



# Food Innovation Center

Collaborating for a healthier, hunger-free world



## Annual Report 2010–2011<sup>1</sup>

*Respectfully submitted by*

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<sup>1</sup> Reporting period: Jan. 1, 2010-March 31, 2011. In November 2010, OAA and OR changed the funding and annual reporting schedule for the Centers for Innovation from calendar year to fiscal year.

## I. Executive Summary

Ohio State is strategically well positioned as the only major research university to map collaboration around the globally critical themes of food and poverty. The faculty members of the Food Innovation Center (FIC) are inspired to impact the world with food as demonstrated by several major first year accomplishments. The five co-directors and three staff are fortunate to help orchestrate this faculty-initiated trans-college effort.

Participation and a culture of shared mission are keys to the success of this faculty-driven center. Substantial progress is made in our first year to build ownership through events and engagement. From the enthusiastic response of this center faculty to recruit students at Honors Day weekends, to connect at center meetings, and to collaborate and compete in FIC grant competitions we are well underway.

Year one internal achievements are many but perhaps most promising is our new logic model that we will connect directly to our annual budget process. This cycle of continuous improvement based on measurable outcomes will help us achieve our newly stated mission to improve global life quality by inspiring sustainable multidisciplinary food solutions.

Representing faculty from thirteen colleges may seem unwieldy, but in practice it proves magnetic. External partners enthusiastically contact this center as it is a one-stop shop—exactly what they need, an effective way to find the right expertise in a huge academic enterprise. These contacts create faculty opportunities to propose creative ideas like a healthy smoothie with Crimson Cup Corporation, co-sponsoring a visit by former US Surgeon General Satcher, or improving food systems in developing nations.

FIC faculty members report good return on our first year seed grant investment, submitting 13 extramural proposals with five funded to date, seven publications in review, and one invention disclosure. We are pleased to “break the food barrier” within Ohio’s Third Frontier in partnership with Wornick Foods Corporation, winning \$1.7 million this April. Ohio’s economic recovery will accelerate by investing in its largest and most vital industry: Food.

We have the right people at the right place and time to set a critical course. With 10 billion people on this planet by year 2050, we must provide the academic foundation for a second green revolution. The current generation of science must improve life quality through food and educate those who will satisfy global needs. This strategic innovation investment brings hope to Ohio State's role in building a healthier, hunger-free world.

## II. Accomplishments to date

From the inception of FIC in January 1, 2010 to March 31, 2011, FIC faculty have focused on building organizational identity and connectedness—internally and externally; augmenting center capacity through the addition of new members; facilitating and investing in transdisciplinary collaborations; and targeting opportune areas such as obesity.

### A. Connecting and growing center capacity

The center's capacity to build partnerships with industry and government, to secure significant extramural funding, and to advance Ohio State solutions to complex food problems is an important foundation for year one. Efforts bolstering capacity include:

## 1. Connecting members

### a. Innovators premier meeting

March 19, 2010

At the innovators premier meeting, Provost Joe Alutto and VP for Research Caroline Whitacre set the stage for food innovation. Consistent with the theme of achieving innovation through collaboration, 46 founding members and guests in attendance participated in breakout sessions focused on the four FIC themes.

Discussions focused on engagement in established relationships and the development of new collaborations to address areas of interest across the food systems continuum. Participants learned of the impending RFP for the initial Seed Grant program.

- Meeting literature and presentations are available on our FIC download page <https://carmenwiki.osu.edu/display/10192/Home>
- More premier meeting photos online at <https://picasaweb.google.com/113282499099837096351/Innovation#>



Participants at the premier meeting

**b. First annual meeting** August 31, 2010

Member input and a focus on innovation shaped the outcomes of the center's inaugural annual meeting. The highly rated meeting was structured to promote interaction, inspiration, and ideation.

**Outcomes:**

- More than 50% of FIC faculty members were joined by prospective center members and several new members of the External Advisory Board.
- Participants represented 10 colleges, two VP units, and two external organizations.
- Through speed networking, more than 90% of participants met at least one potential new collaborator; 86% met one from a college other than their own.



- Teams brainstormed innovative solutions to complex food challenges including malnutrition in the developing world, childhood obesity, and food contamination.



- Three Innovation Incentive planning grants were awarded sustaining meeting momentum. The RFP and recipient list are in Appendix A. Progress reports are provided in a confidential appendix.

- Evaluations were overwhelmingly positive, with the meeting rated a 4.2 on a 5-point scale.
- Annual meeting highlights are in a two-page overview of the meeting included as Appendix B.

## 2. Facilitating identification of collaborators

This faculty-driven center offers networking opportunities at meetings and builds strategic partnerships among members through human and technical means. For example, we built a fully searchable, detailed member profile database into the Members section of <http://fic.osu.edu> to facilitate identification of cross-disciplinary collaborators. We also started an FIC wiki enabling sharing of large files and proposal development at <https://carmenwiki.osu.edu/display/10192/Home>.



