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University of Northern Iowa
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BOARD OF REGENTS
STATE OF IOWA



January 15, 2009

Michael E. Marshall
Secretary of the Senate
State Capitol Building
Des Moines IA 50319

Mark Brandsgard
Chief Clerk of the House
State Capitol Building
Des Moines IA 50319

Holly Lyons, Division Director
Legislative Services Agency
State Capitol Building
Des Moines IA 50319

Re: Grow Iowa Values Funding (GIVF)

Dear Members of the Iowa General Assembly:

Pursuant to Iowa Code §15G.111(2), the enclosed annual report includes information from the University of Iowa, Iowa State University, the University of Northern Iowa, for FY 2006, FY 2007, FY 2008, and FY 2009 (year-to-date) on revenues and expenditures related to GIVF appropriations.

If there are any questions concerning this report, please do not hesitate to contact us.

Sincerely,

Robert Donley

H:\BF\Legislative\2009 Session\responses\GA_GIVF011509.doc
Enclosure
cc: Legislative Liaisons
Legislative Log

Iowa State University - as of December 31, 2008
Grow Iowa Values Fund Appropriations

| | | | | |
|---|---|---|---|---|
| | | **FY 2007 GIVF Appropriation** | **$1,925,000** | Board of Regents approved August 2007 |
| 1 | Commercialization Infrastructure and Campus-Wide Entrepreneurial Cult | $600,000 | | |
| 2 | Commercialization Program | $1,325,000 | | |
| | | **FY 2008 GIVF Appropriation** | **$1,925,000** | Board of Regents approved August 2008 |
| 1 | Commercialization Infrastructure and Campus-Wide Entrepreneurial Cult | $600,000 | | |
| 2 | Commercialization Program | $1,325,000 | | |

| **Iowa State University** | **Project** | **List of all FY 2007 Revenue Sources** | **Revenue Dollars for FY 2007** | **Amount of FY 2007 State Appropriations Expended as of 12/31/2007** | **List of all FY 2008 Revenue Sources** | **Revenue Dollars for FY 2008** | **Amount of FY 2008 State Appropriations Expended as of 12/31/2008** |
|---|---|---|---|---|---|---|---|
| 1 | **Commercialization Infrastructure and Campus-Wide Entrepreneurial** | FY 2007 State Appropriations (GIVF) | $600,000 | $600,000 | FY 2008 State Appropriations (GIVF) | $600,000 | $441,092 |
| | | FY 2007 Matching Funds (General Fund) | $464,492 | | FY 2008 Matching Funds (General Fund) | $330,276 | |
| | | FY 2007 Matching Funds (In-Kind) | $200,000 | | FY 2008 Matching Funds (In-Kind) | $45,000 | |
| | | FY2007 Matching Funds (3rd Party Cash) | $200,000 | | FY2008 Matching Funds (3rd party cash) | $200,000 | |
| | | FY 2007 Matching Funds (Other) | | | FY 2008 Matching Funds (Other) | | |
| **Description of Project** | | | | | | | |
| **Anticipated End Results** | | | | | | | |
| **Results achieved to Date** | | | | | | | |
| **Plans** | | | | | | | |

| **Iowa State University** | **Project** | **List of all FY 2007 Revenue Sources** | **Revenue Dollars for FY 2007** | **Amount of FY 2007 State Appropriations Expended as of 12/31/2008** | **List of all FY 2008 Revenue Sources** | **Revenue Dollars for FY 2008** | **Amount of FY 2008 State Appropriations Expended as of 12/31/2008** |
|---|---|---|---|---|---|---|---|
| 2 | **Commercialization Program** | FY 2007 State Appropriations (GIVF) | $1,325,000 | $1,325,000 | FY 2008 State Appropriations (GIVF) | $1,325,000 | $650,803 |
| | | FY 2007 Matching Funds (General Fund) | $888,224 | | FY 2008 Matching Funds (General Fund) | $710,278 | |
| | | FY 2007 Matching Funds (Federal Support) | | | FY 2008 Matching Funds (Federal) | $98,364 | |
| | | FY 2007 Matching Funds (In-Kind) | $548,331 | | FY 2008 Matching Funds (In-Kind) | $433,489 | |
| | | FY2007 Matching Funds (3rd Party Cash) | $43,530 | | FY2008 Matching Funds (3rd Party Cash) | $164,562 | |
| | | FY 2007 Matching Funds (Other) | | | FY 2008 Matching Funds (Other) | | |
| **Description of Project** | See individual projects | | | | | | |
| **Anticipated End Results** | | | | | | | |
| **Results achieved to Date** | | | | | | | |

