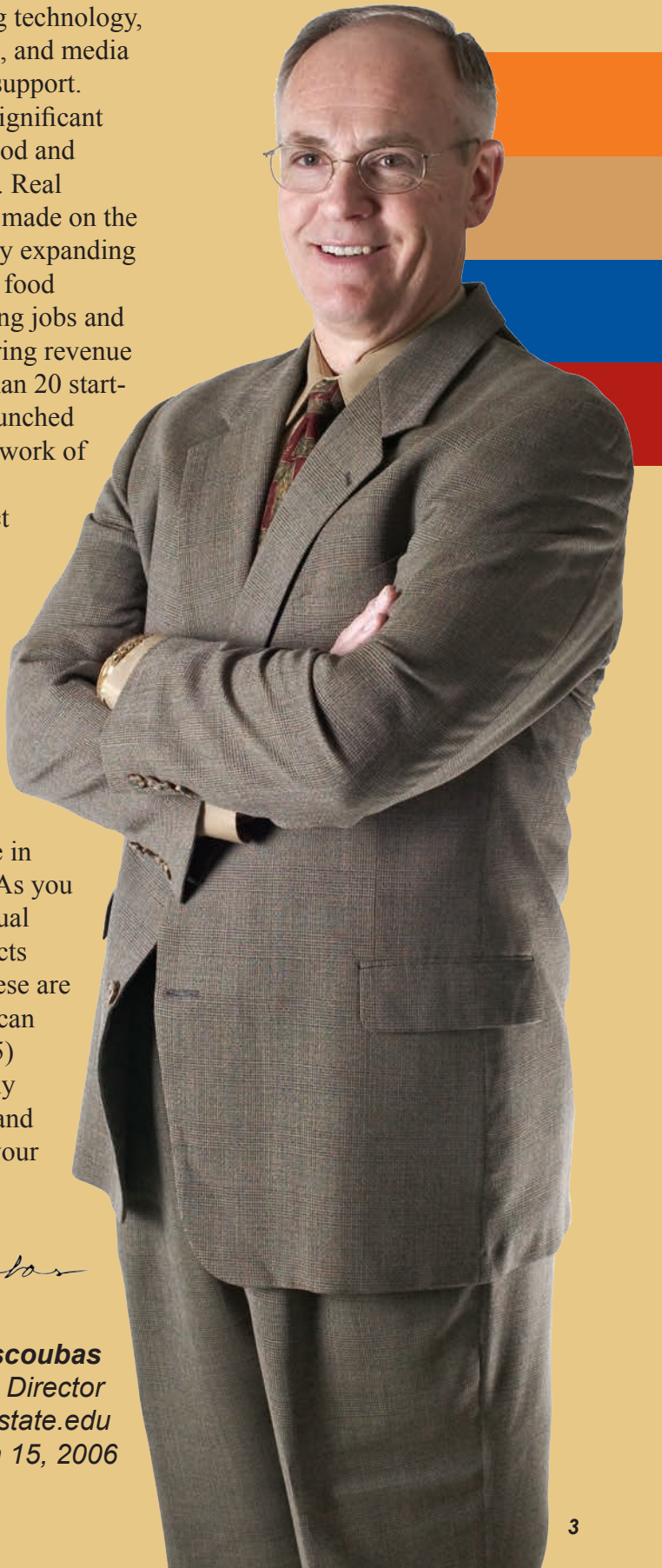
In 2005, the FAPC was active in more than 180 client projects, and about 20 of those were major grant and contract research projects supported by more than $800,000 of extramural funds. The FAPC offered 23 business, marketing, food safety, and technical training sessions to about 500 attendees.

The FAPC operated in 2005 with nine faculty members, nine professional staff members, and three full-time clerical staff members and made significant contributions in value-added processing in horticultural products, meat products, wheat and other small grain products, forest products, and oilseed products.

Additionally, significant food industry and agribusiness support was given for process engineering, food safety, agricultural economics, business planning and market development, food manufacturing, food sensory technology, food harvest and processing technology, quality manufacturing, and media and communications support.

The FAPC made significant contributions to the food and agricultural industries. Real economic impact was made on the Oklahoma economy by expanding the direct and indirect food industries and providing jobs and enhancing manufacturing revenue in Oklahoma. More than 20 start-up businesses were launched in Oklahoma through work of the FAPC.

Economists predict 2006 will be a good business year. The Oklahoma business environment is excellent, and the Oklahoma food industry continues to expand. The FAPC is prepared to help you participate in this business growth. As you read through this Annual Report, note the projects that are discussed. These are examples of what we can do with you. Call (405) 744-6071 or e-mail any one of the specialists and let us help you grow your business.



Dr. J. Roy Escoubas
FAPC Director
roy.escoubas@okstate.edu
March 15, 2006

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 Oklahoma Food and Agricultural Products Research and Technology Center 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.

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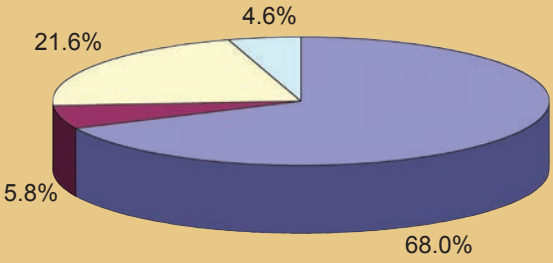
Adding Value to Oklahoma

2005 Financial Highlights

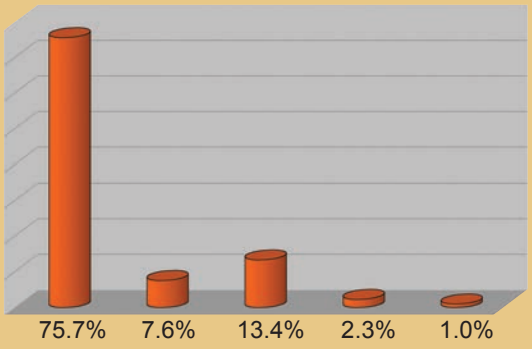
Total Working Funds	
State-Sourced	$2,654,673.00
Fee-Based Sourced	$ 224,516.00
Total State-Sourced Funds	$2,654,673.00
Research Funds, State of Oklahoma	$1,880,202.00
Extension Funds, State of Oklahoma	$ 774,471.00
Total Fee-Based Funds	$ 224,516.00
Conference Income	$ 34,102.00
Small Project Product Development Income	$ 57,566.00
Pilot Plant Processing Income	$ 132,848.00
Grants and Contract Research Funding	$ 842,000.00
Regents' Value-Added Product Development and Rural Development Grant	$ 180,000.00
Total Available Funds	$3,901,189.00
State-Sourced Funds	$2,654,673.00
Fee-Based Funds	$ 224,516.00
Grants and Contract Funds	$ 842,000.00
Regents' Grant	$ 180,000.00

Description of Funds	
State-Sourced Funds	68.0%
Fee-Based Funds	5.8%
Grants and Contracts Funds	21.6%
Regents' Grant	4.6%



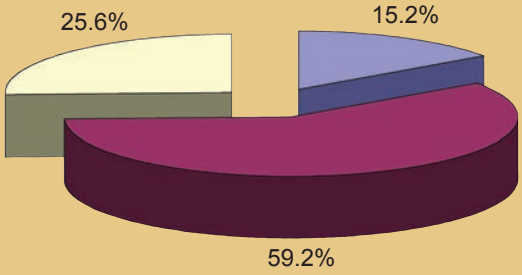
Description of Funded Activities	
Research and Product Development Activities	70.0%
Outreach Activities	30.0%

Disposition of Budgeted Resources	
Faculty and Staff Salaries and Benefits	75.7%
Faculty and Staff Maintenance and Operational Funds	7.6%
Facility and Equipment Operational and Expense Funds	13.4%
Small Projects Development	2.3%
Market Development	1.0%



Donations and Pledges	
Endowed and Non-Endowed Donations and Pledges	$1,002,720.00
Gifts-In-Kind Donations	$ 15,000.00
Total Pledges and Donations	$1,017,720.00

Description of Fee-Based Activities	
Conferences and Training Programs	15.2%
Pilot Plant Processing Programs	59.2%
Small Projects and Applied Development Projects	25.6%



Keeping the PRODUCTS, JOBS, and MONEY in Oklahoma

Purpose

The purpose of the FAPC is to help develop successful value-added enterprises in Oklahoma–keeping the products, jobs, and money in Oklahoma. A study conducted by the FAPC and the OSU Department of Agricultural Economics assessed the impact of the center on the state of Oklahoma.

Objectives

The specific objectives of the study were to determine the economic impact of all the firms assisted by the FAPC and to determine the economic impact of services offered by the FAPC.

Results

Of the firms surveyed, there was a 12-percent increase in full-time employment, a 32-percent increase in payroll, and a 144-percent increase in total sales. Direct, indirect, and induced effects of the firms also were estimated. Direct effects are the changes in economic activity that result from the production or processing of a product. Indirect effects are the result of increased business spending by the basic sector, and induced effects are the increase in household spending due to an increase in income. The direct employment totaled 8,385, and the total related employment was 21,960. The total direct sales equaled $544,915,000, and the total related sales was $2,129,654,871.