## 3. Expanding membership

FIC began with an interdisciplinary core of more than 80 faculty members. In November 2010, we opened [membership](#) with the goal of further building capacity to improve lives through food. An associate member category for graduate students, postdocs, and research staff was created. The results:

- **29 new faculty members** and **11 new associate members** were accepted, adding **two new colleges** (Dentistry and Nursing), a branch campus (Mansfield), and **eight new departments** (Biomedical Engineering, Cardiovascular Medicine, Chemical and Biomolecular Engineering, Economics, Epidemiology Pathology, Periodontology, Teaching and Learning).
- A list of current members is provided in Appendix C.

## B. Catalyzing cross-college collaborations through seed grants

In 2010, the FIC directors invested \$260,000.00 in seed grants to enable 11 cross-college teams to generate preliminary data and proofs of concept for extramural proposals. In an increasingly competitive extramural funding environment, these data are expected to markedly enhance the likelihood of proposal success. An awardee list and the request for proposals are in Appendix D. The funds have sparked collaborative research across all four FIC focus areas: Biomedical Nutrition; Food Safety; Foods for Health; and Global Food Strategy and Policy. Projects address significant topics such as emerging food safety technologies, human clinical trials of cancer-preventive foods, and urban food production. Although the one-year period of support will not be completed until July 2011, the teams are already reporting positive returns on the investment.

### *Outcomes*

- 38 of the Center's founding members were involved in submitting 20 compelling proposals.
- **29 FIC faculty members from eight colleges comprise the 11 funded teams.**

- **All teams are interdisciplinary.** Each team involved a minimum of three FIC faculty members from two colleges. Some teams were newly formed for this competition, such as Jiyoung Lee who linked experts in environmental microbiology, food virology, and horticulture and crop science. Other preexisting teams engaged new cross-disciplinary expertise, such as Steve Clinton's team who expanded to include Debra Zynger for histopathologic insight and Carlo Croce, the world leader in microRNA signatures in cancer.
- Awards ranged from \$16,982 to \$25,000.
- 19 FIC members, plus five center directors served as peer reviewers.
- As of March 2011, seed grant teams reported these outputs: the submission of 13 extramural proposals (five funded so far: three USDA, one HUD, and one

publications at various stages of the review process (including four in press or published), 18 presentations completed or abstracts submitted, two undergraduate awards, and the filing of one invention disclosure. Further return on investment is likely as the teams complete their projects. Seed grant and Innovation

Incentives progress reports are in a separate confidential appendix as these works in progress should not be web-posted or disseminated widely.

"The establishment of the FIC at OSU has pulled together a diverse group of academic researchers that had not collaborated previously. The complexity of childhood obesity and the challenges of field research within the community has made such a collaborative team invaluable to test practical interventions using existing programs and organizations. We are optimistic that we can, as a group, take advantage of the many emerging funding opportunities around childhood obesity."—**Robert Murray, MD; PI, 2010 FIC Seed**

### C. Interdisciplinary proposals

FIC played a role in the nine proposals described in section VI.A.5, providing a range of participation including team lead, collaborator matching services, proposal development assistance, and organizational hub.

### D. Building identity and partnerships

#### 1. Connecting with potential clients, partners, and stakeholders

FIC serves as the front door for the university's significant food and nutrition expertise. Multiple activities built internal and external recognition of the center and established new partnerships.

##### *External Connections*

- **Industry:** Center directors gave presentations to or met with leaders of organizations including Alltech Corporation, Campbell Soup Company, Crimson Cup, Cultivian Ventures LLC (*a food and agriculture venture capital firm that connected to FIC following an Ohio Farm Bureau event*), Egg Tech Limited, Kaneka Nutrients (*a major producer of nutraceuticals developing a project with FIC on the bioavailability of coenzyme Q<sub>10</sub>*), Mead Johnson Nutrition, Ohio Farm Bureau, and Wornick Foods (*please see section VI.A.5*).

- **Nonprofit and Philanthropic Organizations:** Mathile Institute for the Advancement of Human Nutrition; Center for Innovative Food Technology, CIFT; and the Institute for Food Technologists, where Lee was a keynote at the Ohio annual symposium.

- **Government:** Newly elected Governor John Kasich selected the Parker Food Science Building for his only academic visit in the first months of his administration. VP Bobby Moser and FIC Directors Lee, Clinton and Schwartz were hosts along with several leaders from Ohio's food industries. He sought to learn how Ohio's academic



*Ohio Governor John Kasich learns all about functional food in the Schwartz lab (Dec. 7, 2010)*

resources can stimulate economic recovery and requested written feedback from the 20 guests at the event. Schwartz was one of only three presenters and impressed the Governor with the crops-to-clinic-to-consumer flow of food innovation at Ohio State.

- **International:** South Korea is investing \$8 billion US to establish Foodpolis, a city dedicated to food production, in anticipation of global demand for food by the 10 billion earth inhabitants in year 2050. FIC Directors Mark Failla and Ken Lee were invited to Seoul and Iksan-si as US experts to help guide the long-term plan to attract 145 major food companies to Foodpolis. FIC has been invited to join four international centers (South Korea, Netherlands, Japan, and Canada) as founding members of a global consortium focused on food related research and development.
- **Nationwide Children's Hospital:** Joint efforts regarding obesity are detailed below in II.E.