| Iowa State University | Project | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|
| | Surya Mallapragada, Principal Investigator | | 7,943.86 | |
| **Description of Project** | Protein Micropatterning on Microsensors to Quantify Cell Cytotoxicity of Adherent and Non-adherent Cells | | | |
| **Anticipated End Results** | | | | |
| **Results achieved to Date** | We have optimized our silanization techniques to attach proteins to the indium-tin oxide (ITO) electrode substrates. Using this technique, we have shown that CD34 antibodies can be attached to the ITO electrode substrates covalently, and verified this by atomic force microscopy. In addition, we have cultured CD34+ cells on these substrates and shown good attachment. Our collaborators at Cellular Engineering technologies investigated selective cell adhesion on these substrates. | | | |
| **Plans** | | | | |

| Iowa State University | Project | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|
| | Byron Brehm-Stecher, Principal Investigator | | $32,088 | |
| **Description of Project** | Applied Nanotechnology for Label-free Detection of Pathogen-Specific | | | |
| **Anticipated End Results** | | | | |
| **Results achieved to Date** | The original intent of this work was to create AFM-deposited, self-assembling peptide nucleic acid (PNA) ultramicroarrays capable of capturing pathogen-specific nucleic acids, with subsequent detection via either non-specific fluorescent staining and simple imaging or via AFM-detectable differences in spot heights between negative controls and treatments after hybridization. Although we were able to bind PNA probes to chip surfaces, their capture efficiencies for target nucleic acids were low. Subsequently, litigation between the Copenhagen Inventor's Group (original inventors of PNA) and our commercial PNA source (Applied Biosystems) resulted in a lapse in the availability of PNAs. We therefore changed our tact to include a focus on DNA-based probes arrayed onto chip surfaces. Using BioForce Nanosciences' NanoEnabler ultramicroarrayer, we were able to array Salmonella-specific DNA probes to the surface of silica chips and were able to demonstrate specific capture of a short, complementary synthetic DNA target. Once proof of principle was shown in this model system, we were able to demonstrate capture and fluorescence-based detection of purified Salmonella rRNA, with rRNA from non-target cells serving as negative controls. A concentration curve demonstrated that we were able to detect as little as 10 picograms per microliter (an estimated ~10-100 cells) of Salmonella rRNA via the array-based syste<br><br>with large molecules of intact rRNA showed poor binding characteristics. Despite the initial setback of limited PNA availability, we have accomplished all goals of this grant, with the exception of height-based detection of rRNA via AFM. We will continue to work with BioForce Nanosciences to accomplish this goal, using colloidal gold to amplify height differences for array spots occupied by captured Salmonella rRNA. We anticipate submission of this work for publication in 2008. | | | |
| **Plans** | | | | |

| Iowa State University | Project | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|
| | Martha James, Principal Investigator | | $21,800 | |
| **Description of Project** | Development of Novel Digestion-Resistant Starches from Corn to Combat Human Disease | | | |
| **Anticipated End Results** | | | | |
| **Results achieved to Date** | Progress in this final period included additional characterization of the functional properties of two types of cornstarch predicted to be more slowly digestible (i.e., degraded to glucose) in the human system. The prototype starch was made by genetically engineering plants for increased expression of a starch debranching enzyme, which resulted in production of a long-chain amylopectin starch (LCAPS1). A derivative starch termed LCAPS3 was made by crossing LCAPS1 plants with dull1 mutant plants. This combined genetic engineering/breeding approach was predicted to produce a more digestion-resistant type of starch. Starch hydrolysis analyses were performed using a combination of two digestive enzymes, □-amylase and amyloglucosidase. These in vitro tests confirmed LCAPS1 was digested more slowly than normal starch over a two-hour digestion period. LCAPS1 digestion ranged from 40% of normal starch after just 10 minutes incubation to 80% of normal starch after an hour or more. LCAPS3 digestion, however, was slower, approximately 40% to 50% that of normal starch throughout the two-hours. | | | |
| **Plans** | | | | |