The research also included case studies, which provided useful qualitative data about the services provided by the FAPC. Some of the responses by the firms included:

- Potentially increased revenues through the better business and tax structuring.
- Potentially saved the firm money, decided not to expand from current market.
- Grateful that Oklahoma can provide these services at a minimal cost to value-added firms.
- Probably would not have started the firm without the assistance of the center.
- Provided helpful information through every phase of starting the firm.
- Appreciated that the center's staff stayed in contact through the entire process.
- Potentially made production more efficient.
- Useful to compare with in-house research.

Economic Impact

The study found the firms assisted by the FAPC accounted for approximately 21 percent of the direct food processing jobs and 31 percent of the indirect food processing jobs in the state of Oklahoma. Also, the firms indicated an increase in full-time employment, sales, and payroll, and the responses to the case study indicated the services provided by the FAPC are having a positive impact on the firms.

The FAPC strives to ensure a profitable future for Oklahoma's food and fiber processors by necessitating a constant and intensive review of changes in both industry characteristics and markets.

Agribusiness Economics

Analytical Chemistry

Business Planning & Marketing

Cereal Chemistry

Food Engineering

Horticulture Processing

Food Microbiology

Muscle Science

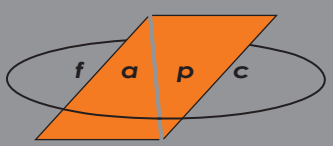
Oil/Oilseed Chemistry

Pilot Plant

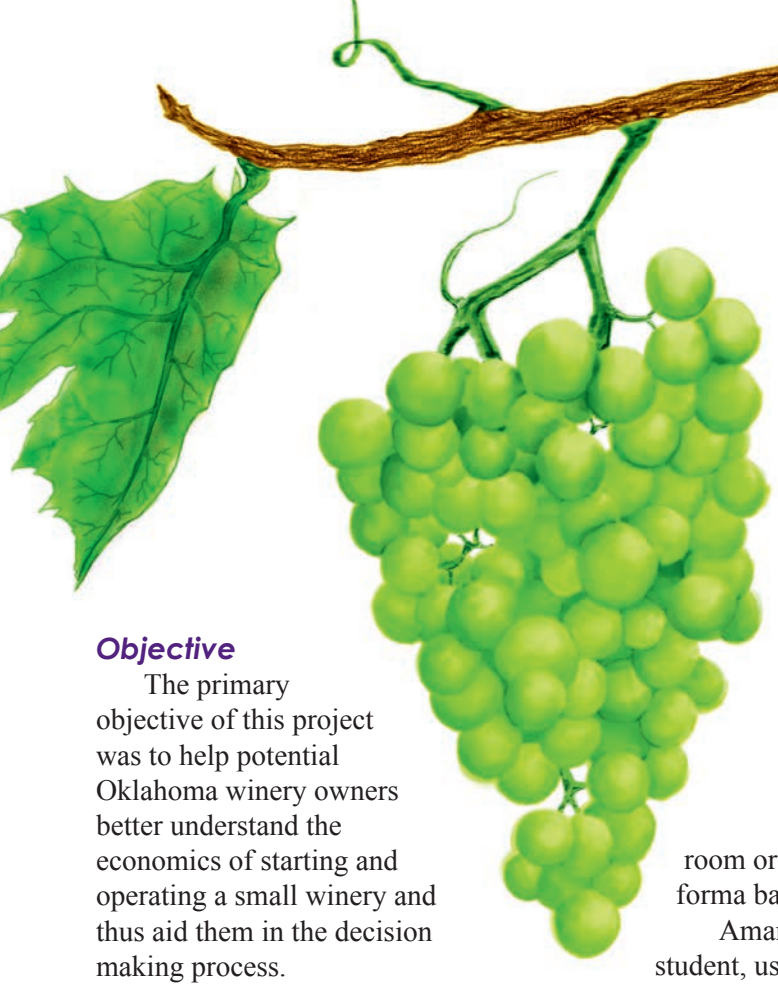
Product Development

Quality Control & Assurance

Value-Added Wood Products



Adding Value to Oklahoma



The Economic Feasibility of Small Oklahoma Wineries

Objective

The primary objective of this project was to help potential Oklahoma winery owners better understand the economics of starting and operating a small winery and thus aid them in the decision making process.

Approach

Researchers identified virtually all aspects of wine production and marketing in Oklahoma. To capture the detailed production and regulatory requirements associated with winemaking, several Oklahoma wineries and state agencies, including the Oklahoma Alcoholic Beverage Laws Enforcement (ABLE) Commission, were consulted.

The information obtained was used to develop a feasibility assessment model in a Microsoft® Excel® spreadsheet. The user-friendly model, which is available to the public via the FAPC Web site, takes user-defined inputs (e.g., grape prices, type and quantity of wine to be produced, bottle and labeling costs, production equipment costs, etc.) and generates 10 years of projected profit/loss and annualized cash flows, plus several measures of return on investment. The spreadsheet also can be easily modified to fit a specific business model, add more detail to the costs associated with operating a tasting room or gift shop, derive pro forma balance sheets, etc.

Amanda Hill, graduate student, used the model and an Excel® add-in software called Simetar® to simulate winery operating conditions and measure the risk associated with variances in grape prices, wine prices, and operating parameters for her thesis.

Benefits

Oklahoma winemakers can now easily assess the viability of a new or expanded winery before spending considerable money on a proposed project. Additionally, the spreadsheet can be easily modified to suit the specific needs of and regulatory environments faced by winemakers across the United States.

Economic Impacts

The number of small wineries in Oklahoma is expected to continue to increase, and the results of this project will hopefully prevent or minimize the number of failures among small start-up wineries.

Publications

As a result of this research, a thesis is being completed, the software is available online via the FAPC Web site, and a companion Fact Sheet for the software is being developed.

Funding

This project was undertaken and funded as part of a USDA Initiative for Future Agriculture and Food Systems (IFAFS) grant, entitled “Production, Development, and Marketing of Value-Added Horticultural Products.” This IFAFS project is a collaboration of multiple universities, including the University of Arkansas – Fayetteville, the University of Arkansas – Pine Bluff, Mississippi State University, and Alcorn State University.

Collaborators

Dr. Rodney Holcomb, FAPC Agribusiness Economic Specialist, was the principal investigator for this project. Other collaborators included Amanda Hill, agricultural economics graduate student; Dr. William McGlynn, FAPC Horticulture Processing Specialist; and Dr. Phil Kenkel, Agricultural Economics Professor and Fitzwater Cooperative Chair.

The FAPC offers analysis of food products to assist processors and entrepreneurs. From aflatoxins to beef jerky to food colorants to vanilla analysis, the FAPC strives to serve the various disciplines within the food and agricultural industries.

Agribusiness Economics
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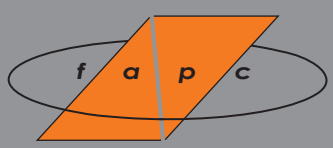
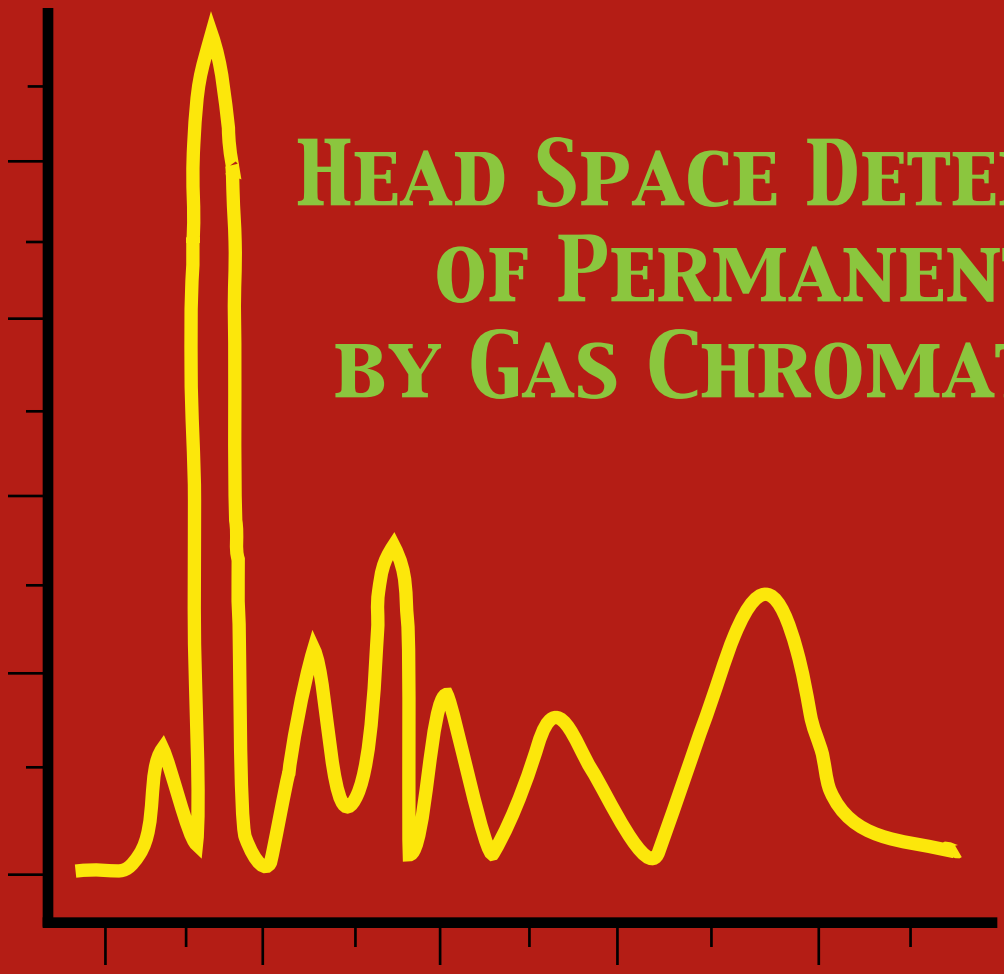
Oil/Oilseed Chemistry
Pilot Plant
Product Development
Quality Control & Assurance
Value-Added Wood Products



Adding Value to Oklahoma

Head Space Determination of Permanent Gases by Gas Chromatography



Objective

One of the objectives was to establish a Gas Chromatography (GC) method for the identification and quantification of modified gaseous atmosphere in food packages.