**Internal Connections:** Involvement with other university centers is important to the members of FIC. We have sought synergy with numerous university entities such as

- International Poverty Solutions Collaborative (*leaders and staff of the two centers met in August 2010 to compare notes and explore potential synergies; staff continue to meet*); Center for the Advanced Functional Foods Research and Entrepreneurship (*CAFFRE partners with the OSU Comprehensive Cancer Center to support 10 projects relating to diet, nutrition, functional foods, and cancer. 100% of the current PIs are FIC members. Quarterly CAFFRE meetings include faculty and trainees from across campus, providing FIC members with additional opportunities for in-depth interaction regarding development of novel food products that target disease and promote health. Outputs include collaborative grants submitted to NIH and the USDA and multiple publications.*); Ohio Bioproducts Innovation Center, OBIC;

Fisher College of Business; Center for Clinical and Translational Sciences, CCTS (*shared lessons learned in interdisciplinary centers and assisted with the obesity inventory reported in II.E.*); Administrative Research Council, ARC; Government Affairs; Development (*initial strategies for sustainability*)

- Directors presented to university groups including the Board of Trustees, Food Science and Technology Advisory Board, and the CFAES Faculty Council.

## 2. Communications and marketing

To enable effective, consistent communications and marketing, FIC developed an infrastructure that includes a robust public website (<http://fic.osu.edu>), center listserv, internal Carmen Wiki, fact sheet, and exhibit materials. Awareness of the center was raised through exhibits at the local Celebration of Research Expo, at a Nationwide Children's Hospital obesity event described in II.E. below, and at the Ohio Food Industry Expo. Melinda Swan, Associate VP University Communications, gave beneficial guidance and review.

## E. Obesity a priority for collaborations

Obesity affects one out of every three Americans. The obesity epidemic is the result of complex interactions among biological, behavioral, community, environmental, and public health factors. Thus solutions require trans-institutional and interdisciplinary partnerships--exactly what FIC can do. Fortunately, considerable extramural funding is available for meaningful activities that address this serious health and economic problem.

### ***Highlights of accomplishments to date***

- FIC is exploring Ohio State's capacity for greater insight and solutions to the obesity epidemic. We collaborated with the Center for Clinical and Translational Science to develop a campus-wide inventory of investigators addressing problems associated with the causes, prevention, and treatment of obesity. Phase one is now complete with more than 80 investigators identified. The response from investigators has been overwhelming. FIC is developing an internal website to provide investigators with information about funding opportunities, lectures, and symposia, and to serve as a tool for collaborations.
- FIC Associate Director Mark Failla organized investigators to review the USDA AFRI RFA directed at prevention of childhood obesity. A team is developing an innovative proposal for submission in May 2011.
- FIC partnered with Nationwide Children's Hospital to host the visit of former US Surgeon General David Satcher, MD, PhD, on March 24, 2011, speaking on ***Fit to Succeed: What Every Parent and Community Needs to Know. Fitness and Nutrition for Kids***. FIC exhibited and sponsored tickets to more than 20 FIC members and stakeholders, with the program in Appendix E.

- Robert Murray and Mark Failla serve on the planning committee for *Obesity and Chronic Disease: Making and Unmaking the Epidemic*, an obesity conference Nov. 1–2, 2011, at the Blackwell. This event, co-sponsored by FIC and Nationwide Children’s Hospital, will call on national leaders and local scholars to consider preventive, therapeutic, and economic approaches to tackling the epidemic. The multidisciplinary target audience includes medical and public health professionals, academic faculty, policy makers, and food industry representatives.

**SAVE THE DATE!**  
Tuesday  
November 1–2  
2011

**Obesity and Chronic Disease:  
*Making and Unmaking the Epidemic***

The Obesity and Chronic Disease Symposium, in collaboration with the Ohio State University Food Innovation Center and Nationwide Children’s Hospital, explores the latest medical, educational, community action, and public policy approaches to tackling this international epidemic. Throughout the 1.5 days the faculty and participants will explore:

- :: Links between Childhood Obesity and Adult Disease – Prenatal Forward
- :: Interventions to Improve Health Outcomes – from Prevention to “Undoing” Extreme Obesity
- :: Public Health Initiatives and Industry Collaborations

For more information, please log on to [www.NationwideChildrens.org/Conferences](http://www.NationwideChildrens.org/Conferences) or call (614) 355-0676

 **Food Innovation Center**  
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 **NATIONWIDE CHILDREN'S HOSPITAL**

## F. Investing in education

Educational goals of FIC include promoting advances in knowledge of food systems to undergraduate and graduate students, faculty, staff, and stakeholders. During our first year, this was achieved through partnerships with ongoing initiatives, with new forays planned in year two.

