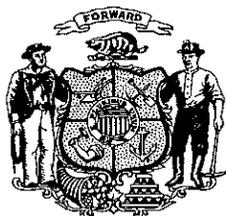


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JOINT COMMITTEE ON FINANCE

MEMORANDUM

To: Members
Joint Committee on Finance

From: Senator Alberta Darling
Representative John Nygren

Date: November 16, 2015

Re: UWS Report to JFC

Attached is a report on the Industrial and Economic Development Fund from the University of Wisconsin, pursuant to s. 36.25(25)(c), Stats.

This report is being provided for your information only. No action by the Committee is required. Please feel free to contact us if you have any questions.

Attachments

AD:JN:jm



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DATE: November 13, 2015

TO: Senator Alberta Darling, Co-Chair
Representative John Nygren, Co-Chair
Joint Committee on Finance

FROM: Ray Cross, President *Ray Cross*

RE: 2013-15 Report on Industrial and Economic Development Funds

With an economic impact of over \$15 billion annually, the University of Wisconsin (UW) is continuously engaged in economic growth for the state. One of the tools that the UW uses to ensure that its research mission translates into economic success is the Industrial and Economic Development Research Fund (IEDRF).

The funding for this program is distributed through the Applied Research Program, the Industrial and Economic Development Research/State Economic Engagement and Development (SEED) Program, and the Center for Dairy Profitability. These programs are intended to promote technology transfer and collaborative projects that stimulate economic development in Wisconsin.

Wis. Stats. s.36.25(25) (c), requires the University of Wisconsin System to report biennially to the Joint Committee on Finance regarding projects funded as part of the industrial and economic development research program in the previous fiscal biennium and the relationship of the funded projects to the state's economy. The enclosed report is submitted for your review.

If you require any additional information regarding the 2013-15 Report on Industrial and Economic Development Funds, please contact Gillean Kitchen at gkitchen@uwsa.edu or 608-263-7879.

Enclosure

CC: UW Board of Regents
UW System Cabinet
Gillean Kitchen, Program and Policy Analyst, Office of Budget and Planning
Joe Malkasian, Joint Finance Committee
Sara Hynek, Department of Administration
Nathan Schwanz, Department of Administration
Dave Loppnow, Legislative Fiscal Bureau
Emily Pope, Legislative Fiscal Bureau



UW UNIVERSITY OF WISCONSIN SYSTEM

2013–15

INDUSTRIAL
AND ECONOMIC
DEVELOPMENT
RESEARCH FUND REPORT

INDUSTRIAL ECONOMIC DEVELOPMENT RESEARCH FUND REPORT

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INDUSTRIAL AND ECONOMIC DEVELOPMENT RESEARCH FUND

2013-15 BIENNIAL REPORT

INTRODUCTION

Background

The Industrial and Economic Development Research Fund (IEDRF) was established in 1987 to enhance the relationship between UW System institutional research and Wisconsin industrial practices in an effort to promote the state's economic growth. It has supported projects which have assisted a large number of Wisconsin enterprises. Many of these projects continue to improve the competitive position of Wisconsin business.

This report describes the activities supported by the IEDRF for the 2013-14 and 2014-15 fiscal years. The report is divided into three narrative sections and eight appendices. The first narrative section details the Industrial and Economic Development Research Program (IEDR), which in 2014 was reformatted into the State Economic Engagement and Development (SEED) Program. The SEED Program provides grants to faculty at UW-Madison. This program is administered by the UW-Madison Office of the Vice Chancellor for Research and Graduate Education. The second section provides an overview of the Applied Research Program, administered by the UW System

Office of Academic Affairs. These funds provide grants to faculty throughout the UW System. The final section describes the activities of the Center for Dairy Profitability, an on-going UW-Extension and UW-Madison project that addresses economic challenges to Wisconsin's dairy industry.

Both the IEDR/SEED program and the Applied Research Program provide grants which are competitively awarded. Researchers are encouraged to submit technically innovative proposals that are of interest to a broad economic sector and will immediately benefit Wisconsin's industrial and economic development. All projects are selected based on a combination of scientific merit and the potential for technology transfer. Grant summaries are provided in the appropriate sections.

Eight appendices are attached which list all grants, investigators, campuses or departments, and the amounts funded by the IEDR/SEED and Applied Research programs. Appendix G and H note extramural grants awarded in support of the work done by the Center for Dairy Profitability as well as the Center's publications.

IEDR/SEED PROGRAM- UW-MADISON

Background

The Office of the Vice Chancellor for Research and Graduate Education administers the IEDR/SEED program for the University of Wisconsin-Madison. The IEDR/SEED program seeks to stimulate and enhance research collaborations between UW-Madison and Wisconsin firms and to promote economic development in the state. University faculty and staff researchers submit proposals that are subject to a competitive selection process. A selection panel comprised of faculty and representatives from the technology transfer, research policy, and industrial contracts offices, select technically innovative projects that will benefit Wisconsin businesses. The panel reviews each proposal for scientific and technical merit, while also taking into consideration the impact the research will have on the identified sector of the Wisconsin economy.

Originally, the IEDR program required applicants to submit a proposal in conjunction with a Wisconsin business, and the business was required to match the program funding. When the program was reformatted, this component was replaced with a requirement that the faculty or staff researcher who submitted the grant has a financial or management interest in a company that has spun out of research performed at UW-Madison.

Highlights

The IEDR program funded 14 projects during the fiscal year ending June 30, 2014 (\$679,565) and the SEED program funded 5 projects during the fiscal year ending June 30, 2015 (\$694,921). Research titles for individual projects are listed in this

report. The following points highlight some noteworthy facts and outcomes resulting from IEDR/SEED research program:

- Over the 2013-2015 biennium, IEDR/SEED funding supported collaborative research between UW-Madison scientists and Wisconsin businesses in the following counties: Dane, Jefferson, Waukesha and Wood.
- Faculty indicated that IEDR/SEED funding fundamentally demonstrates state and university commitment to translational research, solidifies research collaborations with companies, and leverages awards into further funding opportunities. Several faculty members noted the scarcity of such funding to directly support product development, making it unlikely that the research would have been undertaken without support from IEDR/SEED. Some specific feedback received includes:
 - o “Based in part on this work funded by the SEED program, Ameba Gone Inc. and the UW-Madison lab of Dr. Curtis Brandt were able to secure Small Business Technology Transfer (STTR) funding from the National Institutes of Health for \$225,000 to fund exploration of Dicty as a treatment of MRSA USA300 – medical keratitis. In addition, AmebaGone, Inc. secured additional monies of \$75,000 within the period ending September 1, 2015... in total contributing to acquisition of over \$1 million in funding and soon [will] enable more hiring.” (Dr. Marcin Filutowicz, AmebaGone, Inc.)
 - o “Our results have had substantial economic impact. [The Principal Investigator] worked with Silatronix employees to write and submit two major research proposals to Department of Energy (DOE) Vehicles Technology Program for funding... DOE could not fund both of the proposals in this round of funding, and so funded the first one...for \$1.3 Million... We have been told that the second proposal will also very likely be funded in the next round of competition, thus bringing the likely economic impact in excess of \$ 2 Million. That proposal... would include a UW Subcontract.” (Dr. Robert Hamers, Silatronix)
 - o “In June this year, University of Wisconsin Engine Research Center (WERC) received a \$2.6 million award from ARPA-e for the design and development of a natural gas fueled combined heat and power engine that extends beyond the SEED award. The project is a collaboration between WERC, Adiabatics and Briggs & Stratton... The APRA-e award will support three engineers at WERC (based in Madison, WI), research staff and students at the University of Wisconsin-Madison, and staff at Briggs & Stratton

(based in Wauwatosa, WI), contributing substantially to the Wisconsin Economy. A majority of the award, will be spent in the state of Wisconsin, providing significant return on investment of the SEED award... SEED funding allowed for an initial model-based exploration of advanced DME fuel CI combustion strategies. The results of this work will be directly utilized in future project proposals (e.g., U.S. Department of Energy (DOE) funding opportunities). Potential future projects based on this initial study will result in high-value job creation opportunities for WERC.” (Dr. Sage Kokjohn, WERC)

o “The development of a novel antibacterial bone cement will have significant near-term benefits to Wisconsin. . . . A commercialized bone cement has the potential for significant returns – both in terms of investor payback as well as contributing to the economic base of the region. Following commercialization, it is anticipated that cement manufacturing will be performed in Wisconsin, which is an ideal location for this type of product. The Wisconsin polymer industry employs over 60,000 people and ranks in the top 10 among states in the United States. Therefore, the infrastructure necessary to produce large quantities of medical grade polymers already exists in the state. The proposed cement formulation would expand the [Wisconsin] partner company’s (Imbed Biosciences Inc.) product portfolio and allow them to gain entry into a new market segment.” (Dr. Heidi-Lynn Ploeg, Imbed Biosciences)

- Data from IEDR/SEED projects allowed several faculty to apply for and receive large research grants directly from federal agencies and subcontracts with partnering companies, who received SBIR grants. At least 10 recipients indicated subsequent grants were submitted or received from federal, non-profit, and for-profit entities as a result of IEDR/SEED research.
- As a result of IEDR/SEED research, some collaborating companies plan to hire additional staff, will achieve cost savings, or are in better positions to manufacture and market their products. This provides an economic boost directly to the State of Wisconsin.
- In addition to faculty and academic staff, several dozen students, both graduate and undergraduate, and postdoctoral fellows worked on these projects. Many of these students received training for high-tech jobs and left UW-Madison with job offers in technology companies.
- Researchers have already submitted or published 7 research papers in peer-reviewed journals and conference proceedings. Additional

papers are either in progress or planned.¹

APPLIED RESEARCH PROGRAM- UW-SYSTEM

Background

Applied Research grant program projects are funded through a competitive process administered by the UW System Office for Academic and Student Affairs and the WiSys Technology Foundation, Inc. WiSys Technology Foundation is a 501 (c)(3) supporting organization of the University of Wisconsin System. WiSys helps great ideas – born on University of Wisconsin System campuses – reach the wider world by connecting inventors and businesses with the resources they need.

The colleges and universities in the UW System seek to serve the public through a variety of educational services and scholarly contributions to society that develop advanced human potential and the knowledge economy that employs that potential. The Applied Research programs seek to contribute directly to the growth of the economy in the state of Wisconsin through the production of new knowledge.

The Applied Research Grant and Applied Research-WiSys Technology Advancement Grant programs are competitive. Principal investigators from UW System institutions submit proposals documenting their realizable applied research goals and objectives, and carefully document the funding needed to achieve outcomes that may lead to patent production, technology transfer, business expansion and profitability, and job creation. All proposals are reviewed and rated by a panel comprised of representatives from the private sector with expertise in business and technology, a representative from WiSys, and a staff member from the UW System Office for Academic and Student Affairs. In addition to the quality of the research design and likelihood of successful completion, major criteria for selection and funding is the likelihood of a positive impact of the project on Wisconsin's economy and industry-research partnerships, as well as advancing the commercial potential of technologies.