Approach

In modified atmosphere packaging (MAP), the initial atmosphere of the package is intentionally modified to a unique gas mixture so the shelf life of the product is prolonged. There are many gaseous combinations that can lead to a substantial increase of the shelf life of food products; however, the most common gases used in MAP are carbon monoxide, carbon dioxide, and nitrogen. The FAPC established the headspace of permanent gases by GC. GC is the method of choice because of the sensitivity, selectivity, reproducibility, and speed of the analysis.

Benefits

Food researchers have faced numerous challenges when trying to develop a product that during a shelf life sustains the least amount of damage to quality, texture, taste, and nutrition. MAP can maintain the quality and extend the product shelf life by slowing chemical and biochemical deteriorative reactions and by slowing or preventing the growth of spoilage organisms.

Economic Impacts

Extending the shelf life of food products will allow more efficient use of natural resources, thus economic advantage will be gained.

Publications

As a result of this research, an abstract for a meeting presentation has been submitted.

Collaborators

Dr. Guadalupe Davila-El Rassi, FAPC Analytical Chemist, was the principal investigator for this project. Renee Albers-Nelson, FAPC Research Specialist, and Adam Tittor, graduate student, also served as collaborators.

The FAPC can assist any Oklahoma community by providing information, tailoring workshops to meet specific needs, and assisting in a variety of business and marketing areas.

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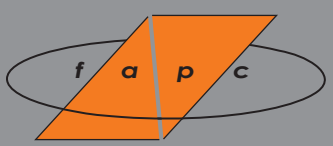

Adding Value to Oklahoma

Development of a Pourable Peanut Butter Syrup

Objective

The main objective of this project was to help Kathy Privett, owner of Abe's Creations, commercialize and market her home recipe for pourable peanut butter syrup.

Approach

The path taken to successfully meet this objective included several steps: Basic Training, "Real World" Marketing Workshop, scale-up and formulation assistance, co-packer identification, test market production in the FAPC Pilot Plant, and market development assistance through tradeshow participation and news publications. All totaled, this project has taken more than 16 months to achieve the current level of success – beginning with Kathy attending Basic Training in August 2004.

Benefits

Consumers benefit from having available to them a convenient, ready to use pourable peanut butter syrup for pancakes, waffles, pound cake, or even ice cream. Oklahoma's food industry benefits as this is an example of innovation in food products coming from the state. While pourable peanut butter flavored topping already exists, no one has ever successfully developed a blend of peanut butter and pancake syrup that meets FDA's standard of identity rules and is actually approved to be called "peanut butter pancake syrup."

Economic Impacts

Economic impacts include the creation of a new start-up company, as well as new work for an existing co-packer. Additionally, a brokerage firm is benefiting from increased sales opportunities. All totaled, the direct economic impact on employment is about 10 jobs. While this is a new start-up, Abe's Creations has experienced fourth-quarter retail sales estimated at approximately $18,000.

Continuing Work

The two steps left to complete this project are continuing efforts for retail distribution throughout Oklahoma and the surrounding states and assisting with evaluation and development of potential foodservice market opportunities.

Publications

The new product developed by Abe's Creations has been featured in *The Oklahoman*, *Tulsa World*, *FAPC FLASH*, Inola Chamber of Commerce, and Oklahoma Farm Bureau. Additionally, Kathy Privett has been nominated for Entrepreneur of the Year by the Inola Chamber of Commerce.

Funding

The client provided the funding for this project.

Collaborators

Jim Brooks, FAPC Business Planning and Marketing Specialist, was the co-principal investigator. Other collaborators included Chuck Willoughby, co-principal investigator and FAPC Business Planning and Marketing Specialist; Dave Moe, FAPC Pilot Plant Manager; Darren Scott, FAPC Sensory Specialist; Mandy Gross, FAPC Communications Specialist; Erin Early, FAPC Business/Marketing Client Coordinator; and Deborah Solie, undergraduate student.

Consumer Perceptions of the Made In Oklahoma Coalition

Awareness Survey

Objective

The objective of this project was to determine impact of the Made in Oklahoma (MIO) Coalition's marketing efforts to increase awareness and sentiment towards MIO products.

Approach

Researchers surveyed close to 1,000 households in Oklahoma and surrounding counties to gather information about general awareness and disposition towards MIO products. This data was then put into frequency tables to help quantify the results. The researchers considered MIO's seasonal marketing activities, as well as general market factors, to attempt to explain the statistics that were generated.

Benefits

As a result of this project, MIO will be able to focus and strengthen its marketing efforts to consumers. This should lead to greater profitability for MIO companies, which already contribute billions of dollars of economic impact in Oklahoma.

Economic Impacts

The MIO marketing effort has led to sales increases and market penetration for member companies. It is likely that this information will lead to a more knowledgeable approach, which will result in more profitability, more jobs, the ability to introduce new products more successfully, and open the door to new companies to join and participate.

Continuing Work

The final report is being reviewed and will be published in April. An extension of this project, regarding awareness and disposition of those residents of surrounding states in counties adjacent to Oklahoma, will be completed this summer.

Publications

The final report of this project will be published, along with at least one journal article. An informational brochure and a mid-term report have already been published. It is likely that an *FAPC FLASH* will coincide with the release of the final report.

Funding

The project was funded jointly by the MIO Coalition and FAPC.

Collaborators

Corey Stone, FAPC Business Planning and Marketing Specialist, was the principal investigator for this project. Other collaborators included Erin Early, FAPC Business/Marketing Client Coordinator; Dr. Rodney Holcomb, FAPC Agribusiness Economic Specialist; Abby Fisher, undergraduate student; and Chuck Willoughby, FAPC Business Planning and Marketing Specialist.

Cookie Pre-Mix Scale-up

Objective

The primary objective of this project was for Upper Red Fork Innovations to diversify sales and marketing of its organic wheat to include value-added food products.

Approach

David and Tami Buss have successfully grown and marketed organic wheat, as well as natural lamb, at farmers' markets and to chefs in the Oklahoma City metro area. They contacted the FAPC asking for assistance in marketing and developing packaged organic whole wheat and organic whole-wheat cookie pre-mixes. The FAPC has assisted with converting home recipes to weighted formulas and with scale-up to larger batch sizes. Test market batches have been manufactured and packaged in the Pilot Processing Plant, and quality of their wheat has been evaluated through the Cereal Science program. Nutrition Facts have been provided and a review of their label to evaluate FDA compliance has been performed as well. Additionally, the FAPC has assisted with market planning and with writing the USDA Value-Added Marketing Grant.

Benefits

The demand for natural and organic foods continues to grow. Consumers will benefit by having available to them convenient and healthy snack options that are grown and produced locally. Additionally, diversification can lead to the survival and success of the Buss family farm. As they continue to be successful, their activities will have a direct, as well as an indirect, impact on their local economy, especially in western Oklahoma.

Economic Impacts

Initially, two jobs will be maintained. Increased revenue will follow the successful marketing of the at least five new products being developed.

Continuing Work

This project will come to completion as Upper Red Fork Innovations succeeds in launching its new value-added products. The expected project completion date is December 2006.

Funding

To cover the expenses associated with marketing and development of value-added products, the Busses applied for and were awarded a Farm Diversification Grant from the Oklahoma Department of Agriculture, Food, and Forestry and a Value-Added Marketing Grant from USDA.

Collaborators

Chuck Willoughby, FAPC Business Planning and Marketing Specialist, was the principal investigator. Other collaborators included Dr. Timothy Bowser, FAPC Food Engineer; David Moe, FAPC Pilot Plant Manager; Darren Scott, FAPC Sensory Specialist; and Dr. Patricia Rayas-Duarte, FAPC Cereal Chemist.

FAPC specialists focus on the food and agricultural uses of hard red and white winter wheat and understanding the physicochemical basis that contributes to the end-user quality of wheat.