### *Highlights*

- Invested in the annual Russell Klein Research Symposium, providing transdisciplinary poster awards, and supported select speakers for the OSU Interdisciplinary Ph.D. Program in Nutrition (OSUN) seminar series.
- Supported two economics graduate students in summer 2010 to help FIC directors explore the market conditions surrounding the egg and black raspberry industries. For years, center members have researched safety-enhancing technologies for eggs and the health benefits of black raspberries. These summer projects were intended to link scientific topics with business and economics.
- Two quarters of support were provided for a graduate student to assist with the development, organization, and teaching of a graduate-level course on nutrition and cancer in 2010 and to assist in curriculum and lecture development for a new nutritional genomics course (Medical Dietetics 745, spring quarter 2011). In addition to adding value to the current portfolio of graduate training opportunities in nutrition at Ohio State, these are two critical foundation courses for a future FIC faculty effort to obtain an NIH training grant in nutrition and cancer. We expect to submit a training grant application in the 2012 funding year.
- Co-sponsored visits by Greg Reinhold, VP of the Mathile Institute, and FIC member Matt Kleinhenz to deliver seminars in the Department of Human

Nutrition autumn quarter series. Over lunch, the speakers provided career counseling to graduate students.

- Participated in the Honors Day weekends in February 2011. A standing-room-only crowd of prospective parents and honors students learned how Ohio State impacts the world with food. Several FIC faculty members shared expertise and an array of opportunities including study abroad, undergraduate research, and internships. Event evaluations showed that FIC was rated highly by the participants. Several students followed up with FIC members and a recruited honors student will be shadowing Professor Ouliana Ziouzenkova in spring 2011.
- FIC in partnership with Nationwide Children's Hospital is leading the organization of a 2011 national obesity conference at Ohio State. This conference will provide continuing education credit for physicians, dietitians, and other health care professionals, as well as a workshop series targeted to students.
- With support from an FIC Innovation Incentive grant, several FIC faculty members are developing an NSF IGERT proposal on urban food systems. This features cross-disciplinary training of graduate students.
- FIC members are presently engaged in discussions with colleagues at Metro High School to partner with their Project Growth program beginning in the 2011-2012 academic year. The goal is to enhance student awareness of diverse scholarly opportunities and careers associated with food systems.

### III. Efforts to address concerns

#### A. Metrics for success are defined

Reviewers recommended a need for defining specific metrics, citing a need for quantification. FIC directors thus sought help from a center member who is an expert in center planning and evaluation. Craig Boardman, Assistant Professor at the John Glenn School of Public Affairs, specializes in evaluating university-based interdisciplinary centers. Boardman recommended the development of a strategic planning tool called a logic model as a schema for setting ambitious yet achievable goals (outcomes) and quantifiable objectives (outputs) that could become metrics for center success. Simply defined, a logic model is a linked set of causes and effects that can be steps to achieve goals (Brest and Harvey, 2008, *Money Well Spent: A Strategic Plan for Smart Philanthropy*. Bloomberg Press. New York). With Boardman's advice, FIC directors and staff developed a logic model as a roadmap for the Center. Alex Barkley, who has experience in program evaluation and strategic planning, facilitated a discussion process among the directors and staff that culminated in a cogent plan for FIC. Incorporating FIC priorities, activities, and assets, version 1.0 of the model was agreed upon and is shown in section VIII. It serves as a guide to the activities of FIC and as a means to measure center outcomes, failures or successes. Our logic model allows leadership to assess impact, course correct, and refine plans as the center continuously improves.



## B. Transinstitutional research is a priority

Feedback on our implementation plan noted "...*transinstitutional and interdisciplinary activities will be essential to the success of the center.*" The first seed grant competition, held in spring 2010, embodied this goal. As noted in II.B., teams were required to have a minimum of three center members from at least two Ohio State colleges working on a problem congruent to the center's mission. Similarly, the Innovation Incentives awarded in conjunction with the first annual meeting gave priority to teams of several Center members working across multiple colleges on innovative transdisciplinary approaches. Our second year seed competition takes a bold approach, giving priority to new collaborations with the social sciences.

## IV. Integrating Progress and Implementation Boundaries

### Progress of integrating efforts, both scholarly and administratively, across traditional boundaries

*is combined here with*

### Implementation issues that have emerged, if any, and the steps taken to accommodate or remediate those issues

*These two major headings from the suggested OAA/OR annual report outline are combined as the answers are better understood in this one integrated report section IV.*

Integration across traditional boundaries is paramount to the success and central to the purpose of the Centers for Innovation. FIC has kept the goal of transdisciplinarity at the forefront of its activities and has achieved measurable progress in uniting scholars and staff around this paradigm.

#### **College counts reveal integration progress:**

- 8** colleges represented on the 2010 seed grant teams
- 10** colleges with participants in the first annual meeting
- 13** of the 14 colleges now part of the FIC membership

A broad implementation challenge is the difficulty fostering interdisciplinary collaboration. This includes administrative and research challenges that FIC faces when attempting to broker interdisciplinary activities.