In 2014-15, 20 applications for funding, requesting a total of \$1,017,872, were received. Six (6) UW institutions' Applied Research Grant proposals were funded in the total amount of \$290,151. Five (5) UW institutions' Applied Research-WiSys Technology Advancement Grant proposals were funded in the total amount of \$213,180. Further funding was provided to WiSys to support four Prototype Development Fund grants and a stipend to cover patenting and licensing costs for technologies developed with the support of the Applied Research grant programs.

In 2013-14, 21 applications for funding, requesting a total of \$1,049,288 were received. Eight (8) UW institutions' Applied Research Grant proposals, two of them collaborative, were funded in the total amount of \$292,371. Five (5) UW institutions'

¹ Not all publication and presentation titles were made available at the time of reporting.

Applied Research-WiSys Technology Advancement Grant proposals were funded in the total amount of \$192,337. Further funding was provided to WiSys to support six prototype development grants and a stipend to cover patenting and licensing costs for technologies developed with the support of the Applied Research grant programs.

Applied Research Program (ARG) Awards, Fiscal Year 2014-15

See Appendix F for a list of investigators, departments, and amounts of the awards.

- Chemically Modified Waste Paper for Biopolymer Based Soil Conditioner as a Replacement for Petroleum Based Soil Conditioner for Lawn and Garden Products (PI: Franklin Chen, UW-Green Bay): This project aims to replace non-sustainable, non-degradable petroleum-based polyacrylamide (PAM) with chemically-modified waste paper to produce effective soil conditioners that are environmentally inert. Multiple methods are proposed to modify cellulose and attach negatively charged groups needed to bond with calcium cations which in turn bond to negatively charged soil particles. This is the same principle PAM based soil conditioners currently use. The most important functional groups on PAM are anionic carboxylate groups thus the PI's focus will be to replace hydroxyl groups present on cellulose surface with sulfonate groups or carboxylate groups thereby creating a viable soil amendment from a recycled material.
- A Novel Drug Screening Platform for Assaying Clinically Relevant Tumor Models, (PI: Kevin Eliceiri, UW-Madison): The PI intends to work with Bellbrook Labs (Madison, WI) to custom fabricate clinically relevant cancerous tissue features in microchannel plates to enable image-based monitoring of tumorigenic processes on existing high throughput screening platforms. Bellbrook Labs iuvo microchannel plates allow cells grown in the native ECM environment to be put into high throughput drug discovery. Rather than multiwell plates, iuvo plates include cell culture compartments with geometries to support the biology and functions of interest such as tumor associated collagen signatures. This research will allow the company to continue to advance product offerings and associated downstream therapeutics.
- Nursing Diagnosis Clinical Support Tool, (PI: Susan Gallagher-Lepak, UW-Green Bay): The PI intends to develop an electronic clinical support tool using the NANDA International nursing diagnosis taxonomy. NANDA-I offers print based nursing diagnosis taxonomy currently offered in 16 translations through publisher Wiley with

worldwide sales of 54,000 print copies per year. This project will further previous work by UW-Green Bay to digitize the content and offer improved functionality via electronic application versioned for mobile devices. This project will also work to translate the tool into additional languages representing significant markets for the product including Spanish and Portuguese language versions.

- Tuning of New Smart Polymer Surfactants for Enhanced Oil Recovery Applications, (PI: Elizabeth Glogowski, UW-Eau Claire): The PI intends to create new smart polymer surfactant for enhanced oil recovery for both oil discovery/exploration and remediation – Poly((2-dimethylamino)ethyl methacrylate). The technology will have the potential to improve oil recovery systems and current technologies that do not have a combined surfactant and polymer to reduce the concentration required to effectively recover oil. The product will be easily removable from water with a change in temperature allowing for easy disposal in addition to viscosity tuning to allow easy separation of the material from oil following recovery.
- Preserving the Power of Plants -- An Innovative Ethnobotany Project, (PI: Paul Hlina, UW-Superior): The PI is working to improve the knowledge and utilization of native plants in the UW-Superior region. This work is carried out by hosting a series of workshops affiliated with experimental stations helping to communicate to participants the properties of natural food plants and suitability for cultivation in garden plots. This work builds upon research on the suitability of varieties for cultivation, economic viability, and availability of plants for new markets. In addition, a publication will be created to help the public understand how best to forage for wild species of plants.
- DNA-Templated Metal-Free Fluorogenic “Click” Reactions for Sequence-Specific DNA Detection and PCR-Free Signal Amplification, (PI: Xiaohua Peng, UW-Milwaukee): The PI is working to use sequence-specific fluorogenic ligation system to develop a rapid, sensitive, user friendly method for gene mutation analysis. This work builds on preliminary identification of a DNA-templated fluorogenic ligation via “click” chemistry. The PI proposes to make nucleic acid sequence detection, especially single nucleotide polymorphisms detection, simpler, faster, cheaper, and more efficient by using a reagent-free fluorogenic DNA-templated reaction capable of single nucleotide discrimination and fluorescence signal amplification. The potential outcome of this research is to apply the methodology for detecting DNA mutations in known genetic diseases.

WiSys Technology Advancement Grant Awards (Fiscal Year 2014-15)

See Appendix F for a list of investigators, departments, and amounts of the awards.

- The Development of ZnO-Based Electro-Absorption Modulators, (PI: Eric Gansen, UW-La Crosse) : The PI is working to construct and test electro-absorption modulators (EAMs) based on ZnO/ZnMgO multiple-quantum-well structures grown via sputter deposition and utilizing the quantum-confined Stark effect. EAMs imprint information on a beam of light or sequence of light pulses – converting an electrical signal to an optical signal making them useful in a variety of applications including telecommunications. Quality of the structures is being quantified by determining standard performance parameters as a function of temperature and geometrical parameters of the structures. ZnO is more readily available and less toxic than current nitride based materials (GaN) currently used in short-wave optoelectronic devices thereby offering an opportunity to the prospective commercialization partners and the industry.
- Methods for Green Alcohol Oxidation Employing New Modified Iron Phthalocyanine Catalysts, (PI: Robert McGraff, UW-La Crosse): The PI is working to develop methods for efficient oxidation of primary and secondary alcohols to produce aldehydes and ketones with decreased cost and environmental contamination compared to currently used industrial processes. The aim is to replace traditional chromium-based oxidants, chlorinated solvents and precious metal catalysts. The PI will expand on previously published work on iron based catalysts to create potentially novel water soluble catalysts that will eliminate the need for toxic solvents while efficiently carrying out these industrially important reactions.
- Towards the Fabrication of Thin-Walled Cellular Structures Using Hybrid 3D Printing and Electroforming Technologies, (PI: John Obielodan, UW-Platteville): The PI is working to develop low-cost, scalable, and versatile hybrid manufacturing of metallic thin walled cellular structures employing both existing layer-by-layer 3D printing process with low-cost, high-throughput electroforming process. This technology has potential application in aerospace, auto and biomedical industries and will compete with existing processes including liquid melt gas injection, investment casting, solid state powder sintering, foaming of slurries, and vapor deposition. It will improve on new process electron beam melting. The process will utilize a low-cost polymer 3D printing of cellular structures and electroforming process (electrodeposition) to coat the printed structure followed by polymer

removal process to generate 100 percent metallic cellular structure with the properties required for the end application.

- Development of Non-Migratory Active Cling Wrap Packaging for Enhanced Food Safety and Quality, (PI: Joongmi Shin, UW-Stout): The PI is working to create low density polyethylene cling wrap with covalently bonded known antimicrobials natamycin (pimaricin) and/or N-halamines. Currently these preservatives are added directly to the food products regulated by the FDA. The indirect delivery of the additive will minimize or eliminate migration of preservatives into food. Target applications include produce that do not receive terminal pasteurization.
- Towards Commercialization of Color Test Kit for Synthetic Cathinones, (PI: Joseph Wu, UW-Platteville): The PI is working to further develop the prototype test kit for synthetic cathinones (aka bath salts) and detection of all scheduled compounds containing amine groups. This study is being conducted to further the current practice of using multiple tests in concert in order to detect synthetic cathinones and improve the effectiveness of the current tests by exploring additional reagents that may provide more accurate results. The tests being developed will target the core structure of these scheduled compounds and will therefore be able to detect future emergent drugs as they are created with additional functional groups or slightly varied chemical structures.

Prototype Development Fund Awards (Fiscal Year 2014-15)

See Appendix F for a list of investigators, departments, and amounts of the awards.

- Reconciliation of Ghost Isotherms in Langmuir Trough System, (PI: Jennifer Dahl, UW-Eau Claire): The Langmuir trough system is the key equipment needed to fabricate Janus nanoparticle systems that have been disclosed and assigned to WiSys. The trough system is malfunctioning and exhibiting ghost isotherms (data artifacts) thereby hindering the ability to create precisely arranged films of monofunctional gold nanoparticles serving as the basis for the proposed Janus systems. The goal of the project is to identify and eliminate the source of the ghost isotherms in consultation with Biolin Scientific, the leading U.S. vendor of Langmuir trough systems.
- Development of a Novel Method for Measuring Occupational Noise levels in the Ear Canal (Phase 1), (PI: Lynn Gilbertson, UW-Whitewater): The project aims to create a dosimeter attachment with

the ability to collect sound level measurements in the ear canal. The current dosimeter testing protocols typically use a shoulder mounted measurement device but does not typically take into account noise from work issue ear pieces often used in many industries. The dosimeter attachment will measure levels of occupational noise in the ear canal when an ear piece is present and evaluate signal to noise ratios during work tasks. The project will be conducted in two phases with phase 1 working to fabricate the most cost effective attachment, laboratory testing, and controlled field testing of the platform technology to show proof of concept for the next stages of development.

- Mold Making Recipes, Modular Molding Systems, and Refractory Foam Technology Commercialization, (PI: Daniel McGuire, UW-Whitewater): The PI is working to refine three casting technologies assigned to WiSys and combine these technologies to create a comprehensive casting system for potential commercialization. The project aims to develop a comprehensive prototype incorporating all components. This system will include core materials reformulated for application in high-temperature metal pours, prefabricated sprue, along with 3D printed molds attached directly to prefabricated sprue. Lab testing, field testing, and industry feedback confirm that the combination of the casting technologies can save end users time, money, and energy.
- Testing SK-03-92 for Synergy with Other Antibiotic Classes, (PI: William Schwann, UW-La Crosse): The PI will work to examine whether target compound, SK-03-92, has synergistic activity with other representative drugs from several antibiotic groups. SK-03-92 and the known antibiotic will be serially diluted and a strain of *Staphylococcus aureus* with known resistance against other classes of antibiotics will be tested to determine if the minimum inhibitory concentration (MIC) against those known classes of antibiotics can be synergistically reduced in the presence of SK-03-92. Antibiotics to be tested in co-assay include clindamycin, vancomycin, oxacillin, erythromycin, tetracycline, ciprofloxacin, and a cephalosporin drug. The MICs will be compared to SK-03-92 along treatment and sole treatment with the known antibiotic. If the project is successful, the study will demonstrate a subtherapeutic dose of SK-03-92 will lower the MIC of the other drug tested.