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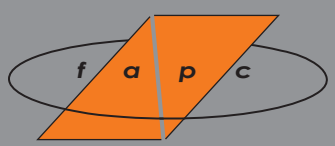

Adding Value to Oklahoma

Endosperm Protein Synthesis During Grain Development and Its Correlation to End-Quality Gluten Proteins

Objective

The objective of this project was to identify the proteins synthesized in wheat endosperm during the grain filling stage.

Approach

Extracts of enriched endoplasmic reticulum and Golgi complex are extracts from wheat endosperm tissue at different development stages representing early, mid, and mature endosperm.

The tissue extracts are prepared by low-speed centrifugation for separation of large particles followed by high-speed centrifugation using sucrose gradient, two phase partitioning, and western blot for identification of standard proteins found in the endoplasmic reticulum and Golgi complex.

Fractions of smooth and rough endoplasmic reticulum are separated from a microsome extraction. Two-dimensional electrophoresis is used for separating the proteins followed by peptide mass fingerprinting for identification of the proteins using Matrix-Assisted Laser Desorption/ Ionization-Time of Flight Mass Spectrometry (MALDI-TOF MS).

Qualitative identification of the expressed proteins from the enriched fractions of the two organelles will shed light in the secretory pathway of the endosperm wheat proteins. Comparison of storage proteins related to end-user quality also will be conducted. All these analyses will be done on samples from early, mid, and mature grain filling stages.

Benefits

The wheat industry will directly benefit from this project. The information can be used by wheat breeders for selecting improved varieties and basic cereal chemists to understand a little better the relationships of events related to the relationship of the environment and the biosynthesis and expression of proteins.

Economic Impacts

The expected outcome of this project is a direct impact on the understanding of endosperm proteins that are relevant for the control of the metabolic pathways and their relationship to endosperm proteins important in the functionality of wheat. The information gained will contribute to the selection process of improved wheat varieties.

Continuing Work

The first steps of this project were to develop the methodology needed to separate from the wheat endosperm tissue two organelles related to protein synthesis. The project will analyze a subset of proteins from enriched fractions of endoplasmic reticulum and Golgi complex. The identification of all the proteins expressed during different grain filling stages is a comprehensive goal that will be completed by multinational research groups. The wheat genome is presently largely incomplete; this means that only a fraction of the wheat proteins are known. Therefore, this project will search matches of the proteins found with those in public databases of wheat proteins positively identified up-to-date and other plant resources. For example, while searching the NCBInr protein database, protein mass and pI search criteria will be very specific utilizing the experimental molecular weight and pI observed from the 2-D gels. For each unknown protein, the pI range searched will match that of the IPG strip used on the corresponding 2-D gel. The molecular weight range will be set at 10 KDa above and below the molecular weight calculated from analysis of the 2-D gel. Local databases available for MS-Fit searches will include a *Triticum aestivum*-specific EST unigene translated database, Viridiplantae taxa subset of dbEST translated database (currently 1.6 million ESTs, release 020102) and the complete NCBInr protein database.

Publications

A doctoral dissertation was completed as a result of this research.

Funding

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

Collaborators

Dr. Patricia Rayas-Duarte, FAPC Cereal Chemist, was the principal investigator. Other collaborators included Mohamad El-Osta and Fadi Al-Jorf, doctoral students; and Michio Shimoyama, undergraduate student.

The FAPC helps Oklahoma's food and agricultural processors solve problems and achieve competitive advantage, leading to sustained economic growth, new jobs, and improved food safety and quality through better engineering.

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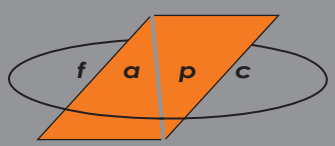

Adding Value to Oklahoma

In-field Production of Ethanol from Sweet Sorghum

Objective

The objective of this study was to determine whether in-field fermentation is feasible with no process temperature control.

Approach

To test whether in-field fermentation is feasible, fermentation experiments were conducted at various temperature extremes to determine efficiency of conversion to ethanol. Temperature-tolerant yeasts were acquired for use in the study, and their efficiency was compared with standard distillers yeast. Sweet sorghum was harvested from a plot in west-central Oklahoma (the farm of Dean Smith). A newly constructed harvester/roll press unit was used to harvest the sorghum and press the juice in a single pass through the field (unit designed and built by Lee McClune). Fermentation of the sorghum juice was then conducted in 1-gallon, 5-gallon, and 55-gallon vessels. Experiments took place both in the field and under controlled temperature conditions, where the temperature ranges tested were obtained from the average low and high temperatures from Oklahoma Mesonet data averaged over the last 10 years. During experiments, fermentation vessels were periodically sampled for sugar, ethanol, and other fermentation products. Other fermentation variables tested included the temperature gradient within vessels, the effect of pH adjustment, and the use of agitation.

Benefits

Development of an alternative source of energy from a domestic agricultural product has numerous benefits, including a decreased dependence on foreign oil, decreased noxious emissions from petroleum-based fuels, and improved rural agricultural economies. The in-field production aspect of this project could allow ethanol production by small agricultural producers, allowing them to fulfill some of their energy needs independently and ultimately reducing production costs.

Economic Impacts

Development of an in-field ethanol production process would have a very significant, positive impact on rural economies. It would provide the potential for either producer-owned or cooperatively-owned value-added processing and could represent potentially tremendous economic gain for agricultural producers. Results from this study also may be applicable to other renewable energy crops and may spur the development of other mobile in-field processing ventures.

Continuing Work

For in-field production of ethanol to become a reality, the single-pass juice press and harvester needs to be optimized, a mobile distillation system must be designed, and the entire process needs to be tested on a large scale.

Publications

This research has led to two presentations at national meetings, and both a master's thesis and journal article are in progress.

Collaborators

Dr. Danielle Bellmer, FAPC Food Engineer, was the principal investigator. Other collaborators included Dimple Kundiyana, graduate student; Lee McClune and Dean Smith, agricultural producers; Dr. Raymond Huhnke, Department of Biosystems and Agricultural Engineering Professor; and Dr. Mark Wilkins, Department of Biosystems and Agricultural Engineering Assistant Professor.

Low-cost, Safe Dehydrator for Small and Very Small Meat Processors

Objective

The primary objective of this project is to design, build, and test a safe and effective dehydrator that processors will be able to build themselves, using off-the-shelf components.

Approach

A safe and efficient dehydrator is being designed and built using off-the-shelf components for a total cost of less than $7,500. The dehydrator is being constructed in the Biosystems and Agricultural Engineering Department shop and will be installed in the FAPC pilot plant.

Once the system is installed and operating, test batches of jerky will be processed, and a complete temperature and humidity profile will be conducted on the drying enclosure. A microbiological challenge study will be performed using *E. coli O157:H7, Salmonella,* and *Listeria monocytogenes*.

Benefits

Safer, higher-quality jerky products will be produced due to tested and validated dryer and drying process. Increased numbers of processors will enter the jerky business due to lower cost of dehydration equipment and reduced product safety risks.

Meat processors will experience less financial risk because of lower equipment costs and increased safety of product. The dryer could be used to dehydrate non-meat products with little or no modification.

Continuing Work

The project is just getting underway with the conceptual design phase complete. Materials are now being ordered for dryer construction.

Funding

Funding for this project is provided by the USDA-FSIS 2005 Cooperative Agreement.

Collaborators

Dr. Timothy Bowser, FAPC Food Engineer, is the principal investigator for this project. Other collaborators include Dr. Peter Muriana, FAPC Food Microbiologist; Wayne Kiner, Biosystems and Agricultural Engineering Lab Manager; and Brady Stewart, Biosystems and Agricultural Engineering student.

The FAPC is committed to helping Oklahoma's producers and processors of horticultural products provide nutritious, delicious, and convenient food products to consumers everywhere.

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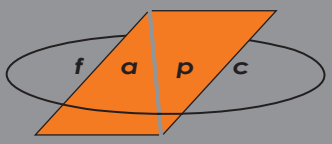

Adding Value to Oklahoma

SYSTEMATIC APPROACH TO MICROBIAL RISK ASSESSMENT IN FRESH-CUT SALAD MIX FROM PRODUCER THROUGH RETAILER

Objective

The overall goal of this project was to develop improved modeling tools that processors of fresh-cut fruits and vegetables can use to assess possible food safety hazards in their processing operations.

Approach

Researchers have collected samples and measured microbial population data on several fresh-cut vegetables from various discrete steps in the production process. The collected samples were evaluated for the presence and numbers of selected microorganisms, including bacteria, yeast, and molds. The microorganisms were selected to give the researchers insight into population dynamics for possible pathogens, as well as simple spoilage microorganisms. This microbial population data will next be used to refine risk assessment models. These models will calculate the survival, growth, and destruction of microorganisms as a function of time and other processing treatments.

Benefits

The researchers expect to create more effective risk assessment models that will enable fresh-cut processors to focus food safety efforts and minimize food safety hazards. This has several benefits to the industry including an enhanced ability to create new HACCP plans and to re-evaluate existing plans when changes are made in products or processes or when new products are introduced. The ultimate benefits to processors and consumers alike include fewer product recalls, improved brand images, reduced costs of product liability, and increased consumer safety and confidence.