- Administratively, it was difficult to distribute funds from FIC grant competitions consistent with the widely divergent business practices or expectations across colleges. FIC benefits from a close working relationship with OAA leadership and staff. Meg Dick has built relationships with faculty members, fiscal and HR administrators, and Senior Fiscal Officers in most colleges. FIC and OAA collaborated with faculty and staff to streamline operating procedures. Good relationships helped to fund recipients of the 2010 FIC grant competitions and to distribute approved support to director colleges and departments. We will work toward seamless allocation of future funds.
- Research challenges involve identifying: (1) common research problems of interest to STEM and non-STEM scholars, (2) pockets of expertise within or across these scholars, and (3) activities consistent with the interests of faculty members who primarily identify with a specific discipline. FIC has begun (1) to identify high-level research questions that require solutions involving scholars from multiple disciplines,

(2) directing funds to new projects involving STEM and non-STEM scholars per our 2011 [RFP](#), (3) developing a database that identifies the research expertise of center members to foster new collaboration (currently searchable at <http://fic.osu.edu>) and (4) investing in networking sessions designed to allow STEM and non-STEM scholars to share insights.

In the future, we are considering implementing a “change casting” technique that involves broadcasting short (2-3 minute) video clips that illustrate problems likely to require cross-college research solutions. A key benefit of this technique is that it encourages FIC members to provide anonymous feedback to directors regarding these problems and potential solutions. We seek to create a "market for ideas" by setting interdisciplinary research objectives, fostering conversation across colleges, and creating incentives for members to engage in these activities.

## V. Success of the governance structure and adjustments

The center's team of five directors and three staff is the core of its governance structure. The team is dedicated to transcending traditional boundaries to improve lives through food, as discussed in section IV. At regular meetings, initially weekly and then twice a month beginning in Jan. 2011, the directors discussed progress and invested considerable time in envisioning and executing the FIC accomplishments detailed in section II. For example, special attention was paid to developing the first seed grant competition, the first annual meeting, and the External Advisory Board. Instead of appointing a Steering Committee to review proposal submissions, the directors sought center member volunteers to serve as peer reviewers to expedite decision making and better engage faculty members.



We seek external advisors who have a broad view of food, are visionary, and experienced in enterprises that are beyond academics. The directors developed an external advisor job description and nominated individuals from the private and nonprofit sectors to be considered in this role. We were quite successful in attracting the right talent to serve the External Advisory Board, as it now consists of eight highly renowned industry and nonprofit leaders, many who are familiar with Ohio State but had minimal interaction with other board members. The board held its first conference call in December 2010, and a face-to-face meeting is expected in fall 2011. The board will evaluate achievements, recommend improvements, and advise the directors and center members regarding the financing, operations, sustainability efforts, and strategic promotion of the FIC mission.

### **FIC External Advisory Board**

1. Dave Beck, President and CEO, Center for Innovative Food Technology (CIFT)
2. Susan Finn, President and CEO, American Council for Fitness & Nutrition
3. Matt Habash, President and CEO, MidOhio Food Bank
4. Surinder Kumar, President, Arora Innovations
5. Sudip Parikh, Vice President of AgriFood and Vice President of Health Policy, Battelle Memorial Institute
6. Harold Schmitz, Chief Science Officer, Mars, Inc.
7. Ken Smith, Director of Food & Beverage Division (retired), Proctor & Gamble
8. Dan Wampler, President, Sensus, Inc.

## VI. Evidence that goals and objectives are being achieved

Items should be listed in two sections: one section should be activities that are a direct result of the COI; the other section should be other accomplishments related to the COI

### A. Activities that are a DIRECT result of the COI

- 1. Peer-reviewed publications:** The 2010 seed grant teams have seven manuscripts in the review pipeline, with more anticipated as the projects conclude.
- 2. Professional presentations:** Seed grant teams have delivered or submitted abstracts for 18 presentations at influential meetings nationally including the 2010 American Institute for Cancer Research (AICR) Annual Scientific Meeting, the 2010 Conference of Research Workers in Animal Diseases (CRWAD), and Experimental Biology 2011, and locally including the Ohio State Comprehensive Cancer Center Annual Scientific Meeting and OARDC symposia. As with publications, more presentations of discoveries resulting from seed grants are expected.
- 3. Honors and awards:**
  - In March 2010, Ohio Governor Strickland and Chancellor Fingerhut came to campus to announce our designation as Ohio's Center of Excellence in Agriculture, Food Production & Bioproducts. Of the several Ohio Centers of Excellence, this is the only one that is exclusive to Ohio State. The OSU Office for Research won this award, based partly on the portfolio of ideas advanced within the innovation centers competition.
  - FIC nominated center member Herb Ockerman who was elected a **Fellow of the Institute of Food Technologists**, the honorary society of food science. Details provided at <http://fic.osu.edu/node/175>.
- 4. Graduate student and undergraduate student notable accomplishments, including grant funding, publications, and presentations:** Students presenting results from Parwinder Grewal's seed grant earned first and third place in the undergraduate competition at the 2010 OARDC Research Internship Program Symposium.
- 5. Additional funding via the Office of Sponsored Programs or via contracts and grants and outreach and engagement**

**Proposals submitted.** FIC sought extramural proposals to build sustainability, advance commercialization, and leverage resources. This section does not include our internal seed grant awards that require a plan for extramural support. Listed here in order of large to small budget are pending or funded awards, with unfunded not listed. Participation varies from FIC serving as lead investigator to providing support to other centers as indicated under each grant.