Applied Research Program Awards (Fiscal Year 2013-14)

See Appendix E for a list of investigators, departments, and amounts of the awards.

- Fabrication and Evaluation of Plasmonic Waveguides for Enhanced Performance of Photovoltaic Materials, (PI: Jennifer Dahl, UW-Eau Claire and Seth King, UW-La Crosse): The PI worked to develop a method for creating durable, flexible films of cross-linked gold nanoparticles that are easily transferred to solid substrates, enabling their use as inexpensive backside reflector materials for enhanced photovoltaic devices. The application of gold films to solar devices will improve efficiency of the established technology at a low cost. The project goal of characterizing the flexible film of cross-linked gold nanoparticles to enhance photovoltaic devices was successful. Further development studies are underway to optimize the surface chemistry of the gold nanoparticles to promote adhesion between the gold and a substrate. The results of this study will enable the fabrication of gold nanoparticle films with customizable surface chemistry, supporting the fabrication of photovoltaic hybrids with high structural integrity, as well as enabling additional applications in nanomedicine.
- Spray Pyrolysis Fabrication of Zinc Tungstate Thin Films for Photovoltaic Applications, (PI: Seth King, UW-La Crosse): The PI employed a novel deposition technique to fabricate zinc tungstate thin films which may be interfaced to previously developed zinc oxide nanolaminate materials. Zinc tungstate offers great promise as a photon absorbing layer for zinc oxide based photovoltaics, and the application of spray pyrolysis allows for these materials to be immediately scaled to industrial level production. While the structural and compositional characteristics of non-stoichiometric zinc tungstate films has been fully explored, additional work must delve further into the electronic properties of the fabricated materials.
- Development of New Broad-spectrum Antimicrobial Therapeutics, (PI: Laura Knoll, UW-Madison): The PI tested how broad-spectrum, a single, low dose of an E.Coli protein (called cyclophilin) is as an effective therapeutic in two different microbial models. These models are the bacteria *Listeria monocytogenes* and the cerebral malaria-inducing parasite *Plasmodium berghei*. The project also aimed to perform the dose optimization and basic mechanism studies needed for cyclophilin product development. Because of the urgent need for novel anti-bacterial agents, the project focused on and achieved both of these milestones and is now moving toward testing these

microbial proteins as immunotherapeutics. With future licensing potential in mind, PIs have had discussions with campus technology transfer, biotechnology leaders from large established companies, a FDA regulatory expert, as well as several physicians. From these discussions, it has been determined that licensing and future clinical trials will be easier if these immunotherapeutic proteins are first developed as effective cancer treatments. Therefore PIs goals are to now test these microbial proteins in cancer models in collaboration with two UW School of Medicine and Public Health physician scientists.

- Development of a Wearable, Portable, TheraBracelet to Enhance Touch Sensation and Dexterity of the Hand of Neurologic Patients via Vibrotactile Stimulation, (PI: Na Jin Seo, UW-Milwaukee and John Webster, UW-Madison): The PI worked to assist stroke victims in regaining their touch sensation through a sensorimotor orthotic worn as a wristband. The wristband, called TheraBracelet, applies low-level vibration at the wrist to enhance stroke patients' touch sensation of the fingertips, which is critical for manual dexterity and skilled hand movements. Both of the goals of the project were achieved. A prototype of TheraBracelet that functions and satisfies most of customers' expectations except for the cost has been developed. Based on patient feedback of the prototype, improvements are the next step in the research to further develop the technology.
- Cold Spray Coating Technology for Electronics and Corrosion Protection Applications, (PI: Kumar Sridharan, UW-Madison): The PI applied cold spray technology for coating of copper on alumina (aluminum-oxide) dielectric substrates and coating of Hastelloy C-276 bond-layer for corrosion resistance. Cold spray is a solid state material deposition process that uses a high-velocity inert gas to propel micron-sized metallic powders toward a substrate. The powder particles undergo severe plastic deformation upon impact which adhere them to the substrate, and successive impacts build up material for coatings or near-net-shape manufacturing of components. The deposition of Inconel on steel was successful and copper on aluminum is also promising but more research and characterization is needed for both. This project has allowed for continued discussions between industry and researchers for new cold spray commercial applications.
- Self-Supported Silicon-Carbon Hybrid Nano-Material for High Capacity Lithium Ion Battery Anode, (PI: Chris Yuan, UW-Milwaukee): The PI worked to develop a silicon-carbon hybrid nano-material that could be commercialized to increase battery capacity over 1000 mAh/g (triple the capacity). Current lithium batteries are limited for energy storage and increasing the capacity of the battery anode material

can increase the energy storage and as a result extend battery life. The findings identify that the harvest of alkyl-capped crystalline Si nanoparticles is possible along this route, if further efforts are made to improve operation details and experimental apparatus. The method can be generalized readily to the production of many other nanosized Li-ion battery anode materials, such as tin, germanium, cobalt, and their alloys, which are less active to oxygen and moisture than Si nanoparticles. Additional research is required with established commercial collaborators in order to prospectively commercialize the technology.

WiSys Technology Advancement Grant Awards (Fiscal Year 2013-14)

See Appendix E for a list of investigators, departments, and amounts of the awards.

- Micromechanical Torque Magnetometer for Characterizing Magnetic Nanoparticles. (PI: Palash Banerjee, UW-Stevens Point): The PI worked to measure the hysteresis loop of a single micrometer sized magnetic structure with an instrument called a torque magnetometer working within an ultra-high vacuum environment. The instrument is based on a thin and flexible silicon cantilever whose position and frequency can be measured with exquisite precision. By placing small volumes of magnetic material on the tip of such a cantilever and applying a magnetic field, the frequency of vibration of the cantilever changes. A theoretical model has been developed that allows researchers to extract meaningful magnetic parameters from the measurements of frequency versus applied field. The hysteresis loop allows researchers to determine several important physical parameters of the magnetic structure such as the magnetic moment, the coercive field, and its internal anisotropy. The experiments performed lay the scientific basis for the development of an ultrasensitive micromechanical magnetometer as a platform for the study of small volumes of technologically relevant magnetic nanoparticles.
- Alert:HeadsAhead (AHA). (PI: Athula Gunawardena, UW-Whitewater): The PI further developed the capabilities of the web-based Interactive Degree Planner system by adding an enrollment forecast/notification system called Alert:HeadsAhead (AHA). The goal of AHA is to predict future course enrolments over the years alongside other features to optimize degree planning for both students and advisors. AHA also provides a graphical user interface to view the forecast results and a notification system within AHA will trigger email alerts to

administrators when predictions exceed course enrollment limits, allowing corrective planning to commence well in advance of future scheduling issues. Researchers have successfully developed and implemented the AHA system using a model-view-control paradigm. This has enabled the IDP-AHA software to be ported to any client institution without writing new codes. User-friendly guided interfaces for manual data entry, as well as scripts to extract and create required course data from the course catalog, have been created. The course and scheduling databases are implemented using MySQL. The optimization algorithm for the determination of the shortest path to graduation has been written in C++ and works directly with the database.

- Refractory Molding Recipes, (PI: Dan McGuire, UW-Whitewater): The PI has developed a process that uses 3D printing technology to produce quick and easy ceramic cores and molds for the investment casting industry. This new process can save labor and energy costs associated with the use of traditional wax based slurry dipping technologies and processes. The technology would also have an immediate decrease in the turnaround time required to generate finished cast parts as the printed ceramic parts can be poured with molten metal within hours of printing rather than days of dry time required with traditional processes. The recipe was tested in an industry setting with assistance from collaborative partner Aristo Cast, and a method to successfully 3D print ceramic molds for investment casting was developed. Continued work with potential customers and 3D print companies is ongoing in order to commercialize the technology.
- Highbush Cranberry Project: Biofuels and Pharmaceuticals through Native Plants of NW Wisconsin, (PI: Michael Waxman, Jim Lane, UW-Superior): The PIs worked to further understand highbush cranberry (HBC) fruit and seeds to study its antiviral properties, its impact on plant yields, and its oxidative stability for biofuel products. The goal of the antiviral studies was to identify HBC cultivars whose extract and extract components show the most potent antiviral properties. The goal of the oxidative stability study was to identify those cultivars producing oils with the highest yields and lowest saturated fat with good oxidative stability. The goal of the yield study is to identify the most promising cultivars for yield, cultivation, and growth conditions. During the course of research PIs identified a unique fraction of HBC fruit extract with high anti-viral activity and low cytotoxicity and a unique method of extraction/preparation. PIs undertook oxidative stability analysis of HBC oil. PIs will start the yield studies by collecting the HBC fruit this fall season.

- Development of Biodegradable Polylactic Acid/Clay Nano-composites: Mechanical Strength, Gas Barrier, and Thermal Stability, (PI: Wei Zheng, UW-Stout): The PI has worked to develop a one-step blown film process and then uses the process to produce biodegradable nano-composites with improved mechanical strength, barrier properties, and thermal stability. The primary system of interest is polylactic acid, clay, and a small amount of curing agent. Overall, the results indicate that both the material synthesis and the experimental measurement are reproducible. The results also show that the curing process not only enhances mechanical strength but also stabilizes the material. All of the proposal goals were accomplished for this project. The viscosity is found to increase with curing; upon gelation, the viscosity increases dramatically. The increase in viscosity indicates the formation of polymer network. It was observed there was no difference between the curing under nitrogen and oxygen. Overall, the results indicate that both the material synthesis and the experimental measurement are reproducible. The results also show that the curing process not only enhances mechanical strength but also stabilizes the material.

Prototype Development Fund Awards (Fiscal Year 2013-14)

See Appendix E for a list of investigators, departments, and amounts of the awards.

- The Effect of Papermaking Additives on Fiber-Length Distribution Control, (PI: Karyn Biasca, UW-Stevens Point): The PI worked to determine whether or not the inclusion of typical papermaking additives, such as polymeric retention aids and inorganic fillers would overshadow the effect of a fiber length process controller. A potential commercial licensee of the technology raised the question in response to reviewing the technology and requested the study be undertaken. The project studied both hand sheet and machine made paper. It was determined that the presence of inorganic fillers and retention additives typically used in current papermaking does not negatively impact the benefits of the paper pulp preprocessor patented technology and therefore demonstrates the potential for successful implementation of the technology in typical large scale paper making processes. Not only do strength properties still vary in response to changing fiber length distributions, but changing fiber length distribution affects the way in which additive adsorption takes place.