| Iowa State University | Project | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|
| | David Grewell, Principal Investigator | | $37,023 | |
| **Description of Project** | Retooling Ethanol Industries: Integrating Ultrasonics into Dry Corn Milling | | | |
| **Anticipated End Results** | | | | |
| **Results achieved to Date** | This work evaluated the use of high power ultrasonic energy to treat corn slurry in dry corn milling ethanol plants to enhance liquefaction and saccharification for ethanol production. Corn slurry samples obtained before and after jet cooking were subjected to ultrasonic pretreatment for 20 and 40 seconds at amplitudes of vibration ranging from 64 to 107 µmpp(peak to peak amplitude in µm). The resulting samples were then exposed to enzymes (alpha-amylase and glucoamylase) to convert cornstarch into glucose. A comparison of scanning electron micrographs of raw and sonicated samples showed the development of micropores and the disruption of cell walls in corn mash. The corn particle size declined nearly 20-fold following ultrasonic treatment at high power settings. The glucose release rate from sonicated samples increased as much as 3-fold compared to the control group. The efficiency of ultrasound exceeded 100% in terms of energy gain from the sugar released over the ultrasonic energy supplied. Enzymatic activity was enhanced when the corn slurry was sonicated with simultaneous addition of enzymes. This finding suggests that the ultrasonic energy did not degrade or denature the enzymes during the pretreatment. In addition, it was seen that ultrasonic energy could gelatinize starch at relatively low temperatures (30-50 C) much faster compared to heating. It is believed that this also promoted hydr<br><br>Continuous flow studies suggested that single ultrasonic systems (5 kW) could treat 5-10 gallons of corn slurry per second. Based on conservative assumptions, ultrasonication could be implemented on ethanol plants resulting in a pay-back period of less than a year. This work has resulted in over $300,000 of external funding and equipment donation as well as further studies investigating ultrasonication in various bio-fuels, such as bio-diesel and itanonic acid chemistries.This analysis showed that both modified starches have higher gelatinization temperatures compared to wild type, and the onset, peak, and end gelatinization temperatures for LCAPS3 are significantly higher. Thus, more heat energy is required to dissolve the structure of LCAPS3 starch. A previous human feeding trial designed to test the digestibility of an LCAPS1 containing food product was unsuccessful. That trial fed participants a starch based pudding, and no difference was seen in the glycemic index of the LCAPS1 pudding versus the wild type pudding. In this research period preparation was in progress for a second round of human feeding trials, which will use an alternative to cooked food product. Foods such as muffins, breads, and polenta that include varying amounts of cornstarch (LCAPS1, LCAPS3, or the control) are being produced and evaluated in the laboratory.<br>Based on these results, a food product will be selected for planned feeding trials in the fall of 2008. Finally, Starch Design, LLC is a small biotechnology company that was organized in 2007 to commercialize these and other new starches.<br>The company is in the process of reorganizing as a class C corporation, and has nearly finalized negotiations with ISURF[2] to license intellectual property.<br>Starch Design has begun informal negotiations with two multi-national agricultural biotechnology companies and one multi-national starch company regarding this technology. | | | |
| **Plans** | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Mary Holz-Clause, Principal Investigator | | | $49,380 | |
| | | | | | |
| **Description of Project** | Corn-Biomass Composite Fuel Pellets: An Industry University Partnership | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | The project has been completed. Testing with wood and cob material showed that these formulations produced an inferior product. This resulted in fine-tuning the extruder-die configuration and extrusion parameters for a 100% ethanol-manufacturing co-product pellet that is "commercially firm," i.e., for packaging, shipping, storage and auger-handling. Emissions and combustion testing by Twin-Ports Testing Inc., Superior, WI., demonstrated significantly higher BTU production, lower emissions, and lower ash (residual) production; than corn kernels, wood pellets or composite DDG-wood-dust pellets (competing and potentially competing fuels). A USDA Rural Development Pass-Through-Loan-Guarantee application was submitted by IADG to assist the ongoing expansion of the fuel-stove production facility in Pella, IA. A patent application regarding the architecture of the extrusion die has been applied for by LDJ, Landers Machine, and Gary Wobler under the name of Ag Pellet Energy. Additionally, a filing for patent-protection currently is underway on a 100% DDG Pellet and Processing System for both fuel and feed applications. Ag Pellet Energy and Landers Machine have introduced this concept to the ethanol industry and are forming a new company, Ag Fuel & Feed, which will be based in Iowa. The "100% DDG Pellet and Processing System" is designed to be located at or near ethanol<br><br>Marketing the