Economic Impacts

Fresh-cut processors are expected to benefit from safer products and more efficient and effective food safety assurance programs, which should lead to increased revenue. In addition, the incidence of foodborne illness is expected to be reduced, thus lessening the economic losses that stem from these outbreaks.

Continuing Work

Data collection is substantially complete. The mathematical modeling portion of the project is just beginning and is expected to take two to three months to complete.

Publications

The generation of a dissertation and multiple journal articles from this project is expected.

Funding

This project was funded through USDA-CSREES grant funds.

Collaborators

Dr. William McGlynn, FAPC Horticulture Processing Specialist, was the principal investigator. Other collaborators included Haregewoin Woldemeskel, Ph.D. candidate; Dharmendra Bangalore, FAPC Research Specialist; and fellow researchers from the University of Arkansas.

One of the main focuses of the FAPC is to help Oklahoma's value-added businesses and processors in the area of microbial food safety from farm to table.

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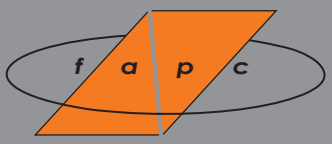


Adding Value to Oklahoma

Food Safety: Farm to Table

Objective

The objective of this project was to evaluate transport trailers as a source of *Escherichia coli* 0157:H7 in cattle.

Approach

Thus far, 12 transport trailers arriving at the Willard Sparks Center have been sampled. Six swab samples were obtained from each truck and analyzed for *E. coli* 0157:H7 using enrichment procedures coupled with an immunological separation of the pathogen from the enrichment broth. Of the 12 transport trailers, nine tested positive for the pathogen (all samples from each of the trailers were positive). The three others that were negative for the pathogen had been washed since the last load of cattle. The nine positive trailers had not been recently cleaned. These trailers were being used to transport the cattle to a slaughter facility. The cattle to be loaded had tested negative for the pathogen. Thus, cattle negative for *E. coli* 0157:H7 were being transported in trailers that contained manure containing the pathogen from previous cattle. The result of such practice could increase the incidence of *E. coli* 0157:H7 in cattle entering slaughter plants even though the cattle were free of the pathogen in the feed yard. Increased incidence of *E. coli* 0157:H7 on cattle entering a slaughter facility greatly increases the chance of the pathogen being isolated from meat of the cattle.

Benefits

The results suggest that cleaning the transport trailers could reduce a source of *E. coli* 0157:H7 on cattle. Reduction of the incidence of this pathogen on cattle entering slaughter facilities could reduce the possibility of *E. coli* 0157:H7 being found in beef products reaching the consumer, thus providing a safer food supply.

Economic Impacts

The potential economic impact for results such as these would benefit the meat industry by reducing the incidence of *E. coli* 0157:H7 in products such as ground beef, which would help prevent the massive recalls of such products from the market place. The researchers are in the process of typing the isolates of *E. coli* 0157:H7 in an effort to determine if they were all from the same group of cattle or feedlot.

Continuing Work

Additional sampling of transport trailers is needed to confirm the benefit of cleaning. Studies on the potential use of some types of sanitizers for the trucks between loads of cattle could further benefit the reduction in incidence of this and other pathogens that might contaminate the cattle to be transported.

Funding

The objective covered here is one of eight in the 2005-2007 Food Safety: Farm to Table special research grant funded by the USDA-CSREES.

Collaborators

Dr. Stanley Gilliland, FAPC Food Microbiologist, was the principal investigator for this project. Other collaborators included Dr. Paloma Cuesta Alonso, Post Doctoral Fellow; Sandra McCoy and Jennifer Nangle, FAPC Research Specialists; and Lacey Smith, Meriam Velasco, and Mindy James, graduate students.

EFFICACY OF LIQUID SMOKE AS AN ANTIMICROBIAL ON READY-TO-EAT MEATS

Objective

The objective of this project was to inhibit *Listeria monocytogenes* on ready-to-eat meats using liquid smoke.

Approach

The application of liquid smoke was examined by dipping and/or spray application onto hotdogs or deli turkey. Hotdogs were manufactured without lactate/diacetate currently used for control of *L. monocytogenes* by the processed meat industry. Hotdogs were sprayed in-house using a pressurized canister or during commercial manufacturing using a commercial spray applicator. Hotdogs were then distributed into various vacuum-package sampling bags with inoculated pathogen, stored, and sampled periodically for up to 10 weeks. Some trials included heat pasteurization in combination with liquid smoke (i.e., inhibitory effect of the liquid smoke allowed lower heat treatments). The results showed that liquid smoke was able to reduce and prevent outgrowth of *L. monocytogenes* when inoculated with up to 100 cfu (more than would likely to be acquired from contamination during packaging) for up to 10 weeks.

Benefits

Consumers will benefit because instead of processors adding smoke for flavor alone, it is better if the liquid smoke provides flavor and safety by inhibiting a pathogen known to be problematic for ready-to-eat meats. The meat processing industry will benefit because if liquid smoke provides initial reduction or prevents growth of *L. monocytogenes* during shelf life, then a product may be considered an Alternative 2 process, requiring less USDA regulatory scrutiny and testing. If the liquid smoke can do both (initial reduction and prevent growth of *L. monocytogenes* during shelf life), then the product will be considered an Alternative 1 process (more safe) and require even less USDA-FSIS oversight and testing.

Economic Impacts

Compared to other processes that require $300,000 or more in equipment to obtain Alternative 2 process level, this process is chemical-based and can be implemented even by small processors. Therefore, they too can implement new processes to reduce FSIS oversight and testing.

Publications

As a result of this research, two papers have been submitted for publication. An *FAPC FLASH*, research report and master's thesis have been published.

Funding

Funding for this project was provided by AMI Research Foundation and the OSU Experiment Station.

Collaborators

Dr. Peter Muriana, FAPC Food Microbiologist, was the principal investigator. Other collaborators included Will Robertson, FAPC Food Microbiology Specialist, and Praveen Yerramsetty, Rachel Wright, and Sunita Macwana, graduate students.

Microbial Forensic Model for Category B Biological Agents Deployed in Food Systems and Development of Rapid Detection Device

Objective

The primary objective of this project is to develop a rapid detection system for a Class B Biological Agent.

Approach

To achieve the objective, researchers must develop the "lock and key" database between the *Staphylococcus aureus* vegetative cell and the associated toxins (bioterrorism agent). Using this database of known enterotoxins from up to 40 strains, a rapid screening tool can be created to be used in the agriculture field to screen for the presence of enterotoxin. A rapid and sensitive screening sandwich enzyme-linked immunosorbent assay (ELISA) may be developed for the detection of *Staphylococcal* enterotoxin in food and agricultural products by using a multiple anti-SE Antibody (A) as the Capture A (CA) and as the antibody conjugate. The need to develop sensitive and specific antibodies will be accomplished using the *Staphylococcus aureus* strains. Antibody matrix will be coated onto the membrane; whereas, the target zone will react with target specific antigens and thus result in a positive reading.

Benefits

The benefit of this project is to prevent the food and agricultural industry from a bioterrorism event.

Economic Impacts

In the event of a bioterrorism attack, the economic impact of rapid detection of such an event could be in the multi-millions of dollars.

Continuing Work

All preliminary work for this project is ongoing at the moment.

Publications

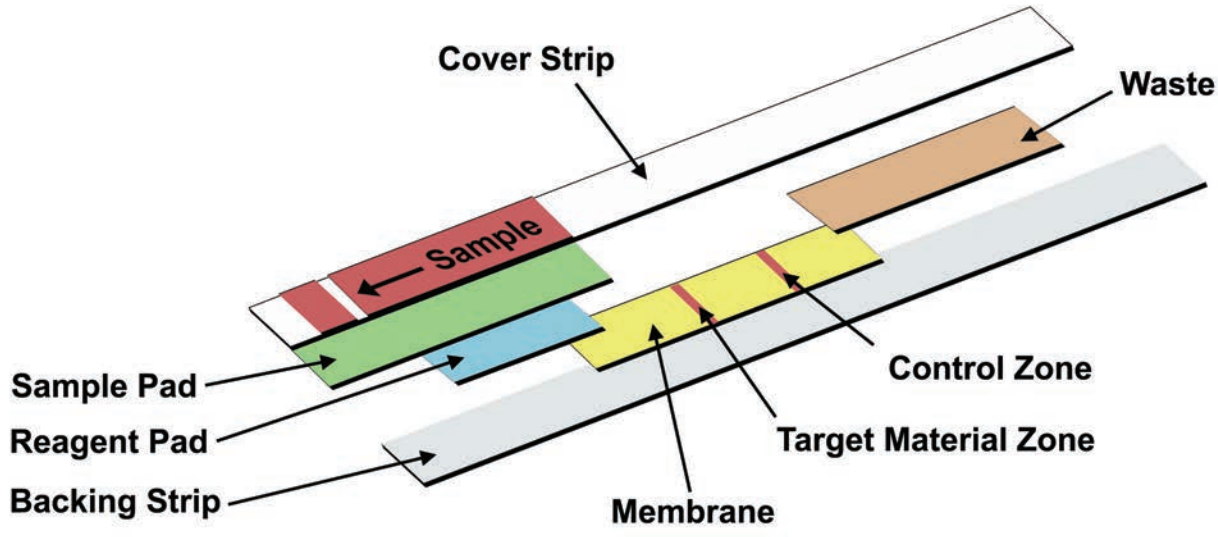
No publications have resulted at this time; however, there is plan to produce a series of *FAPC FLASHES* in the future.