- Continuous Growth of Vertical Graphene on a Tungsten Wire for a Novel Ion Source, (PI: Junhong Chen, UW-Milwaukee): The PI worked to determine the effectiveness of using vertically-oriented graphene nanosheets (VG) on tungsten wires for novel corona discharge electrodes with potential applications in the air cleaning and photocopying markets. This research worked to deposit VG on tungsten wires as the wires are traditionally used within the industry and will be required for broad adoption of the technology. An effective way to fabricate VG sheets on tungsten wire was developed and multiple conditions were used to improve VG growth and study carbon radical activity during synthesis (especially temperature) in order to tailor speed, thickness, and quality of deposition.
- Interactive Degree Planner, (PI: Athula Gunawardena, UW-Whitewater): The PI worked to further develop an optimized degree planner (ODP) software that creates optimal degree plans for college students based on major. Specifically this study has directed to improve computing times, and to generate an algorithm that will produce desirable degree plans and these goals were successfully accomplished during the course of the project. The ODP requires only that the student input the desired degree options, semester credit limits, and list courses already completed/waived. The ODP then initiates a semester clock and generates a set of current candidate courses for the semester, based on prerequisites and degree requirements. The software also sets preference weights for those courses based on priorities related to prerequisites and degree requirements.
- Characterization and Synthesis of the Skin-Whitening Compound, A11, (PI: Cheng-chen Huang, UW-River Falls): The PI worked to confirm whether the target compounds, A11 and MEK-I, could be potentially safer skin-whitening products for the cosmetic industry. The toxicology of A11 and known skin whitening compounds was evaluated using zebra fish embryos as an early animal model. Goals included comparing the whitening effects to current products on the market, confirming the long-lasting effects of A11, understanding the molecular mechanisms of the two compounds, and preparing for more A11 tests on mammals in order to prove efficacy in a known animal model for this indication. Results confirmed A11 is a very potent skin-whitening agent comparing with several current human skin-whitening products, including arbutin, niacinamide, kojic acid, and others. MEK-I, however, is also potent, but only when it is applied to early embryo, indicating MEK-I targets a process in the early melanin synthesis. The project revealed unknown toxicity of some common skin-whitening products. MEK-I does cause toxicity in the developing notochord but only when it is used in early embryo before 24 hours

old. There is no detectable toxicity for A11.

- Design and Build of Final Version of Capstan Lever Drive Wheelchair Prototypes for Testing, (PI: Peter Knight, UW-Parkside): The PI worked to complete the assembly of two final prototype wheelchairs using a patent pending linear to rotary motion conversion mechanism designed by Procubed LLC. The two prototypes are to be the final, pre-production wheelchairs that will verify the form, fit, and function as it has been detailed throughout the project. The project allowed finalized prototypes to be completed thereby enabling small-scale production of wheelchairs to begin and certification testing to be performed at Human Engineering Research Laboratories (HERL) in Pittsburg, PA, by collaborator, Dr. Jon Pearlman.
- Refractory Mold Making Recipes, Modular Molding Systems, and Refractory Foam Technology Commercialization, (PI: Dan McGuire, UW-Whitewater): The PI developed a comprehensive prototype incorporating multiple components into a casting system that will include core materials reformulated for application in high temperature metal pours, prefabricated sprue, along with 3D printed molds attached directly to prefabricated sprue. All technologies involved have been disclosed to WiSys and are in the process of being patent protected. After the refining process, the next step will be testing the technologies with research partner, Aristo Cast, to develop a licensable product. The research team was able to verify the following regarding the three proprietary technologies: all are capable of withstanding working temperatures in excess of 3000 degrees Fahrenheit range; all are a seamless fit for current operating practices found in the industry; all are capable of withstanding standard thermo shock related issues associated with use in the industry; all provide end users with shortened production cycles with no traditional wax patterns required; technologies do in fact save the end user expenses related to time, money and energy.

CENTER FOR DAIRY PROFITABILITY (UW-EXTENSION/UW-MADISON)

Background

The University of Wisconsin Center for Dairy Profitability (CDP) is a multi-campus Extension unit with faculty and staff at UW-Madison, UW-Extension, UW-Platteville, and UW-River Falls. The CDP develops and delivers effective interdisciplinary education and applied research to dairy farms and dairy industry service providers resulting

in sustainable, profitable decisions, and a healthy and progressive dairy industry in Wisconsin. Mark Stephenson, Director of Dairy Policy Analysis at UW-Madison, is also the Director of the CDP.

The CDP receives funding from the Industrial and Economic Development Research Fund (IEDRF). In 2013-15, the IEDRF provided \$286,725 to fund 3.18 FTEs that were allocated as follows: 2.49 at UW-Madison; 0.29 at UW-Platteville; and 0.40 at UW-River Falls.

The economic success of Wisconsin's dairy industry contributes \$43.4 billion of dairy revenue annually—a rate of more than \$82,500 per minute. The dairy industry is linked directly and indirectly to many businesses in Wisconsin, providing jobs and additional revenue for the state. For example, every dollar of dairy income generates an additional \$1.54 for our communities and our state. In addition, the dairy business in Wisconsin directly supports 78,900 jobs. Plus, the employment multiplier for dairy is 2.23, which says that every job in dairy supports an additional 1.23 jobs elsewhere in the Wisconsin economy. This work force depends largely on the knowledge and management skills of dairy farmers and agribusiness professionals who work with them. Their decisions determine whether the state's dairy industry is competitive and prosperous over time. From the mid-1980s through the mid-2000s, milk production in the state was in decline. Since 2004, the state's milk production has been increasing and is currently at all-time highs.

Informed management decisions are a key to dairy farming's economic success. The CDP's emphasis is on educational programs that enhance the management skills and decision-making abilities of dairy producers and others who assist them in making management decisions. It is the vision of the CDP to be the preeminent academic institution empowering farm managers toward profitable decisions. To this end, the CDP will: 1) enrich the quality of life for farm owners, operators, employees, animals, and industry stakeholders; 2) collaborate with universities and industry to identify, develop, and supply a diverse clientele of farm managers and service-providers with research-based information and best-management practices; 3) create a work environment that is challenging, rewarding, and fun; and 4) disseminate products through traditional means and cutting-edge technologies. The core values of the CDP are diversity, sustainability, planning, collaboration, and quality of life.

This section describes the CDP's educational programs. It also contains examples of how the CDP facilitates the development of multi-disciplinary educational programs and partners with other agencies—such as the Department of Agriculture Trade and Consumer Protection and, previously, the Department of Commerce—that share its goal of enhancing the profitability of the dairy businesses and enhancing business development in Wisconsin and throughout the world.

The Center for Dairy Profitability leverages its limited resources by cultivating key collaborations with professionals and organizations in the agriculture industry throughout Wisconsin. CDP staff work in conjunction with UW-Extension agriculture

agents to develop educational programs, materials, speakers, and financial support for programs to help dairy and agricultural producers. Equally important is the relationship between CDP and the Lakeshore and Fox Valley farm management associations. The majority of the farms in the AgFA database (a financial benchmarking tool) are gathered through these two associations. Wisconsin Technical College System (WTCS) farm business instructors also collaborate with the CDP in providing financial record-keeping workshops and financial analysis for dairy producers in all parts of the state. Other collaborations include:

- Farm Credit Services: Badgerland and AgStar
- Farm Service Agency (FSA)
- Professional Dairy Producers of Wisconsin (PDPW)
- Dairy Business Association (DBA)
- Wisconsin Farm Bureau Federation (WFBF)
- Wisconsin Farm Center (WDATCP)
- Wisconsin Cheese Makers Association
- Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP)
- Wisconsin Farm and Rural Appraisers Association
- Wisconsin Milk Marketing Board (WMMB)
- Wisconsin Frame Builders Association
- Wisconsin Custom Operators Association

Economics of Dairy

Farm Financial Management and Financial Benchmarks

The CDP works with the Lakeshore and Fox Valley Farm Management Associations, UW-Extension Agents, and Wisconsin Technical College System (WTCS) instructors and others on a farm financial management, records, and benchmark project to increase the knowledge of the economic and financial operations of dairy farm business. This program is an integral part of the mission of the CDP. The records gathered by all the entities are used to compute costs of production of dairy farms and selected financial measures such as return on assets, return on equity, debt to asset, etc. These performance measures are widely used by county agents, lenders, policy-makers, and agribusiness professionals who work with producers on economic related problems. Since 1996, the AgFA database has served dairy producers and others to summarize and analyze the annual financial performance of farm businesses.

The Center for Dairy Profitability's AgFA Benchmarking tool is:

- A real-time, web-based agricultural financial database and program,
- For collecting and reporting farm level financial information,
- For use in providing farm financial statements and reports,
- For use in conducting farm financial analysis, and
- For benchmarking.

AgFA enables data collection, generating individual producers' financial reports, and benchmarking reports. Financial reports can be generated based on selected criteria and provide results consistent with industry standards and the recommendations of the Farm Financial Standards Council (FFSC).

Nate Splett, represents the CDP on the Farm Financial Standards Council (FFSC). Representation includes memberships on the FFSC, Board of Directors, Technical Committee, and Subcommittee on Guidelines Terminology (Splett – Chair). The CDP actively participated in the annual meeting in Billings, Montana this past summer and was recognized "for continued commitment of time, personal resources and service to the Technical Committee of the FFSC." CDP provided substantial input to updating the Guidelines of the FFSC. The result of this effort led to formation of a subcommittee to complete an edit of the Guidelines for consistency in terminology, language, style, and currency. This effort is being led by Splett. CDP is also an active participant in the FFSC's program to provide financial management education.

Farm Business Financial Management and Benchmarking (Collaborative Effort between Center for Dairy Profitability, University of Wisconsin and the Farm Service Agency, U.S. Department of Agriculture)

Situation:

Among management foci (i.e., production, financial, marketing, risk, tax, labor, etc.) for the farm business, financial management is the common thread through which useful decisions are made concerning farm profitability. Sound financial management cannot be made without accurate financial information, organized and structured for analysis and interpretation. In turn, complete and accurate financial information requires an appropriate recordkeeping system. And, financial analysis and interpretation requires appropriate financial statements constructed using standard methods. The analyses provide measures of the financial position and performance of the farm business. The financial position and performance of the farm business is better understood when compared against other similar farm businesses (financial benchmarking). The Farm Service Agency (FSA) and the Center for Dairy Profitability (CDP) are deeply invested in producers' financial management, providing funding, expertise, information, and education.