- a. Geisler, J., Hyche, M., McDulin, D. **Microwave Assisted Thermal Sterilization.** Submitted to Ohio Third Frontier R&D Center Attraction Program. **\$11,450,746.00 total budget** / 5 yrs. Funded April 6, 2011: **\$1.7 million** award.
- 1) This marks the first time ever that the Third Frontier Commission has supported an initiative in food and agriculture, the largest manufacturing industry of Ohio.
  - 2) FIC serves as the OSU partner in attracting new R&D centers to Ohio. Directors Lee and Myers collaborate with the Wornick Foods Corporation PI and CEO Jon Geisler, VP of Operations Hyche, and CFO McDulin. The Ohio Bioproducts Innovation Center directed by Stephen Myers developed the partnership with FIC Innovation Incentive funds. CIFT Toledo is an important collaborator.
  - 3) This establishes an R&D Center to support commercialization of Microwave Assisted Thermal Sterilization in Cincinnati, OH. It serves as a National Center for food industry's R&D and commercial production of superior quality shelf-stable foods.
  - 4) A national Microwave Sterilization Consortium was established among large branded food companies along with members of academia, commercial co-manufacturers, equipment, and packaging suppliers. Ohio's R&D Center provides support for full commercialization and long term product development of new technology. Wornick is a major supplier of shelf-stable food products for the U.S. Government and private sector.
  - 5) Copies of this and all FIC proposals may be downloaded from <https://carmenwiki.osu.edu>.
- b. Chen, H., Niemira, B., Wu, C., Ozbay, G., Jiang, J., Li, J., Gurtler, J., Lee, K., Pivarnik, L., Worobo, R., Su, Y. **Inactivation of enteric foodborne viruses in high risk foods by non-thermal processing technologies.** USDA NIFA Competitive Grants Program. **\$4,997,078.00** / 3y. Funded Jan 2011.
- 1) FIC members Jianrong Li and Ken Lee are the Ohio State collaborators on this five university project funded by the USDA National Institute of Food and Agriculture. FIC was directly involved in proposal development. This proposal was completed while investigator Lee was at the UW System in Madison thus support of newly hired FIC staff was key. The Ohio State share of the \$5M award is **\$1,149,998**.
  - 2) Food virology is a key national need and the hire of Assistant Prof Jianrong Li from Harvard was by the PHPID Targeted Investment in Excellence, via Director Lee's collaboration on in its steering committee. One of FAES's National Academy members, Dr. Linda Saif, is already a renowned norovirus expert. Ohio State is well positioned to be a global leader in this vital field.
  - 3) Viruses are responsible for more than 67% of foodborne illnesses worldwide. This malady is commonly known as cruise ship illness and plagues military boot camps or anywhere people gather in dense proximity.

- c. Lee, K., Myers, S., Heavenridge, J., Moreno, J., Hertzfeld, T., Yousef, A., Weaver, T., Hemmelgarn, R. **Improved Human Health by Commercial Development and Deployment of Innovative Ohio Sanitation Technology: Heat/Ozone Biomedical Technology to Produce Safe Eggs.** Submitted to Ohio Third Frontier Wright Projects Program, January 20, 2011. **\$2,988,532.00** / 2 yrs, in review.
- 1) We received a favorable National Academy of Sciences review and advanced to an oral defense on April 20, 2011. This review follows the due date of this report so updates will be posted on the FIC Wiki:  
<https://carmenwiki.osu.edu/display/10192/Home> (standard OSU login).
  - 2) Brainstorming at our first annual meeting resulted in three “innovation incentive” awards. One by FIC member Stephen Myers sought food technologies that advance the goals of Ohio’s Third Frontier. Myers, Lee and Yousef are FIC members; the remaining investigators listed are executives of successful businesses in Ohio.
  - 3) The Egg Tech Ltd. partnership formed in 1997 to incubate an innovative ozone patent application from FIC member Ahmed Yousef’s lab. The FDA proactively approved our process for pasteurization of whole shell eggs.
  - 4) We advance OSU’s goals in commercialization and job creation. By year six, this project creates more than 431 jobs and revenues of \$241 million. Each machine generates \$314,000 per year in royalties to Ohio State. This project creates Ohio employment and improves health for all Americans.
- d. Tiniano, J., Jones, K.B., Grewal, P.S., Rabe, M., Wagenbrenner, M. **An Agrarian Urbanist Overlay for Central City Development.** US Dept. of Housing and Urban Development Community Challenge Grant. **\$864,989.00** / 2 yrs. Funded Feb. 2011.
- 1) FIC participated in early proposal development meetings, submitted a letter of support without commitment of FIC funds, and involved key collaborators including center member Parwinder Grewal.
  - 2) This ambitious interdisciplinary project is an example of FIC cooperating with other university organizations to improve lives in our local community. The International Poverty Solutions Collaborative, the Knowlton School of Architecture, and Extension were among the Ohio State participants.
- e. Vodovotz, Y., Kleinhenz, M., Lee, K., Schwartz, S.
- 1) Details protected by a bilateral confidential disclosure agreement.
  - 2) Team submitted a proposal to an undisclosed company for a project expected to commence in 2012.
- f. Lee, K., Hills, S. **Global Summit on Business Incentives for Food Safety.** Submitted to BETHA, November 2010. **\$53,000** / 1 yr, in review.
- 1) FIC and the Fisher COB International Programs Office propose a global food safety summit at Ohio State to establish a food framework for the future.
  - 2) This would be the first such meeting engaging local and world experts at our university. The Summit, to be held in 2011–12, is organized jointly with investment of \$10,000 from FIC, \$10,000 from CIBER (Center for International Business, Education and Research), \$3,000 from CFAES, and a request of \$30,000 from BETHA.