Funding

The Food Safety Research Initiative Program of the United States Department of Agricultural Cooperative State Research, Education and Extension Service is funding this project.

Collaborators

Siobhan Reilly, FAPC Food Microbiologist, is the principal investigator for this project. Other collaborators include Dr. Stanley Gilliland, FAPC Food Microbiologist; Dr. Christina Dewitt, Animal Science Assistant Professor; Jennifer Nangle, Food Microbiology Coordinator; and Mindy Caldwell, graduate student.



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The FAPC works toward the development of an outstanding research program emphasizing the chemical or biochemical aspects of further processing of livestock, poultry, and aquatic muscle, as well as other food-producing species for value-added products.

f a p c

Adding Value to Oklahoma

Oklahoma Beef Quality Summit

Objective

The primary objective of this project is to teach the attendees a part of each segment of the entire beef industry, with particular emphasis on how each segment directly affects the ability of the end product (beef) to conform to consumers' requirements.

Approach

An intense, hands-on, 2 1/2- day short course is used. For each Summit, participants are exposed to and/or participate in lectures on relevant and current topics in the beef industry; defects that exist in all segments of the industry; live animal evaluations and selection technique; assessments of the market value of animals, carcasses, and meat products; determining beef carcass grades and grading principles; current economic conditions in the industry; and current slaughter, fabrication, further processing, and food safety practices.

The Summit is accomplished with the efforts of approximately 50 OSU personnel. Intended participants of the Summit include beef producers, growers and finishers, restaurateurs, meat processors and distributors, chefs, and others wanting to learn the intricacies of the beef industry. Participants are extremely encouraged to interact and participate in the hands-on portions, in order to maximize their understanding and increase their knowledge of all segments of the industry.

Benefits

Consumers and the industry both benefit tremendously by way of increases in product quality, as the producers and processors learn first hand the obstacles that inhibit continuous improvement of their product and industry. Many producers and processors have commented that before attending the Summit, they had no knowledge that certain practices they perform have a direct impact on the product's quality or value and what they do has a direct impact on what the people in the 'next step' do.

Economic Impact

According to the 2000 National Beef Quality Audit, $100.10 is potentially "lost" nationally for every slaughtered steer and heifer. Many of the quality problems, defects, shortcomings, shortfalls, and nonconformities that contribute to this loss value are directly addressed through the Beef Quality Summit. If the attendees of the program take what is learned and apply it to their operations, the loss value may be reduced by up to $25.00/head, particularly at a state (Oklahoma) level.

Continuing Work

Continuous evaluation of quality defects in the industry will continue to direct the Beef Quality Summit program.

Publications

Numerous popular press articles (magazines, newspapers, etc.) have been written and published about the Beef Quality Summit.

Funding

Funding for the Summit is provided by the Oklahoma Beef Council, the FAPC, and the Department of Animal Science.

Collaborators

Many people are involved with the Beef Quality Summit. Some of the collaborators include Heather Buckmaster from the Oklahoma Beef Council; Jake Nelson, David Moe, Russell Nabors, Dr. J. Roy Escoubas, Jerri Beth Tivis, and numerous graduate and undergraduate students of the FAPC; Dr. Brad Morgan, Dr. Deb VanOverbeke, Dr. Bob Kropp, Dr. Glen Selk, Kris Novotny, Linda Guenther, Amy Doss, Diana Bateson, and numerous graduate students and undergraduate students from the Department of Animal Science; Dr. D.L. Stepp from the College of Veterinarian Medicine; and Jandra Pricer and Patty Hood from Ag Conference Services.

The FAPC strives to enhance the nutritional and economic value of plant-based materials and oils/ oilseeds through innovative processing.

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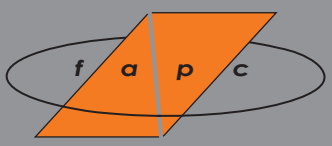

Adding Value to Oklahoma

Supercritical Carbon Dioxide Extraction and Fractionation of Wheat Germ Oil

Objective

The main objective of this project was to develop an environmentally friendly process that will efficiently extract oil and enrich naturally occurring bioactive compounds in edible oils while refining the crude oil.

Approach

Wheat germ processing presents challenges due to its high content of polyunsaturated fatty acids and bioactive compounds. These compounds are prone to oxidation and degradation under the conditions used for conventional edible oil extraction and refining methods. In this study, supercritical fluid extraction (SFE) and fractionation (SFF) methods were examined as alternative techniques to obtain high quality and purity wheat germ oil.

The researchers also investigated applicability of their patented edible oil processing method (Dunford, N. T.; King, J. W. Supercritical Fluid Fractionation Process for Phytosterol Ester Enrichment in Vegetable Oils. U.S. Patent 6,677,469 B1, 2004) to wheat germ oil.

A supercritical carbon dioxide "pilot plant" extractor designed and constructed at the Critical Fluid Technology Laboratory of the National Center for Agricultural Utilization Research Center was used for oil extraction. The extract yield was about 11 percent, which was very similar to that of conventional hexane extraction process. It was shown that both commercial and supercritical carbon dioxide extracted wheat germ oils were rich in tocopherols and phytosterols and superior to soybean oil.

The supercritical fluid fractionation experiments were conducted at the FAPC Pilot Plant. The pilot scale SFF column was designed in-house. The SFF technique was effective in removing undesirable free fatty acids from crude wheat germ oil while retaining bioactive components.

This project demonstrated that supercritical fluid technology can be used to produce high quality wheat germ oil enriched in bioactive compounds.

Benefits

Public concerns and consequently, government scrutiny regarding the environmental hazards of organic solvents, such as hexane and residues in oil/oilseed-derived products, have catalyzed the search for alternative solvents for edible oil processing. Supercritical fluid technology is environmentally benign and produces high quality and high purity products. Processing can be carried out at relatively low temperatures, thus minimizing degradation of heat labile bioactive compounds naturally occurring in vegetable oils.

Economic Impacts

There is a potential that wheat germ oil processing techniques developed at the FAPC can be transferred to industry to add value to Oklahoma-grown wheat.

Continuing Work

Supercritical fluid extraction and fractionation processing parameters need to be optimized for wheat germ oil extraction and refining before they can be applied to industrial scale operations. Determination of economic feasibility of supercritical fluid technology for wheat germ oil processing requires further research on current wheat germ oil market supply and demand trends and equipment costs.

Publications

As a result of this research, one master's thesis and two journal articles have been published.

Funding

This research was funded by Hatch funds.

Collaborators

Dr. Nurhan Dunford, FAPC Oil/Oilseed Chemist, was the principal investigator. Other collaborators included Michael Eisenmenger, graduate student, and Fred Eller and Scott Taylor, USDA-ARS National Center for Agricultural Utilization Research.

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The FAPC Pilot Plant facilities were designed with the needs of the Oklahoma food and agricultural products processing industry in mind; therefore, the facilities can accomodate all levels of the industry.

f a p c

Adding Value to Oklahoma

Specialty Meals - Community Action

Objective

The primary objective of this study was to provide support to Granna's, a start-up company manufacturing family recipes as frozen, single-serve units.

Approach

Granna's started as a plan to manufacture and market chili and other family recipes as frozen, single-serve units. The FAPC provided various services for this initial phase leading up to opening a USDA-inspected facility in 2004 with a line of four products. However, it proved difficult for Granna's to achieve its marketing and sales objectives and operate a production facility at the same time. Thus, a search began to identify a niche where growth could continue with reduced focus on marketing.

In early 2005, Granna's was contacted by "Community Action Plan" leaders looking to find local vendors for mobile meals and other similar programs, which was an ideal opportunity for Granna's. Granna's developed samples based on budget and nutritional specifications and became an approved vendor for a five-county area in Oklahoma.

The initial product line consisted of about 12 different meals designed to meet applicable standards. This has since grown to about 18 meals and sales to almost all counties in Oklahoma. The FAPC facilitated this new direction by providing assistance in recipe evaluation and revision, review of standards, labeling review, calculating nutritional profiles, and ongoing business support.

Benefits

The potential benefit of this new marketing system is to provide an Oklahoma-based alternative for adult care food programs.

Economic Impacts

The owners of Granna's have been able to expand their business, and four new jobs have been added to the Bessie community for a total of six. Out-of-state products are now being replaced with Oklahoma-made products.

Continuing Work

The current project has been completed; however, assistance will be provided as new items are added to the line.

Funding

The client, in addition to the FAPC, provided the funding for this project.