Response:

In 2012, the CDP partnered with FSA in Wisconsin to assist the high-risk 'transition-into-farming' group (new and beginning) and women farmers. The 'transition-into-farming' group generally borrows directly or receives loan guarantees from FSA, with the requirement they receive financial management education. In the initial project, FSA-WI provided the CDP with beginning farm data variables needed to generate reports such as Schedule F, Income Statement, Balance Sheet, and Statement of Cash Flow. These variables were taken from Webequity (FSA's data collection program) and were used to supplement Wisconsin's Agriculture Financial Advisor (AgFA) benchmarking database. Education workshops were conducted for FSA officers who subsequently assisted the high-risk dairy and crop farmers improve their financial position, profitability, and competitiveness. AgFA data are valuable to improve the core (financial, production, marketing) of management and to identify and evaluate areas (i.e., costs) that are well controlled and those which need attention. Populating the AgFA database with the Webequity data enabled FSA and their clients to access financial data for benchmarking and borrower education, which were not otherwise available. With the success of the initial FSA-WI experience, Webequity data from FSA-IA and IL were also brought into the system. Data from all three states are currently being migrated into the AgFA database on a quarterly basis.

With the technical success of data migration and the working partnership with FSA in WI, IA and IL, the foundation was laid to broaden the effort and create a national, collaborative effort between Wisconsin's farm financial benchmark work and the direct and indirect lending that FSA does in the agricultural community. The purpose of this project is threefold: 1) to improve producers' financial management decision-making for their farm businesses; ii) to improve and increase the use of data for decision-making; and iii) to improve the quantity and quality of financial information and data.

Dairy Markets and Policy

Dairy Markets and Risk Management

Mark Stephenson, Director of the CDP, has given dozens of presentations to farm groups and agribusinesses around the state to provide an update on the current state of and outlook for milk prices. Many of these presentations are given on location but several have been conducted with webinar technology and there is a monthly market update that can be streamed anytime. While 2013 and 2015 were fairly ordinary milk price years for dairy producers, all previous records were exceeded in the 2014 high price year. The highs and lows of milk prices can cause significant interruptions to the cash flows of dairy farms. Understanding the emerging role of the U.S. dairy sector in world markets has been an important part of this program effort.

New Dairy Policy

The Agricultural Act of 2014 is now the “current” farm bill and significantly new dairy policy was introduced to producers. The Margin Protection Program for Dairy represents the most significant change in policy for many years. This insurance-like product requires dairy farms to assess their risk coverage needs and invest in premiums to purchase protection from adverse milk and feed price movements. The Center took a national leading role in the development of a dairy decision tool, which is hosted on USDA’s Farm Service Agency web site and the Center’s web site.

The CDP developed educational material, conducted 7 national train-the-trainer events, and held dozens of producer information meetings across the state and the country. This effort led to an award and national recognition from the American Agricultural Economic Association.

The CDP also received funding and conducted training for Cooperative Extension agents in Wisconsin to co-host information meetings with the Farm Service Agency throughout the state on the new Agriculture Risk Coverage and Price Loss Coverage programs. Integrated campus specialists participated in national train-the-trainer meetings, developed decision-making software tools, delivered 20 webinars, trained a core of 10 county educators, presented at 13 major conferences including the Corn/Soy Expo and Wisconsin Crop Management Conference attended by 1,650 Great Lakes agricultural professionals, and held 208 informational meetings across the state from August 2014 to March 2015.

International Connections

The U.S. dairy industry now sells approximately 15 percent of its milk production as exported dairy products. Wisconsin plays a significant role in this effort exporting cheese and a majority of its whey products. Today, it is important for the industry to be cost competitive not only with dairy producers in other states but also other countries. The CDP has been actively involved with the International Farm Comparison Network (IFCN) supplying production and financial data of “representative” (synthetic) dairy farm data from Wisconsin. This sharing of information helps producers understand competitiveness and consequences of different business models.

Extension Educational Programs

The CDP is involved in a variety of management education programs that are intended to teach farm managers and agribusiness professionals about practices to improve the performance and profitability of farm businesses. The following is a brief summary of some of these programs.

Agricultural Land Values and Rental Rates

The CDP has worked with the Wisconsin Chapter of the American Society of Farm Managers and Rural Appraisers and the Wisconsin Department of Revenue to tabulate and identify trends in agricultural land values. Land values, a major factor in determining land rental rates are an important cornerstone of farm financial strength.

Beginning Farm Financial Record-Keeping Using QuickBooks

Dairy farming is a complex business which demands accurate records and careful financial management. Both financial and production records are required to provide the information the farm manager needs to make critical risk management decisions. Unfortunately, since farming is widely viewed as a “way of life” rather than a business, the financial management tools long available in other industries have not been universally embraced by farmers. Record-keeping has, and continues to be, a major skill-set deficiency among small farm businesses. Lacking the scale and margins necessary to access specialized skills beyond rudimentary tax preparation, many producers’ accounting systems fall far short of being able to address basic business, financial, and risk management issues such as accurate measurement of profit and owners’ equity and the ability to budget cash flows.

Beginning workshops on QuickBooks were introduced in 2005 and have continued through the last decade. These financial accounting workshops achieve two main objectives: (1) improve the accounting/recordkeeping knowledge base of small Wisconsin dairy farm businesses and (2) train farm businesses in the use of QuickBooks®. In addition to CDP funding, these trainings are partially funded through competitive grants from the North Central Region Risk Management Education Center and USDA Risk Management Agency Community and Outreach Assistance Partnership Grants.

Dairy Modernization

According to the Wisconsin Agricultural Statistics Service (WASS), the number of Wisconsin dairy farms continues to decline. As of September 2015 the number has fallen to approximately 9,825 (WMMB) with an average herd size of 130 cows. Approximately 75 percent of these farms are less than 100 cows and are still operating with tie/stanchion stall barns and associated feeding, milking, and manure-handling procedures. These systems are labor intensive and inefficient. The average age of dairy farmers is 56 years (2012). Over half of the farms with fewer than 200 cows plan on making investments in housing, milking, feed storage, or manure-handling facilities in the next 5 years (2012). As these farmers struggle with the future of their dairy farm operations, they need information and education on available options and how to transition the dairy business and invest in new facility designs that will allow the farm to stay profitable. David Kammel and the CDP staff, in cooperation with the UW-Extension Dairy Team, provide information, decision aids, and educational programs that allow farmers to determine whether and/or how to adopt technology and modernize, and permit farmers to develop their businesses, enhance profitability, and improve their quality of life.

Dairy Decision Tool

Producers used the Dairy Decision Tool for the first time to help make decisions about coverage in the fall of 2014. Based on last year's experience, the Decision Tool added a "Farm Financial Stress Test" section to help producers think about enrollment more from a risk management approach than an investment approach. This section of the decision tool requires few inputs on the part of producers, but it does require them to understand their financial position. In that sense, it works well with producers who have AgFA data entries and know their farm's cost structure and solvency.

Farm Succession Facilitator's Manual and Training

Joy Kirkpatrick co-authored a Farm Succession Facilitator's Manual in 2013 with John Baker from the International Farm Transition Network. This manual has been used in seven trainings in Wisconsin and other states. Since 2013, 81 agriculture professionals in Wisconsin including Extension and Technical College educators, attorneys, tax specialists, lenders, and insurance agents have been trained using this manual. An additional 80 professionals have been trained in other states.

Farm Business Financial Management Curriculum

In 2014 a new curriculum for financial management consisting of six modules was developed by Vanderlin and Splett. This course follows the continuum, beginning with farm business records, through financial statements, to decision-making. Structure, analysis, and interpretation of financial statements is emphasized in accordance with the Farm Financial Standards Council. Benchmarking financial position and performance is presented, using the AgFA database program. Budgets and the budgeting process are taught as principle decision-making tools.

FarmCEO

The FarmCEO project is an agent training and development activity on farm business management topics between the Center for Dairy Profitability and ANRE county faculty. A county team of two representatives from each region work together with CDP staff (Bernhardt & Vanderlin) to develop farm management topics and coordinate logistics.

Long-Term Outcome: Increase the capacity of farmers to understand and use farm business management principles to help them help themselves determine their own economic destiny.

Short and Medium Term Outcomes: Increase the farm business management capacity of county agents through continuous and purposeful in-service training, development of curriculum, development of decision aids, and dissemination of applied research results.

The FarmCEO project for agent training and development has two primary efforts:

- Farm Management Clinics: The purpose of clinics is to have continuous annual training activities that provide awareness of farm management topics, basic understanding, and provision of resources. The clinics are intended for all Ag agents as means to keep up and aware of farm management topics and resources. Clinics are held in each region, each year.
- Farm Management Boot Camps: Boot Camps are for in-depth coverage, understanding, and implementation of farm management topics. The Boot Camps are intended for those agents that have a desire to specialize in a specific farm management topic (Example: Farm Business Financial Management Curriculum).

Human Resource Management

Starting in February 2015, Simon Jette-Nantel started working on the development of a human resource management (HRM) program by developing knowledge in the field and a network of HRM experts and resources at the state and national level. This network provides the CDP with an information basis that helps us develop our capacity and knowledge in the field of HRM, and it is directly supporting our ongoing state and regional programming efforts. One of the outcomes of his leadership and networking efforts is the planning of HRM professional development training for UWEX agents planned for late Fall 2015. This professional development will also contribute to the development of farmers' education programs to be delivered starting in January 2016. In addition, Jette-Nantel is collaborating on a Risk Management Education grant proposal that aims to develop web-based tools to assist farmers in completing their employee handbooks.

Milk Check Checkup

CDP is again conducting a program with Wisconsin producers to provide them with a Milk Check Checkup—a benchmark of premiums and deductions from farm milk checks. Last year about 500 dairy farmers participated, and this year, the CDP has nearly 600 who have sent in copies of their milk checks for this program.

Returning to the Farm

Returning to the Farm (RTTF) is a project designed to address the human, legal, and financial risks involved in the transfer of the farm to the next generation. It attempts to reach college juniors and seniors who are planning on returning to their home farming operations. The project includes two weekend sessions held in the fall and spring. Each student and the farming family members are required to attend both sessions. Communication, conflict management, financial analysis of the farm, strategic planning, business arrangements, retirement planning, and estate planning are covered in the two sessions. Consultations are offered between the two sessions to analyze the financial capacity of the farm. Two hundred forty people representing 75 farm families have participated in a Returning to the Farm workshop since 2005.

Evaluations from the workshops indicate participants use the tools provided to help analyze their farms and to develop farm succession plans.

Shifting Gears in Your Later Farming Years

This curriculum was originally developed by a UW-Extension educator team lead by Joy Kirkpatrick and offered in 2012. It continues to be offered in various locations throughout the state. The curriculum includes communications, financial considerations, and estate planning topics. Approximately 140 farmers have attended the two-day workshop series since 2012. Evaluations indicate the participants have estimated their income needs and nest egg needed for retirement and have considered and discussed what activities will replace their farm responsibilities as they shift gears.