- 3) Professor Steve Hills is the Director of International Programs and CIBER. Hills collaborated earlier with Professor Lee on a CIBER proposal in 2009, and this outreach is a logical next step of the now federally funded CIBER.
- g. Vodovotz, Y., Stokes, D. and Ubert, G. **Supposin' It's Frozen® Healthy Black Raspberry Smoothie**. Submitted to CIFT Functional Food and Ingredient Development and Commercialization program, **\$30,000** /1y, March 2011. *Funded 4/15/2011, the only award from all submitted.*
- 1) Upon reading about our innovative food mission in a *Business First* article, CEO Ubert of Crimson Cup Inc. asked FIC for help in developing a healthy smoothie. FIC linked Crimson Cup with the Stokes Berry Farm (Wilmington, OH), a longtime ally in OSU's cancer-fighting foods initiatives. We proposed a unique product development project to the CIFT Functional Foods Program with the creative leadership of PI Yael Vodovotz.
  - 2) This new collaboration between Ohio State and Crimson Cup builds on the existing relationship with the Stokes family farm to bring a new Ohio-based functional food to the market. The prototype will help us obtain NIH funding for human clinical trials on the health benefits. This functional beverage will create jobs and economic growth for the state.
- h. Bomser, J., Chitchumroonchokchai, C. and Failla, M. **Anti-inflammatory and Anti-oxidant Properties of XYZ Peptides in Human Intestinal Caco2 Cells**. Mead Johnson Nutrition (MJN), **\$30,196** /1y. Funded December 2010.
- 1) FIC Associate Director Mark Failla was invited to visit MJN (Evansville, IN) in September 2010 to consult about bioavailability and efficacy of compounds and their metabolites. He advanced the mission of the FIC and opportunities for partnerships.
  - 2) MJN contacted FIC member Josh Bomser about interest in examining anti-inflammatory activities of proprietary peptide preparations. Agreement was reached for an initial investigation. The project uses human intestinal epithelial cells in a model from Mark Failla's lab. Studies were initiated and one of three specific aims is successfully completed to date. This project serves as a springboard for continued collaboration with MJN.
  - 3) A scientific team from MJN will visit OSU in August 2011. On the agenda are interactions with leadership of FIC, the EHE Schoenbaum Family Center, the Bionutrition core in the Center for Clinical and Translational Science, and select faculty. These contacts are a portal to future partnerships with this Fortune 500 company.
- i. Ballard, C. and Lee, K. **Evaluation of the Chorleywood Bread Process for Economical Production of High-Quality, High-Soy Protein Bread**, Submitted to CIFT, **\$25,000** /1y pending.
- 1) Cory Ballard is an entrepreneur Ohio State graduate with a unique heart-healthy soy bread. He is President of Bavoy, an Ohio Company he started to capture this market. Bavoy is a member of CIFT Toledo. FIC Director Lee is a co-investigator and CIFT Board member.
  - 2) In 1999, the FDA approved a qualified health claim for soy protein and coronary heart disease. Increased soy consumption has a positive health benefit; yet, commercially available soy products are limited.



- 3) Bavoy, Inc. developed a soy-wheat bread that qualifies for a heart-healthy soy claim and is well liked by consumers. This unique process has just entered the market at <http://mysoybread.com>.

## B. Activities that are an INDIRECT result of or are related to the COI

An interesting question of TIEs and of Centers for Innovation is what are the indirect results and related activities. A typical reply includes lists of outputs of center members based on large database searches. Although this list is quite impressive, it is pure speculation that these are indirect results of center funding. We choose instead to focus on documented center results and impacts in this report. We respectfully do not list the substantial number of indirect activities and accomplishments of our more than 100 members in the interest of brevity and integrity.

## VII. Adopted metrics to gauge success

FIC developed the logic model shown in section VIII. to depict the relationships among center resources, activities, outputs, outcomes, and impact. The outputs from the model, excerpted in the first column below, are the quantifiable results of center activities—our adopted metrics for measuring success. In this first year report, we establish baseline values so target benchmarks can be refined and set in future years.