Collaborators

David Moe, FAPC Pilot Plant Manager, was the principal investigator during this project. Darren Scott, FAPC Sensory Specialist, and Jim Brooks, Business Planning and Marketing Specialist, also served as collaborators.

THE RANCHERS CLUB

Objective

The objective of this project was to provide technical assistance and counsel regarding the purchase, aging, inventory control, packaging, storage, and processing cost analysis of beef items for the Rancher's Club restaurant, allowing it to meet the expectations of its stakeholders, sponsors, and customers.

Approach

The FAPC Meat Pilot Plant was selected by the Rancher's Club to be the processing facility for all beef and pork items. This was a logical decision because of the FAPC's physical location, its USDA inspection capabilities, and academic curricula present at the university that could use the activities for educational purposes.

With the FAPC Meat Pilot Plant directly involved in the operation of the restaurant, the technical assistance and counsel regarding the purchase, aging, inventory control, packaging, storage, and processing cost analysis of beef items for the restaurant would be readily visible through the efforts of the plant.

Through the regular production of items for the restaurant, meaningful data was collected and presented to the restaurant administration. Personnel from the restaurant have easy access to the processing areas for education of their staff, for auditing the process, and for showcasing the process to their stakeholders and customers.

Benefits

A model is being created for other meat processors who may have future opportunities to provide items for premium-type restaurants. Meat processing possesses an intrinsic challenge of assigning correct and proper value to multiple items produced from one central product. A formal study in product and inventory valuation and management could be started using the restaurant and pilot plant model as the basis for the study.

Economic Impacts

Approximately 50 new jobs on the OSU campus have been created from the establishment of the Rancher's Club. Increased revenue is generated at multiple levels. At the local level, restaurant sales and processing fees go to the FAPC. At the state level, meat purchases from Oklahoma suppliers benefit the state. At the national level, meat purchases from out-of-state packing companies will provide those companies with new business.

Continuing Work

Because the restaurant is still open, the processing is continuous. The next major component is to begin the study of product and inventory valuation and management.

Publications

As a result of this research, numerous popular press articles have been released in magazines and newspapers.

Funding

Funding for the restaurant construction and start-up came partly from private donations. Funding for the processing that occurs at the FAPC comes from operational revenues from the restaurant.

Collaborators

Jacob Nelson, FAPC Value-added Meat Processing Specialist, was the principal investigator. Other collaborators included Jim Brooks, FAPC Business Planning and Marketing Specialist; Dr. Roy Escoubas, FAPC Director; Dave Moe, FAPC Pilot Plant Manager; Chuck Willoughby, FAPC Business Planning and Marketing Specialist; Dr. Donald Wagner, Department of Animal Science Professor and Department Head; Dr. Brad Morgan, Department of Animal Science Associate Professor; Jim Barnard, Atherton Hotel General Manager; Jim Anderson, Consultant; Ben Coffin, Atherton Hotel Executive Chef; Jennifer Grandpre, Rancher's Club Beverage Manager; Gary Sherrer, DASNR Special Assistant to the Vice President, Dean, and Director; and Russell Nabors, FAPC Meat Pilot Plant Assistant Coordinator.

The FAPC assists Oklahoma's small processors and entrepreneurs with the scale-up and reformulation of products.

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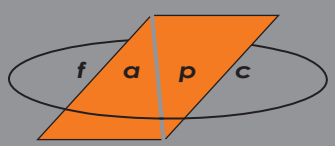

Adding Value to Oklahoma

Peanut Patty Reformulation

Objective

The objective of this study was to assist Denim's Homemade Candy Co. by adjusting its peanut patty formula to extend the product's shelf life and maintain its appearance.

Approach

The project objective was achieved by reformulating the peanut patty so the formation of large sugar crystals was prevented.

Benefits

The client is now able to manufacture, and consumers are able to purchase a product with a desirable appearance and an extended shelf life.

Economic Impacts

Potential economic impacts of the project are increased revenue, as well as new markets for the client. The candies are currently sold in Oklahoma and Texas.

Publications

This research was featured in the Winter 2005 FAPC *Food Facts*.

Collaborators

Darren Scott, FAPC Sensory Specialist, was the principal investigator during this project. Jim Brooks, FAPC Business Planning and Marketing Specialist, and David Moe, FAPC Pilot Plant Manager, also served as collaborators.

The FAPC is committed to helping Oklahoma's producers and processors incorporate quality management into their operations.

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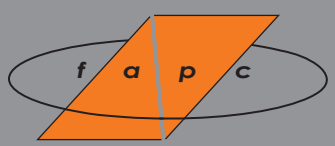

Adding Value to Oklahoma

Food Allergen Workshop

Objective

The objective of this workshop was to identify the basics of food allergens and give food manufacturers the information they need to control food allergen issues at their processing plants.

Approach

Tom Black, Quality Manager at Bama Foods, approached the FAPC in January 2005 requesting a series of workshops. The Food Allergen Workshop Black requested was an important need for food companies in the state of Oklahoma. FAPC staff attended the Food Allergen Research and Resource Program's (FARRP) Food Allergen Workshop in 2003, the FARRP Sanitation for Allergens Workshop in April, and an FDA Food Labeling Workshop in Arkansas that highlighted the new regulation for labeling allergens. By coupling their newly acquired knowledge with help from Erick Harp and Tom Black of Bama Foods, the researchers put together two very sound allergen workshops that included demonstrations on how to use allergen assay test kits.

Benefits

Consumers will be provided a food product in the marketplace that identifies allergens in the product and is free from allergens due to cross contamination. The food industry will benefit from the identification of the food allergens to be concerned with and processing control strategies to eliminate cross contamination.

Economic Impacts

The primary impact would be to not have a product recall. When companies recall or withdraw product from the marketplace, their bottom line takes a big hit, and the future sales of their product can decrease until the consumer builds confidence in the product again.

Continuing Work

This workshop will be repeated two times per year until attendance determines that the workshop should be held only one time per year.

Funding

Participants paid $100 to attend the workshop.

Collaborators

Jason Young, FAPC Quality Management Specialist, was the principal investigator. Other collaborators included Chuck Willoughby, FAPC Business Planning and Marketing Specialist; Darren Scott, FAPC Sensory Specialist; Dr. Guadalupe Davila-El Rassi, FAPC Analytical Chemist; Tom Black and Erick Harp, Bama Foods; and David Arvelo, Small Business Representative FDA Southwest Region.

The FAPC is concerned with the physical and mechanical properties of wood products and value-added wood composites.

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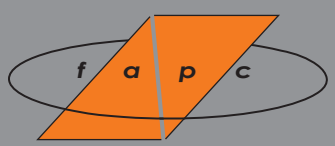

Adding Value to Oklahoma

Resistance of Eastern Redcedar Particleboard to Subterranean Termites

Objective

The objective of this project was to evaluate resistance of eastern redcedar particleboard against termite damage.

Approach

This study evaluated resistance of experimental particleboard panels manufactured from eastern redcedar (*Juniperus virginiana* L.) to feeding by the wood-destroying eastern subterranean termite, *Reticulitermes flavipes* Kollar. Eastern redcedar particles, one-inch square samples of single-layer panels with or without foliage, and three-layer panels with foliage were exposed to termites. The specimens sustained some damage by feeding termites. All of the samples were not preferred equally by the termites. In no-choice feeding tests where termites received only one panel product as a sole feeding source, all panel products sustained less feeding damage compared with Radiata pine. Also, termite survival was less than 20 percent after 12 weeks compared with 84 percent survival in Radiata pine controls. In the choice tests where all particles and panel products were available at the same time, Radiata pine sustained 40.6 percent weight loss compared with weight loss ranging from 4.75 to 6.09 percent for the three types of sample products. In the no-choice tests, these values ranged from 4.75 to 6.62 percent, and Radiata controls sustained 9.84 percent weight loss. Based on the initial findings in this study, it appears that particleboard panels made from eastern redcedar could provide some benefit against termite damage.

Benefits

Based on the initial findings in this study, it appears that particleboard panels made from eastern redcedar could provide some benefit against termite damage.

Economic Impacts

This study would motivate mid-size wood products manufacturers in Oklahoma to take an action to produce panel products with termite resistance.

Continuing Work

Evaluation of termite resistance of the exterior panels treated with borax would be desirable to have detailed information about the biological deterioration of such product.

Publications

As a result of this research, a manuscript is under preparation to be submitted to *Forest Products Journal*.

Funding

Funding for this project was provided by the McIntire-Stennis project, OKL 2517.

Collaborators

Salim Hiziroglu, FAPC Wood Products Specialist, was the principal investigator. Other collaborators included Dr. Brad Kard, Department of Entomology and Plant Pathology Associate Professor, and one visiting scientist from Kasetsart University, Thailand.