Wisconsin Assessment Center for Dairy Farm Owners/Managers

In today's changing farm environment, dairy farm managers are required to take on more of a managerial role. Specialists from the CDP and a team of UW-Extension agricultural agents designed the Management Assessment Center (MAC) for Dairy Managers. The assessment center curriculum was developed, tested, and implemented to help dairy farm managers understand their own competency levels as they relate to selected managerial attributes. Each assessment center includes a two-day program where producers participate in a series of activities which help assessors evaluate individual managerial strengths and areas needing improvement. Following the program, producers are given a detailed individualized report and a personal consultation. A resource guide is provided that assists them in developing a plan for self-improvement. Through impact and publicity, the MAC for Dairy Farmers has received interest from new audiences and agricultural organizations to develop and hold a MAC specifically for them. To date, the team has developed curriculums for Agronomy Managers, Fruit Growers, and UW-River Falls to host a MAC for juniors and seniors who plan on going into farming themselves or back to their family farm after graduation. To date, eighteen (18) assessment centers have been offered and 176 dairy managers, agricultural professionals (current and potential), and college juniors and seniors have participated in the assessment program. Evaluations show that 83 percent of the participants have changed how they use their managerial strengths, while 66 percent have changed their day-to-day approach to managing their farm. Other evaluation results have been extremely encouraging, and there is an increasing demand to modify the curriculum for other commodity groups as well.

Wisconsin Farm Succession Professionals Network (WIFSPN)

In 2014, CDP staff, Joy Kirkpatrick and Phil Harris, brought together agriculture service professionals who work in the area of farm succession for networking meetings. An initial meeting of 30 professionals in January of 2014 provided the impetus to offer three regional meetings in the fall of 2014 in Eau Claire, Appleton, and Madison. Two hundred forty-five professionals attended one of the regional meetings. This program

will be repeated with an additional site in Wausau in the fall of 2015. Evaluations of the regional network meetings indicate the professionals valued the time to network with other professionals and have professional development on farm succession issues.

Wisconsin Women in Agriculture

Of the 69,000 farms (2012 Census of Agriculture), 7,346, or just over one in ten, are operated by women. In 1997, women farmers accounted for only 7.3 percent of all Wisconsin farms and 4.3 percent of acreage. By 2012, the number of women farmers increased by 28.3%. During the same period, the total number of farms in Wisconsin declined by 12.3%. While the growth in the number of women farms in Wisconsin was not sufficient to entirely off-set the decrease in the total number of farms, it slowed the rate of decline. Indeed, women farmers are a source of growth for Wisconsin agriculture. Coordinated by Jenny Vanderlin, the CDP and UW-Extension county faculty and state specialists continue to provide one-day Heart of the Farm-Women in Agriculture (HOF-WIA) conferences and Annie's Project workshops to farm women across Wisconsin. Vanderlin works with county agents and other state staff to provide risk management education tailored to the needs identified by the county agents and/or past participant evaluations and feedback. In 2014 alone, approximately 315 people attended UW-Extension programs specifically targeting farm women. Evaluations indicate participants increased their knowledge and skills in several of the topic areas that were presented. The women also indicated the need for farm women's meetings that provide them a venue to network with other farm women. Follow-up evaluations indicate 75 percent of the respondents used information presented at the conferences. Examples of this included: farm financial and business management, farm succession, farm safety checks, herd health information, 5Ds information, improved internet security, connecting with other generations, and writing a business plan.

The place of farm women in Wisconsin over the last 5-6 decades has changed remarkably, from Alice in Dairyland, to women in management and ownership of farm businesses. Traditionally, women have been the financial record-keepers for the farm business; however, women are increasingly becoming decision-makers for the farm business. As such, it is important that they are skilled in making farm business decisions in today's rapidly changing agriculture world. Over 70 percent of past participants in Wisconsin's HOF-WIA and Annie's Project indicate they equally share the farm investment and long-term planning decisions for the farm.

The Heart of the Farm-Women in Agriculture (HOF-WIA) Conference Series continues to empower Wisconsin farm women in production, price, and the financial, legal, and human areas of risk management education. The Heart of the Farm – Women in Conference Series bring women together in a professional setting and increase their knowledge and competence in farm business management skills and production. These conferences are a vehicle to decrease the social isolation experienced by many

farm women by providing opportunities to network with their counterparts. HOF-WIA evaluations reveal farm women place priority on attending an agriculture educational program that is relevant to their business. Other factors that determine farm women's participation in agriculture education programs are the distance they must travel and knowing that other women will be attending the program. With partial funding through competitive grants from the North Central Region Risk Management Education Center and USDA Risk Management Agency Community and Outreach Assistance Partnership Grants, the CDP has been able to offer at least eight workshops each year throughout the state each year. The funding covers speakers' costs, travel costs, materials, and supplies.

Annie's Project is another opportunity for women farmers to connect with risk management resources and to network with each other. Annie's Project participants usually meet with instructors four to six times to train farm women to manage agricultural information systems, engage in critical decision-making processes, and to build support networks with other women throughout the state. During the years 2013-2015, several Annie's Projects were held covering topics such as the Affordable Care Act, retirement planning, business succession plans and exits, and direct marketing and financial management. Annie's Project is partially funded by CDP, UWEX, AgStar Financial Services, and competitive grants from the North Central Risk Management Education Center.

In addition, the CDP has a strong partnership with Wisconsin Farm Bureau and BadgerLand Financial to provide programming for Wisconsin Women in Agriculture through the Annual Wisconsin Ag Women's Summit (WAWs), reaching more than 350 women during a two day conference held in Madison.

Management Information Systems

Agriculture Financial Advisor (AgFA)

Agriculture Financial Advisor (AgFA) is a real time financial analysis and benchmarking tool. It is richly populated (over many years) with high quality data, developing a very comprehensive set of financial statements and reports all guided by the Farm Financial Standards Council. An integral part of the Farm Financial Management Project, the AgFA benchmark data are used to determine how farm businesses compare to others. The financial benchmark data and publications resulting from the economic data analysis are used extensively in dairy extension programs, and permit lenders, policy makers, and agribusiness professionals to help producers become better managers and more profitable farmers. The AgFA benchmarking site gives producers access to financial records from which they can generate and print reports immediately from the internet. (<http://cdp.wisc.edu/AgFA.htm>)

Agricultural Accounting and Information Management Systems (AAIMS)

The Agricultural Accounting and Information Management System (AAIMS) is a computerized agricultural accounting system maintained and updated by Jenny Vanderlin (UW-Madison). Training workshops are held across the state throughout the year through UW-Extension and the Wisconsin Technical College System. Software is sold by word of mouth and through the Heart of the Farm and financial management programs. In 2015, updates requested by producers were incorporated. In 2016, a new version will be released to include online banking capability. This information is available in hard copy or on the website: (<http://cdp.wisc.edu/Software.htm>).

Wisconsin Dairy Ratio Benchmarking Tool (WisDRBT)

The Wisconsin Dairy Ratio Benchmarking Tool (WisDRBT) creates a trend analysis by comparing financial ratios to a farm's past performance and a comparative analysis with the industry. The WisDRBT represents 15 of the "Sweet 16" financial measures: current ratio (CR), net working capital (NWC), debt to asset ratio (D/A), equity to asset ratio (E/A), net farm income (NFI), rate of return on farm assets (ROROA), rate of return on farm equity (ROROE), operating profit margin (OPM), term debt coverage ratio (TDCR), replacement margin ratio (RMR), asset turnover ratio (ATO), operating expenses ratio (OER), depreciation expense ratio (DER), interest expense ratio (IER), and net farm income ratio (NFIR). Production, operating, and financial decisions are eventually reflected in the financial statements. Therefore, analyzing financial statements can reveal some useful insights into the strengths and weaknesses of a dairy farm operation. Comparing an individual's ratio values to a group of values or measures is just one step in the financial analyses process. <http://dairymgt.uwex.edu/benchmark/index.php>

APPENDIX A**Industrial and Economic Development Research Program (IEDR) Grants 2013-14**

Investigator	Department	Amount	Researcher Company	Title
Marc Anderson	Civil and Environmental Engineering	\$49,993	SolRayo Inc. (Middleton, WI)	<i>An Aqueous Na-Ion Battery/Ultracapacitor Internal Parallel Hybrid Energy Storage</i>
Kevin Eliceiri	Molecular Biology	\$47,808	Prairie Technologies (Middleton, WI)	<i>WiscScan: Open Optics for Integrated Characterization and Manipulation</i>
Sean Fain	Medical Physics	\$50,000	Clinical MR Solutions (Brookfield, WI)	<i>A Combined RF Coil for Pulmonary MRI of Structure and Function</i>
Nancy Keller	Medical Microbiology	\$50,000	Lucigen Corporation, (Middleton, WI)	<i>Development of a commercial toolkit for fungal drug discovery in the Aspergillus model system</i>
Jingshan Li	Industrial and Systems Engineering	\$32,808	Techline USA (Waunakee, WI)	<i>Dynamic Production Control for High Variety Manufacturing Environment</i>
Mikko Lipasti	Electrical and Computer Engineering	\$49,880	Thalchemy Corp. (Madison, WI)	<i>Prototyping of sensor watchdog preprocessor</i>
Frank Pfefferkorn	Mechanical Engineering	\$50,000	MCD Technologies (Madison, WI)	<i>Dry Drilling: Synergy of Diamond Coatings and Modulation Assisted Machining</i>
Heidi-Lynn Ploeg	Mechanical Engineering	\$49,968	Imbed Biosciences, Inc. (Madison, WI)	<i>Silver-Doped antimicrobial bone cement for use in total joint</i>
Robert Radwin	Industrial Engineering	\$49,892	KineVid (Waunakee, WI); Kraft Oscar Meyer (Madison, WI)	<i>Video technology to prevent fatigue and injuries in the workplace</i>
Dhanansayan Shanmuganayagam	Animal Science	\$49,946	Complete Phytochemical Solutions (Cambridge, WI); BNK Enterprises (Wisconsin Rapids, WI)	<i>Biodegradable and biocompatible tannin-chitosan composites</i>
Timothy Shedd	Mechanical Engineering	\$49,900	Ebullient (Waunakee, WI)	<i>Modeling System to Enable the Design of Innovative Thermal Management Solutions</i>
Kumar Sridharan	Materials Science and Engineering	\$49,470	Thermal Spray Technologies (Sun Prairie, WI)	<i>Application of cold spray technology for deposition of reactive metal coatings</i>
Douglas Wiegmann	Industrial and Systems Engineering	\$50,000	Pilot Training System (Middleton, WI)	<i>Aeromedical Evacuation Simulation for Improved Safety in Emergency Medicine</i>
Michael Zinn	Mechanical Engineering	\$49,900	Simplex Scientific (Middleton, WI)	<i>Interleaved Robotic Manipulation: Next Generation MIS Cardiovascular Procedures</i>

APPENDIX B**Industrial and Economic Development Research Program (IEDR)/(SEED) Grants 2014-15**