technology as a system for sale to ethanol plants was initially proposed by the ISU Extension Value-added Agriculture Project. Ag Pellet Energy is now focusing on their "100% DDG Pellet" to serve both the fuel and feed markets; with the fuel market changing from home and light-industrial application to large-scale power co-generation systems. In March, 2007, a test-burn was conducted at the Wisdom Station power plant, Spencer, Iowa, owned and operated by Corn Belt Power Cooperative, Humboldt, Iowa. The test burn consisted of mixing 10% of Ag Pellet Energy's DDG Pellets with 90% coal at the power plant. Although the plant did not achieve full generation output with the fuel blend, a reduction in emissions (percent opacity, which is the measurement of visual emissions coming out of the stack) was obtained. Cattle feeding tests were conducted under contract with Dr. Dan Loy, Iowa State University, regarding the analysis of the palletized distillers' grains and examining systems for feeding and delivering them to cattle with positive results. Additional contract research with Dr. Loy is looking at market analysis for this product. LDJ Industries, Pella, has experienced an ash build-up problem with their automatic-feed burner system in their residential light-industrial stove units. Based on testing lab data, this problem was unforeseen and deemed unlikely.<br><br>However, they currently are considering a redesign of their burner system as well as simply abandoning the DDG-pellet product for the residential light-industrial stove application. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Hans Van Leeuwen, Principal Investigator | Samir Khanal (original PI) left ISU. | | $81,977 | |
| **Description of Project** | Collaborative Research on high Performance Stable Amorphous Silison-germanium Solar Cells | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | Soybean whey is an industrial by-product formed during the extraction of soy protein isolates (SPI) from defatted soy flakes. Nisin is the only bacteriocin approved by Food and Drug Administration (FDA) and it is seeing increasing usage as a natural food preservative. The objective of this study is to evaluate the potential of this low/negative value byproduct stream, soybean whey, as an alternative, inexpensive substrate to grow lactic acid bacteria (LAB) specifically Lactococcus lactis subsp. lactis and produce nisin. This project aims to add value to a waste stream with high organic strength by producing an important product. It will result in local production of a popular but expensive food preservative. Our preliminary studies proved soybean whey an excellent growth medium for LAB fermentation and nisin production. We achieved a biomass yield of 2.18 g/L and nisin yield of 619 mg/L without pH control. The goal of the proposed research is to scale-up nisin production from soybean processing wastewater computer-controlled fermentors for development of commercialization protocols. Furthermore, fungal bioremediation of any residual suspended carbon load after nisin recovery will also be examined to reduce the COD levels before discharge to the environment.<br><br>The research team has developed excellent partnerships with the Kerry Group, a leader in the global food industry who will be providing the soybean whey, Kemin Industries, with an interest in the nisin product, and West Central, with an interest in the high-quality protein. We envision that this collaboration will lead to industry funding. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Vikram Dalal, Principal Investigator | | | $63,406 | |
| **Description of Project** | High Performance Solar Cells | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | Task 1: Improve collection of carriers in a-Si cells on plastic so as to improve cell efficiency, in collaboration with Powerfilm Inc. and transfer technology to production at Powerfilm. This task was successfully completed. Using a multi-layer back reflector of Al followed by doped Zinc oxide, we were able to increase absorption of light into the solar cell, and hence current, by 11% compared to the standard Powerfilm process. This process has been transferred to Powerfilm. They have built a new sputtering system for depositing Al followed by doped zinc oxide. Beyond this process, we have also shown that etching zinc oxide using a wet chemical etch also leads to significant increases in current, about 20% compared to standard process. However, this process is not amenable to mass production, and in future projects, we will utilize a different etching scheme, based on plasma etching (which can be implemented into production) , to achieve a similar result. Task 2. Demonstrate that lower bandgap a-Si can be produced using variations in plasma processing, and then fabricate proof of concept solar cells. This task was also completed. We succeeded in reducing the bandgap of a-Si, and hence, increasing absorption of red light, by utilizing a novel low pressure plasma process using a Helium diluted<br><br>plasma. The bandgap reduced to about 1.67 eV compared to normal 1.75 eV. This is a significant reduction which would help in future production of more efficient tandem junction solar cells. We also succeeded in making proof of concept a-Si solar cells in this new material. Thus, this task was also successfully completed. Task 3. Demonstrate that