FAPC Industry Advisory Committee

Front Row:

Mr. John Griffin - Griffin Food Company
Mr. Bruce Price - Price Farms, Inc.
Ms. Jill Stichler - Redland Juice Company
Mr. John Williams - Chef's Requested Foods
Dr. Charles Nichols - Davison & Sons Cattle Company

Back Row:

Mr. Brett Burk - Elanco Animal Health
Mr. David Howard - Unitherm Food Systems
Mr. Bill Wiley, Secretary - Oklahoma Refrigeration Services
Mr. Roger Ediger - Mitchell & DeClerk
Mr. Gary Crane - Ralph's Quality Meats
Mr. Bob Collins - Cooperative Ginners Association of Oklahoma
Mr. Rodger Kerr, Chair - Southwest Technology Center
Dr. J. Roy Escoubas - FAPC Director

Not Pictured:

Mr. John Bailey, Vice Chair - Schwan Bakery, Inc.
Mr. Danny Dupree - Bar-S Foods
Mr. David McLaughlin - Advance Food Company
Dr. Robert Whitson - OSU Division of Agricultural Sciences and Natural Resources

"The FAPC greatly expanded the quantity of publicly-available information for Oklahomans wanting to examine the economic feasibility and marketing potential of new food or fiber ventures."

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

Research Projects - 3
Extension Projects - 7
Key Projects
- Economic Feasibility of Processing Alternatives for Small Scale Producers of Fruits and Vegetables in Oklahoma
- Economic Feasibility of a Producer-Owned Oilseed Processing Facility in Oklahoma

"With new methodology, FAPC opens the opportunity to better serve Oklahoma's entrepreneurs and other potential costumers."

Guadalupe Davila - El Rassi, Ph.D.
Analytical Chemist
315 FAPC
guadalupe.davila_de_el_rassi@okstate.edu

Research Projects - 30
Extension Projects - 3
Key Projects
- Kobe Beef
- GC-FID Analysis of Amino acids
- Katahdin

"The FAPC continues to assist in the development of new start-up companies and the addition of diverse value-added products to the Oklahoma economy."

Jim Brooks
Business Planning & Marketing Specialist
143 FAPC
jim.brooks@okstate.edu

Research Projects - 0
Extension Projects - 19
Key Projects
- Rib Crib Restaurants
- Denim's Restaurant
- Shawnee Milling

"2005 was a year of transition for several clients who moved from a start-up phase to a viable business."

Corey Stone
Business Planning & Marketing Specialist
142 FAPC
corey.stone@okstate.edu

Research Projects - 2
Extension Projects - 51
Key Projects
- Rib Express
- Gourmet Raspberry Food Products
- Buffalo Garments

"This year has been met with new and exciting challenges with the continued success and growth of our small business program and the implementation of a medium- to large-size company project management system."

Chuck Willoughby
Business Planning & Marketing Specialist
141 FAPC
chuck.willoughby@okstate.edu

Research Projects - 3
Extension Projects - 39
Key Projects
- Value-Added Organic Wheat and Beef
- Bacon Barn
- Processing and Marketing of Farm Produce

"Learning how proteins expressed in wheat endosperm during grain filling stages might be important in understanding fundamental metabolic pathways related to the expression of gluten proteins."

Patricia Rayas-Duarte, Ph.D.
Cereal Chemist
107 FAPC
pat.rayas_duarte@okstate.edu

Research Projects - 5
Extension Projects - 5
Key Projects
- Understanding Intrinsic Properties of Wheat Gluten Proteins
- Developing Security to U.S. Commercial Grain Storage and Transportation Systems
- Development Whole Grain Products

"During 2005, the FAPC expanded its communications services to include communications assistance to small, start-up businesses."

Mandy Gross
Communications Specialist
144 FAPC
mandy.gross@okstate.edu

Research Projects - 1
Extension Projects - 63
Key Projects
- FAPC Media Day
- FAPC Promotional Videos
- Oklahoma Wineries Brochure

"I think 2005 will be remembered as the year the FAPC began to come of age."

William McGlynn, Ph.D.
Horticulture Processing Specialist
112 FAPC
william.mcglynn@okstate.edu

Research Projects - 7
Extension Projects - 42
Key Projects
- J&M Farms - New Mushroom Product Development Project
- Pectin Extraction from Watermelon Project
- Ready-to-Drink Coffee Beverage Product Development Project

"Energy costs became significantly more important to food and agricultural processors in 2005, and we are focusing our efforts to help."

Timothy Bowser, Ph.D.
Food Engineer
110 FAPC
bowser@okstate.edu

Research Projects - 8
Extension Projects - 46
Key Projects
- Guymon Extracts Plant Start-up
- Schwan Food Company: CIP study
- Low-cost, Clean-In-Place (CIP) Unit for Small and Very Small Meat Processors

"Another year closer to sustainable, renewable energy."

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

Research Projects - 8
Extension Projects - 4
Key Projects
- Enzymatic Conversion of Cellulose
- Extraction of Pectin from Watermelon Rind
- Conversion of Biomass to Ethanol

"This has been a productive year in research and training for graduate students (three working under my guidance finished their M.S. degrees) in FAPC."

Stanley Gilliland, Ph.D.
Food Microbiologist
111 FAPC
stan.gilliland@okstate.edu

Research Projects - 4
Extension Projects - 0
Key Projects
- *Lactobacilli* as Probiotics, Biopreservatives, and Producers of Nutraceuticals
- Nutrition Physiology Royalty Account
- Sitlington Endowed Chair Funds

"We were Smokin'!"

Peter Muriana, Ph.D.
Food Microbiologist
109 FAPC
peter.muriana@okstate.edu

Research Projects - 9
Extension Projects - 5
Key Projects
- Biofilms: Fluorescent-based Assay for Detection of Biofilm-forming Strains of *L. monocytogenes*
- Bacteriocins: Novel Rapid Method for Detection of New Immunity Classes of Bacteriocins
- Bacteriocins: Use of PCR Array for Rapid Identification of Bacteriocins

"Integrity, perseverance, knowledge, and attitude are the keys to success."

Siobhan Reilly, Ph.D.
Food Microbiologist
105 FAPC
siobhan.reilly@okstate.edu

Research Projects - 3
Extension Projects - 0
Key Projects
- Validation of New Methodology for the Detection of *Campylobacter* in Food
- Evaluation of Various Strains of *Helicobacter pylori* for Growth in Various Media
- Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

"The FAPC has been very active in providing assistance to entrepreneurs and farmer groups interested in growing canola and setting up oilseed crushing and biodiesel production facilities in Oklahoma."

Nurhan Dunford, Ph.D.
Oil/Oilseed Chemist
103 FAPC
nurhan.dunford@okstate.edu

Research Projects - 6
Extension Projects - 15
Key Projects
- A New Process for Producing Phytosterol and Lycopene Nano- and Micro-Particles
- Flavor Profile of Oklahoma Grown Peanuts
- Wheat Biorefinery System

"The year (2005) ended on a very positive note, with me accepting a new position in the FAPC."

Jacob Nelson
Value-Added Meat Processing Specialist
106 FAPC
jacob.nelson@okstate.edu

Research Projects - 3
Extension Projects - 16
Key Projects
- Martek-Biosciences Omega-3 Oils in Meat Systems
- Oklahoma Department of Corrections Ground Beef Study
- Maple Leaf Consumer Foods (Canada) and Unitherm Food Systems (Oklahoma)

"Whew!"

David Moe
Pilot Plant Manager
204 FAPC
david.moe@okstate.edu

Research Projects - 3
Extension Projects - 44
Key Projects
- Evaluate Alternative Ingredients for a Processed Meat Company
- Scale-up Recipe and Process Determination of "Hot Pickles"
- Processing "Peanut Butter Syrup" for Market Introduction

"Food safety, new products, and alternative ingredients which add value or lower costs were key projects in 2005."

Russell Nabors
Meat Pilot Plant Assistant Coordinator
203 FAPC
russell.nabors@okstate.edu

Research Projects - 7
Extension Projects - 4
Key Projects
- Abe's Creations Peanut Butter Syrup
- Bar-S Foods - Value-added Frankfurters
- Effectiveness of Activated Lactoferrin to inhibit *Escherichia coli* 0157:H7

"The FAPC continues to help food processors and entrepreneurs face the challenges of product development and manufacturing."

Darren Scott
Sensory Specialist
101 FAPC
darren.scott@okstate.edu

Research Projects - 2
Extension Projects - 30
Key Projects
- Formulation of Shelf Stable Dry-mixes

"Once again, HACCP assistance has been a necessary focus for my outreach and extension, but the tide is turning, and I am excited to have more opportunities to provide assistance in Quality Management outreach."

Jason Young
Quality Management Specialist
102 FAPC
jason.young@okstate.edu

Research Projects - 0
Extension Projects - 51
Key Projects
- Cable's HACCP Assistance
- Seaboard Foods HACCP Workshop
- Fadler, Construction/Regulatory Assistance

"I worked as a visiting professor in the Department of Forest Products, Kasetsart University, Thailand to teach an undergraduate course for one month."

Salim Hiziroglu, Ph.D.
Value-Added Wood Products Specialist
303G Ag Hall
hizirog@okstate.edu

Research Projects - 2
Extension Projects - 1
Key Projects
- Three-layer Value-added Composite Panel Manufacture from Bamboo and Rice Straw in Thailand

Food & Agricultural Products Center

Adding Value to Oklahoma

- Business & Marketing Assistance
- Total Quality Management
- HACCP & Food Safety Training
- Pilot Plant Facilities
- Technical Assistance

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