Investigator	Department	Amount	Research Company	Title
Phillip Barak	Soil Science	\$178,662	Nutrient Recovery and Upcycling, LLC (Madison, WI)	<i>Upcycling wastewater nitrogen into fertilizer by electro dialysis</i>
Marcin Filutowicz	Bacteriology	\$155,603	AmebaGone, Inc. (Madison, WI)	<i>Reviving and screening Dictyostelid's collection for new drug discovery and other uses at AmebaGone</i>
Robert Hamers	Chemistry	\$73,800	Silatronix, Inc. (Madison, WI)	<i>Thermochemical and electrochemical stability of new organosilicon compounds for lithium-ion batteries</i>
Sage Kokjohn	Mechanical Engineering	\$100,000	Wisconsin Engine Research Consultants, LLC (Madison, WI)	<i>A high efficiency natural gas combustion concept for use by the Wisconsin engine industry</i>
Adel Talaat	Pathobiological Sciences	\$186,856	Pan Genome Systems, Inc. (Madison, WI)	<i>Genetically marked vaccines for Johne's disease</i>

APPENDIX C

IEDR Research Projects, University of Wisconsin-Madison Fiscal Year 2013-14

1. An Aqueous Na-Ion Battery/Ultracapacitor Internal Parallel Hybrid Energy Storage (PI: Marc Anderson, Civil and Environmental Engineering), Industrial Partner: SolRayo Inc., Middleton, Wisconsin.
2. WiscScan: Open Optics for Integrated Characterization and Manipulation (PI: Kevin Eliceiri, Molecular Biology), Industrial Partner: Prairie Technologies, Middleton, Wisconsin.
3. A Combined RF Coil for Pulmonary MRI of Structure and Function (PI: Sean Fain, Medical Physics), Industrial Partner: Clinical MR Solutions, Brookfield, Wisconsin.
4. Development of a commercial toolkit for fungal drug discovery in the *Aspergillus* model system (PI: Nancy Keller, Medical Microbiology), Industrial Partner: Lucigen Corporation, Middleton, Wisconsin.
5. Development of a commercial toolkit for fungal drug discovery in the *Aspergillus* model system (PI: Jingsham Li, Industrial and System Engineering), Industrial Partner: Techline, USA, Waunakee, Wisconsin.
6. Prototyping of sensor watchdog preprocessor (PI: Mikko Lipasti, Electrical and Computer Engineering), Industrial Partner: Thalchemy Corp., Madison, Wisconsin.
7. Dry Drilling: Synergy of Diamond Coatings and Modulation Assisted Machining (PI: Frank Pfefferkorn, Mechanical Engineering), Industrial Partner: MCD Technologies, Madison, Wisconsin.
8. Silver-Doped antimicrobial bone cement for use in total joint (PI: Heidi-Lynn Ploeg, Mechanical Engineering), Industrial Partner: Imbed Biosciences, Inc., Madison, Wisconsin.
Publications
 - Slane, J., Vivanco, J., Rose, W., Ploeg, H.L., and Squire, M., "Mechanical, material, and antimicrobial properties of acrylic bone cement impregnated with silver nanoparticles," *Materials Science and Engineering* (2015).
9. Video technology to prevent fatigue and injuries in the workplace (PI: Robert Radwin, Industrial Engineering), Industrial Partner: none identified.
10. Biodegradable and biocompatible tannin-chitosan composites (PI: Dhanansayan Shanmuganayagam, Animal Science), Industrial Partner: Complete

Phytochemical Solutions, Cambridge Wisconsin, and BNK Enterprises, Wisconsin Rapids, Wisconsin.

11. Modeling System to Enable the Design of Innovative Thermal Management Solutions (PI: Timothy Shedd, Mechanical Engineering), Industrial Partner: Ebullient, Waunakee, Wisconsin.
12. Application of cold spray technology for deposition of reactive metal coatings (PI: Kumar Sridharan, Engineering Physics, Materials Science and Engineering), Industrial Partner: Thermal Spray Technologies, Sun Prairie, Wisconsin.
13. Aeromedical Evacuation Simulation for Improved Safety in Emergency Medicine (PI: Douglas Wiegman, Industrial and Systems Engineering), Industrial Partner: Pilot Training System, Middleton, Wisconsin.
14. Interleaved Robotic Manipulation: Next Generation MIS Cardiovascular Procedures (PI: Michael Zinn, Mechanical Engineering), Industrial Partner: Simplex Scientific, Middleton, Wisconsin.

APPENDIX D

SEED Research Projects, University of Wisconsin-Madison Fiscal Year 2014-15

1. Upcycling wastewater nitrogen into fertilizer by electrodialysis (PI: Phillip Barak, Soil Science). Industrial Partner: Nutrient Recovery and Upcycling, LLC, Madison, Wisconsin.
2. Reviving and screening Dictyostelid's collection for new drug discovery and other uses at AmebaGone (PI: Marcin Filutowicz, Bacteriology), Industrial Partner: AmebaGone, Inc., Madison, Wisconsin.
3. Thermochemical and electrochemical stability of new organosilicon compounds for lithium-ion batteries (PI: Robert Hamers, Chemistry), Industrial Partner: Silatronix, Inc., Madison, Wisconsin.
4. A high efficiency natural gas combustion concept for use by the Wisconsin engine industry (PI: Sage Kokjohn, Mechanical Engineering). Industrial Partner: Wisconsin Engine Research Consultants, LLC, Madison, Wisconsin.

Publications

- Pan, L., Kokjohn, S.L., Huang Z., "Development and validation of a reduced chemical kinetic model for DME combustion," Fuel (Accepted, 2015)
 - Wickman, D.D., Kokjohn, S.L., "Computational Analysis of Advanced DME Combustion Strategies," Fuel (to be submitted)
 - Bergin, M.J., Kokjohn, S.L., "Optimization of fueling strategy with RCCI in an opposed piston two stroke engine using natural gas," Fuel (to be submitted)
5. Genetically marked vaccines for Johne's disease (PI: Adel Talaat, Pathobiological Sciences), Industrial Partner: Pan Genome Systems, Inc., Madison, Wisconsin.

APPENDIX E**Applied Research Program Awards 2013-14**

Applied Research Grant (ARG)			
Investigator	Campus	Amount	Title
Dahl, Jennifer	UW-Eau Claire	\$40,000	<i>Fabrication and Evaluation of Plasmonic Waveguides for Enhanced Performance of Photovoltaic Materials (joint)</i>
King, Seth	UW-La Crosse	\$9,267	
King, Seth	UW-La Crosse	\$44,434	<i>Spray Pyrolysis Fabrication of Zinc Tungstate Thin Films for Photovoltaic Applications</i>
Knoll, Laura	UW-Madison	\$50,000	<i>Development of New Broad-spectrum Antimicrobial Therapeutics</i>
Seo, Na Jin	UW-Milwaukee	\$25,000	<i>Development of a Wearable, Portable, TheraBracelet to Enhance Touch Sensation and Dexterity of the Hand of Neurologic Patients via Vibrotactile Stimulation</i>
Webster, John	UW-Madison	\$25,000	
Sridharan, Kumar	UW-Madison	\$49,470	<i>Cold Spray Coating Technology for Electronics and Corrosion Protection Applications</i>
Yuan, Chris	UW-Milwaukee	\$48,800	<i>Self-Supported Silicon-Carbon Hybrid Nano-Material for High Capacity Lithium Ion Battery Anode</i>

Applied Research-WiSys Technology Advancement Grant (AR-WiTAG)			
Investigator	Campus	Amount	Title
Banerjee, Palash	UW-Stevens Point	\$15,325	<i>Micromechanical Torque Magnetometer for Characterizing Magnetic Nanoparticles</i>
Gunawardena, Athula	UW-Whitewater	\$42,410	<i>Alert:HeadsAhead (AHA)</i>
McGuire, Dan	UW-Whitewater	\$34,731	<i>Refractory Molding Recipes</i>
Waxman, Michael	UW-Superior	\$50,000	<i>Highbush Cranberry Project: Biofuels and Pharmaceuticals through Native Plants of NW Wisconsin</i>
Lane, Jim			
Zheng, Wei	UW-Stout	\$49,871	<i>Development of Biodegradable Polylactic Acid/Clay Nano-composites: Mechanical Strength, Gas Barrier, and Thermal Stability</i>

Prototype Development Fund (PDF)			
Investigator	Campus	Amount	Title
Biasca, Karen	UW-Stevens Point	\$5,840	<i>The Effect of Papermaking Additives on Fiber-Length Distribution Control</i>
Chen, Junhong	UW-Milwaukee	\$15,000	<i>Continuous Growth of Vertical Graphene on a Tungsten Wire for a Novel Ion Source</i>
Gunawardena, Athula	UW-Whitewater	\$15,000	<i>Interactive Degree Planner</i>
Huang, Cheng-chen	UW-River Falls	\$14,000	<i>Characterization and Synthesis of the Skin-Whitening Compound, A11</i>
Knight, Peter	UW-Parkside	\$15,000	<i>Design and Build Final Version of Capstan Lever Drive Wheelchair Prototypes for Testing</i>
McGuire, Dan	UW-Whitewater	\$10,920	<i>Refractory Mold Making Recipes, Modular Molding Systems, and Refractory Foam Technology Commercialization</i>

GRAND TOTAL **\$560,068**

APPENDIX F**Applied Research Program Awards 2014-15****Applied Research Grant (ARG)**

Investigator	Campus	Amount	Title
Chen, Franklin	UW-Green Bay	\$42,641	<i>Chemically Modified Waste Paper for Biopolymer Based Soil Conditioner as a Replacement for Petroleum Based Soil Conditioner for Lawn and Garden Products</i>
Eliceiri, Kevin	UW-Madison	\$49,841	<i>A Novel Drug Screening Platform for Assaying Clinically Relevant Tumor Models</i>
Gallagher-Lepak, Susan	UW-Green Bay	\$49,169	<i>Nursing Diagnosis Clinical Support Tool</i>
Glogowski, Elizabeth	UW-Eau Claire	\$50,000	<i>Tuning of New Smart Polymer Surfactants for Enhanced Oil Recovery Applications</i>
Hlina, Paul	UW-Superior	\$50,000	<i>Preserving the Power of Plants – An Innovative Ethnobotany Project</i>
Peng, Xiaohua	UW-Milwaukee	\$48,500	<i>DNA-Templated Metal-Free Fluorogenic "Click" Reactions for Sequence-Specific DNA Detection and PCR-Free Signal Amplification</i>

Applied Research-WiSys Technology Advancement Grant (AR-WiTAG)