Superscripts <sup>1 2 3 4</sup> for each output below are color keyed to the logic model.

Outputs	Evidence
Dollars invested in multidisciplinary grants <sup>1</sup>	<ul style="list-style-type: none"> <li>Awarded <b>\$262,000</b> in 2010 Seed Grants and <b>\$30,000</b> in Innovation Incentives following the 2010 annual meeting, for a total of <b>\$292,000</b></li> </ul>
Number of new cross-disciplinary collaborations <sup>2</sup>	<ul style="list-style-type: none"> <li>FIC supported <b>13</b> cross-disciplinary collaborations through its 2010 funding programs.</li> <li>More than 90% of the participants in speed networking met at least one potential new collaborator (average=2.8); 86% met one from a college other than their own.</li> </ul>
Number of sustained cross-disciplinary collaborations <sup>3</sup>	<ul style="list-style-type: none"> <li>To be assessed as the center matures.</li> </ul>
Number of extramural grants applied for by cross-college teams <sup>4</sup>	<ul style="list-style-type: none"> <li>Seed grant teams have submitted <b>13 proposals</b> to date, with more anticipated.</li> </ul>

Outputs	Evidence
Number of successfully funded extramural grants 	<ul style="list-style-type: none"> <li>• FIC grant teams have secured <b>seven extramural grants</b>, with more anticipated. Results listed by seed grant or Innovation Incentive PI: <ul style="list-style-type: none"> <li>○ Parwinder Grewal (1): \$864,989 from HUD</li> <li>○ Jianrong Li (3): \$1 million from USDA/NIFSI; \$5 million (subcontract to OSU \$1.2M) from USDA/AFRI; \$25 million (subcontract to OSU \$375,000) from USDA/AFRI</li> <li>○ Yael Vodovotz (2): \$45,000 from the Ohio Soybean Council; \$30,000 CIFT.</li> <li>○ Stephen Myers, Ken Lee (1) \$1.7 million from the Ohio Third Frontier Commission</li> </ul> </li> </ul>
Number of partnerships with external organizations 	<ul style="list-style-type: none"> <li>• Cultivated relationships with the 14 external organizations listed in section II.D.</li> <li>• Outcomes have included funded and pending proposals.</li> </ul>
Number of meetings with potential clients and stakeholders 	<ul style="list-style-type: none"> <li>• FIC directors and staff engaged in <b>more than 60 meetings</b> to forge the partnerships referenced above and to raise awareness of the center. Many of these exchanges involved formal presentations about FIC.</li> <li>• This estimate is artificially low as it does not include activities of all center members.</li> </ul>
Amount of money raised or leveraged 	<ul style="list-style-type: none"> <li>• Created a <a href="#">matching fund</a> for leverage of FIC member proposals with a \$10,000 maximum.</li> <li>• Invested several hours with potential stakeholders to build trust relations.</li> <li>• Met with university and college development personnel, several deans, and VPs to evolve strategy around the food innovation theme.</li> </ul>
Number of scholarly publications 	<ul style="list-style-type: none"> <li>• Seed grant teams have <b>seven publications</b> in the review pipeline, with more planned.</li> </ul>
Number of scholarly presentations 	<ul style="list-style-type: none"> <li>• Seed grant teams have executed or submitted abstracts for <b>18 presentations</b> at national and local meetings.</li> </ul>
Number of students participating in FIC events, seminars, and courses 	<ul style="list-style-type: none"> <li>• First year educational efforts primarily focused on partnering with established events described in the row below.</li> <li>• FIC leadership of educational activities was deliberately staged to begin in year two to free up resources for the development of center infrastructure and grant programs in year one. Student-focused data will be included in the 2012 annual report.</li> </ul>

Outputs	Evidence
Dollars invested in student learning	<ul style="list-style-type: none"> <li>• <b>\$3,365</b> was invested to support the annual Russell Klein Research Symposium and speakers for the OSU Interdisciplinary Ph.D. Program in Nutrition (OSUN) and Dept. of Human Nutrition seminar series. The symposium investment included poster awards for transdisciplinary projects.</li> <li>• Graduate students are also recipients of stipends for efforts on some seed grants.</li> </ul>
A written plan for organizational infrastructure <sup>3</sup>	<ul style="list-style-type: none"> <li>• The center's logic model is a significant component of an evolving plan for organizational infrastructure and sustainability.</li> </ul>
	<p><i>Clinical evidence backing health promoting properties for Ohio's official state beverage may come from Food Innovation Center research teams now engaging scientists from several colleges.</i></p>
<p>Outputs are associated with the following outcomes as depicted in the logic model:</p>	
<p><b>1. Increase OSU interdisciplinary research and outreach on food and nutrition</b></p>	
<p><b>2. Increase student interest and engagement on food through interdisciplinary research and education</b></p>	
<p><b>3. Achieve organizational sustainability within 5 years</b></p>	
<p><b>4. Disseminate new knowledge</b></p>	

## VIII. Logic model

The model and budget on the following pages show integration of our planned endeavors with planned expenditures.

# Food Innovation Center Logic Model