lower gap a-(Si,Ge) cells can be made using VHF process similar to what Powerfilm uses. This task was also successfully completed. Using 45 MHz plasma discharge, we succeeded in making a-(Si,Ge) alloy of bandgaps in the range of 1.6 eV. Such a lowering of bandgap is significant for making tandem junction solar cells on plastic substrates. We achieved very high ratios of photo/dark conductivity (~105) , a measure of the high quality of the film. We also succeeded in making solar cells in this material. The quantum efficiency data showed that the response int eh infrared region significantly improved when Ge was added to Si. The fill factors remained reasonable, ~60% range. More work needs to be done on this alloy to improve its electronic properties to achieve high efficiencies. Summary All three tasks were successfully completed. One major outcome was that part of the technology was transferred to Powerfilm for improving their products.<br><br>Even better avenues for improving the performance were identified but need more research. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY08 | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Manjit Misra, Principal Investigator | | $25,000 | $44,695 | |
| **Description of Project** | Commercialization of a Continuous In-Line Flow Meter | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | We are working with Remington seed plant in Williams, Iowa for field testing of the ISU flowmeter.<br>Drs. Misra and Shyy visited the plant and discussed the testing details with the manager. Presently, seed corn is conditioned and operated 10 hours/day at the facility. They have modified and added a 2-way valve from the discharge end of an elevator from the "Large Flat" sizer bin so the seed corn can be diverted to either flowmeter or a seed-ladder. Another 2-way valve was also added at the end of the flowmeter so that the sample can be collected for flow rate determination. On the bottom of the pipe, a receiving boot was installed so the samples can be dumped back to the flow for recirculation. The flow rate at the point is between 150 to 200 Bushels per hour. We have installed an all-steel, high capacity flowmeter with a data logger to collect the data on site.<br><br>The preliminary data shows that both mechanical and electrical noise is interfering with the signal from the flowmeter during data acquisition for measurement of flow rate. This is due to the fact that the flowmeter is located on the fourth floor of the tower which houses a dust system with two large fans and cyclones running continuously and four sizers and one air-screen cleaner is running simultaneously on third and second floor. The load cell used in the flowmeter is sensitive enough to pick up vibration from building as well as equipments. To solve this problem, a soft layer will be installed on the load cell surface. To solve the electrical noise from the adjacent motors will need some additional research. A noise reducing circuit will be investigated.<br>We will also separate the flowmeter power line from the high voltage AC source. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Larry Johnson, Principal Investigator | | | $167,717 | |
| **Description of Project** | Commercializing New Fractionated Soy Proteins to Improve Human health and Food Quality | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | Five of our six objectives have been completed. We have completed all of the original planned functionality and compositional testing as well as gelling that was added because our market analysis indicated that gelling is a property that companies are especially interested in and willing to pay premiums. Our industry partners, SafeSoy Technologies (Elsworth, IA) and Crown Iron Works, identified a high value market in Japan for our fractionated proteins in fish cakes, which was verified by TechnoSigma, a Japanese consulting firm hired by Crown. We demonstrated that our glycinin-rich products have superior gelling properties and may be especially well-suited for this application. We completed pilot-plant trails to prepare large quantities of our fractionated soy protein products and are evaluating them in Japanese-style fish cakes (surimi). We developed protocols for evaluating protein performance in fish cakes and sensory analysis of flavors of our products. Preliminary data suggest our glycinin fraction has outstanding performance in fish cakes, but this needs to be verified. We have shown that treating soy protein with small amounts of hydrogen peroxide in lieu of the industry practice of jet cooking gives much superior gelling performance while achieving adequate microbial kill.<br><br>We have completed sensory testing (flavor and aroma). Using gas-supported screw-pressed meal produced by SafeSoy gave standard soy protein isolates with slightly more beany flavor, which becomes accentuated in our fractionated proteins.<br>A strategy has been identified to deal with this. SafeSoy continues to engage other soy protein manufactures to partner with them, the latest being Proliant (Ankeny, IA) who is interested in a superior gelling soy protein isolate.<br>SafeSoy and Crown filed a law suit against Specialty Protein Products for theft of trade secrets around our preferred feedstock to prepare fractionated soy proteins, which has delayed SafeSoy from developing markets for our products. | | | | |