Investigator	Campus	Amount	Title
Gansen, Eric	UW-La Crosse	\$25,685	<i>The Development of ZnO-Based Electro-Absorption Modulators</i>
McGraff, Robert	UW-La Crosse	\$48,694	<i>Methods for Green Alcohol Oxidation Employing New Modified Iron Phthalocyanine Catalysts</i>
Obielodan, John	UW-Platteville	\$40,000	<i>Towards the Fabrication of Thin-Walled Cellular Structures Using Hybrid 3D Printing and Electroforming Technologies</i>
Shin, Joongmi	UW-Stout	\$48,801	<i>Development of Non-Migratory Active Cling Wrap Packaging for Enhanced Food Safety and Quality</i>
Wu, Joseph	UW-Platteville	\$50,000	<i>Towards Commercialization of Color Test Kit for Synthetic Cathinones</i>

Prototype Development Fund (PDF)

Investigator	Campus	Amount	Title
Dahl, Jennifer	UW-Eau Claire	\$15,000	<i>Reconciliation of Ghost Isotherms in Langmuir Trough System</i>
Gilbertson, Lynn	UW-Whitewater	\$14,947	<i>Development of a Novel Method for Measuring Occupational Noise Levels in the Ear Canal (Phase 1)</i>
McGuire, Daniel	UW-Whitewater	\$5,000	<i>Mold Making Recipes, Modular Molding Systems, and Refractory Foam Technology Commercialization</i>
Schwann, William	UW-La Crosse	\$3,000	<i>Testing SK-03-92 for Synergy with Other Antibiotic Classes</i>

GRAND TOTAL**\$541,278**

APPENDIX G**Center for Dairy Profitability Research and Outreach
Grants Awarded from External Sources**

Investigator	Funding Source	Amount	Title
Arlin Brannstrom	North Central Region Risk Management Education Center University of Nebraska- Lincoln	\$49,741	<i>North Central Extension Farm Management Committee Lease Modernization</i>
Joy Kirkpatrick Jenny Vanderlin	USDA RMA Grant	\$95,232	<i>Farm Succession and Financial Management for Women Producers and Transitional Farmers.</i>
Joy Kirkpatrick	North Central Region Risk Management Education Center University of Nebraska- Lincoln	\$42,825	<i>Will Your Farm Outlive You? Motivating and Educating WI Farmers on Succession Farming.</i>
Mark Stephenson	Agriculture Food Research Initiative	\$100,000	<i>Climate Change Mitigation and Adaptation in Dairy Production Systems of the Great Lakes Region.</i>
Brent Hueth/ Mark Stephenson/	USDA, National Institute for Food and Agriculture (NIFA)	\$401,775	<i>Spatial Competition in Agricultural Markets (with application to US Dairy)</i>
Mark Stephenson	North Central Region Risk Management Education Center University of Nebraska- Lincoln	\$50,000	<i>North Central Farm Bill Education for Dairy Producers</i>
Mark Stephenson/ Brian Gould	University of IL- Urbana	\$455,000	<i>Web-Based Decision Aids and Education Tools</i>
Mark Stephenson/ Jenny Vanderlin	USDA, Farm Service Agency	\$71,124	<i>2014 Farm Bill – Producer Education- University of Wisconsin Extension Services</i>
Jenny Vanderlin Stan Schraufnagel	USDA-RMA	\$27,199	<i>Farm Financial Accounting Workshops Using QuickBooks for Wisconsin Dairy Producers and Women Farmers</i>
Jenny Vanderlin	USDA-RMA	\$47,782	<i>Farm Financial Management Education by Application of AgFA for New, Beginning and Women Dairy and Crop Farmers in Iowa.</i>
Jenny Vanderlin	USDA-RMA	\$21,192	<i>Farm Financial Management Education by Application of AgFA for New, Beginning and Women Dairy Farmers in Illinois</i>
Jenny Vanderlin/ Nate Splett	USDA-RMA	\$31,740	<i>Annie's Project: Farm Business Financial Management Workshop Series</i>
Total External Funding		\$1,322,486	

APPENDIX H

Center for Dairy Profitability Publications and Internet Sites

CDP Publications

Barnett, Ken. 2013. "The Wisconsin Opportunity Minimum Wage and Agricultural Employee Wage Rates." Center for Dairy Profitability. Includes State & Federal laws and provisions regarding employment.

Brannstrom, Arlin. 2013. "Wisconsin Agricultural Land Prices, 2007-2013." University of Wisconsin, Center for Dairy Profitability, March 2013.

Crockford, Alex; Nischke, Brian; Onan, Paul; and Kriegl, Tom. "Can it Pay to Irrigate Pasture in the Northeast Part of the U.S.A?" Center for Dairy Profitability, University of Wisconsin-Madison, UWEX. February 25-26, 2015. 4 pages. Oral and Poster presentation at Oral and Poster presentation at the National Organic Agricultural Research Symposium. La Crosse, WI.

Jones, Dr. Gordie, D.W. Kammel. 2014. Facility Design to Optimize Transition Cow Comfort with Emphasis on Confinement Systems. Dairy Cattle Reproduction Council Annual Meeting Proceedings. Salt Lake City, UT. November 13-14, 2014.

Kammel, David W. 2013. Goat Housing Chapter. Goat Handbook. Langston University, Langston OK 73050

Kammel, David W. 2013. Chapter 3 Dairy Replacement Housing. Dairy Freestall Housing and Equipment. MWPS 7. Eight Edition. Ames IA.

Kammel, David W. 2013. Chapter 6 Housing for Transition and Special Needs Cows. Dairy Freestall Housing and Equipment. MWPS 7. Eight Edition. Ames IA.

Kriegl, Tom. "Could Increased Feed Prices Help Wisconsin Dairy Farmers" Center for Dairy Profitability, University of Wisconsin-Madison, UWEX. October 15, 2013. 2 pages.

Kriegl, Tom. "Comparing the Impact of Cost vs Economic Depreciation on Financial Measures in AgFA." Center for Dairy Profitability, University of Wisconsin-Madison, UWEX. Sept 2013. 4 pages. Madison, WI.

Kriegl, Tom. "The Financial Performance of Grazing, Organic, and Confinement Dairy Farms." Center for Dairy Profitability, University of Wisconsin-Madison, UWEX. February 25-26, 2015. 4 pages. Oral and Poster presentation at Oral and Poster presentation at the National Organic Agricultural Research Symposium. La Crosse, WI

Harris, Philip E., Linda E. Curry, Nina S. Collum, 2013 National Income Tax Workbook, Kelso, Washington: Land Grant University Tax Education Foundation, Inc., 2013.

Harris, Philip E., 2013 Agricultural Tax Issues, Madison, WI: Tax Insights, LLC, October 2013.

Harris, Philip E., Linda E. Curry, 2013 National Income Tax Workbook Update, Kelso, Washington: Land Grant University Tax Education Foundation, Inc., January 2014

Harris, Philip E., Linda E. Curry, Nina S. Collum, 2014 National Income Tax Workbook, Kelso, Washington: Land Grant University Tax Education Foundation, Inc., 2014.

Harris, Philip E., 2014 Agricultural Tax Issues, Madison, WI: Tax Insights, LLC, October 2014.

Harris, Philip E., Linda E. Curry, 2014 National Income Tax Workbook Update, Kelso, Washington: Land Grant University Tax Education Foundation, Inc., January 2015

Harris, Philip E., "Tax Considerations of Farm Transfers," updated January 14, 2015.

Kirkpatrick, J., J.R. Baker. 2013. Farm Succession Facilitator's Manual.

Kirkpatrick, J. 2013. Retired Farmer – An Elusive Concept. Choices Magazine. Second Quarter, 2013. <http://www.choicesmagazine.org/choices-magazine/theme-articles/transitions-in-agriculture/retired-farmer--an-elusive-concept>

Luck, Brian, D.W. Kammel, 2014. Choose your Mixer Wisely. September 25, 2014. Page 59. Hoards Dairyman.

Luck, Brian, D.W. Kammel, 2014. Choose your Mixer Wisely. Page 754. Hoards Dairyman Spanish Edition. Diciembre 2014.

Newton, John, M. Stephenson, et al., Whither Dairy Policy? Evaluating Expected Government Outlays and Distributional Impacts of Alternative 2013 Farm Bill Dairy Title Proposals., submitted to American Journal of Agricultural Economics.

Newton, John, M. W. Stephenson, et al., *Goodlatte-Scott vs. the Dairy Security Act: Shared Potential, Shared Concerns and Open Questions*, Briefing Paper Number 13-01, April 15, 2013. <http://dairy.wisc.edu/PubPod/Pubs/>

Nicholson, C.F. and M. W. Stephenson, *Dynamic Market Impacts of the Dairy Margin Protection Program*, forthcoming in Journal of Agribusiness.

Nicholson, C.F. and M. W. Stephenson, *Milk Price Cycles in the U.S. Dairy Supply Chain and their Management Implications*, Agribusiness: An International Journal, April, 2015.

Nicholson, C.F. and M. W. Stephenson, *Dynamic Market Impacts of the Dairy Margin Protection Program of the Agricultural Act of 2014*, Working Paper Series 14-03, June, 2014. <http://dairymarkets.org/PubPod/Pubs/WP14-03.pdf>

Nicholson, C.F. and M. W. Stephenson, *Milk Price Cycles in the U.S. Dairy Supply Chain and Their Management Implications*, Working Paper Series 14-02, May, 2014. <http://dairymarkets.org/PubPod/Pubs/WP14-02.pdf>

Novakovic, A.M., M. W. Stephenson, et al., *Comments on Summary Enrollment Data for MPP-Dairy*, Briefing Paper Number 15-01, December, 2014. <http://dairymarkets.org/PubPod/Pubs/BP15-01.pdf>

Stephenson, M. W. and A. M. Novakovic, *The Dairy Subtitle of the Agricultural Act of 2014*, Choices, February, 2014.

Stephenson, M. W., Bozic, M., and C. W. Wolf, *Will Margin Insurance Crowd Out Futures Activity?*, Hoards Dairyman, April 24, 2014, pg. 311.
Stuttgen, Sandy, D. W. Kammel. 2013. Wisconsin Ideal Calf Pen Fact Sheet., UWEX.

Von Keyserlingk, M.A.G., M. W. Stephenson, et al., *Sustainability of the U.S. Dairy Industry*, Journal of Dairy Science, Accepted May 19, 2013.

Wolf, C.W., M. W. Stephenson, et al., *Where the Grass is Always Greener: Dairy Farmer Location Preferences*, Choices. May, 2015

CDP Internet Sites

Center For Dairy Profitability Website

<http://cdp.wisc.edu>

Since 1995, the Center for Dairy Profitability has maintained a home page. The new homepage design was created to enhance access and retrieval of educational information. This site has a wealth of information of value to dairy producers and other professionals making economic decision in their business.

Heart of the Farm Website

<http://www.uwex.edu/ces/heartofthefarm>

Developed in 2002, this site promotes educational programs, conferences, and resources of interest primarily to farm women.

FARM Team Website

<http://www.uwex.edu/ces/farmteam>

Released in Fall 2007.