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| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2007** | |
| | Jay-Lin Jane, Principal Investigator | | | $96,273 | |
| **Description of Project** | Development of Resistant and Low-caloric Maltodextrins from Cornstarch | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | A novel technology was developed to produce resistant maltodextrins from normal cornstarch. A series of resistant maltodextrins were produced by using different reaction conditions and reagents. One example of the product consisted of 52.4% resistant starch and about 3% slow-digestible starch as measured by in vitro enzymatic analysis. The product displayed a tan color, gave lightly caramel flavor, and had a bland taste. The resistant maltodextrin was 78.7% water soluble at 35% weight/volume dispersion. Average molecular weight of the product was 7.2 × 103 Dalton, equivalent to 44.5 anhydroglucose units. Glycosidic linkages of the resistant maltodextrins were elucidated using 13C-nmr. The product was made into a beverage and used for a human feeding study. Twenty healthy free-living adult men, 18-45 years of age, were recruited to participate in the human feeding study. Results of the human feeding study showed that after ingesting the resistant maltodextrin product, the average blood glucose concentration of the human subjects was 62.9% of that obtained after ingesting a regular maltodextrin product (Maltrin M180) as the reference of 100%.<br>The blood glucose concentration profile recorded from 0 to 240 minutes after ingesting the resistant maltodextrin product also showed a slow glucose-release peak up to 90 minutes, indicating the product consisting of slow-digestible maltodextrin.<br>The slow-digestible characteristic of the product is highly desirable as a health food ingredient.<br>Because of these desirable properties of the product, the industry partner is in the process of conducting further studies of the product for potential commercial applications. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | **Allocated FY06** | **Allocated Dollars FY 2007** | |
| | David Grewell, Principal Investigator | | $24,399 | $48,282 | |
| **Description of Project** | Ultrasonic Assisted Exfoliation of Bio-Renewable Polymer Nanocomposites with Micro-Cellular Structures | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | This was an 18 month research project that had the goal of developing protein-based (corn and soy) plastics reinforced with nanoclays, for cost reduction and mechanical property enhancement. Applications for these materials range from packaging materials to automotive body panels. High powered ultrasonication will be used to overcome the obstacle of fully exfoliating and dispersing the nanoclay platelets in the polymer matrix. We demonstrated several applications and worked with Iowa Companies to test their performance. For example, Creative Composites of Brooklyn, IA, tested lubrication sticks that were formulated from 100% bio-based ingredients. The results were promising and the company plans further product testing. In addition, planting pots design, fabricated and currently being tested. These pots rapidly decompose in the soil and release natural nutritions into the soil that promote plant growth. Vermeer Manufacturing Co. of Pella IA is currently testing corn protein based hay bale wrapping. In addition, to product development, this project resulted in the publication of one journal article 8 peer reviewed conference paper, 7 international presentations and 3 domestic presentations. This project also resulted in nearly $750,000 of funded research. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | **Allocated FY08** | **Allocated Dollars FY 2007** | |
| | Robert Brown, Principal Investigator | | $37,705 | $94,569 | |
| **Description of Project** | Gasification Technologies in Support of Biorefineries | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | The current period has focused on completing the 2D and 3D CFD simulations using biomass particles in a fluidized bed and comparing the time-averaged gas fraction predictions to our imaging data. In general, the simulations do a good job of predicting the experimental results. This work has been summarized in several conference papers (see above) and will be included on one more journal publication. CFD simulations that captured the pressure fluctuations within the fluidized bed have also been completed during the current period. These data will be analyzed during the next period to determine if this information can be used to predict fluidized bed hydrodynamics. A ThermoStar mass spectrometer was purchased from Pfeiffer Vacuum and has been installed to analyze producer/syngas contamination levels. The mass spectrometer instrument has been calibrated with the following matrix of gases for quantitative analysis: Hydrogen Sulfide, Hydrogen Chloride, Ammonia, Sulfur Dioxide, Methane, Carbon Dioxide, Carbon Monoxide, Hydrogen, Nitrogen, Ethylene, and Ethane. This matrix contains the primary constituents of the producer/syngas gas stream after the water and organic tars have been removed.<br>Shake down trials have taken place in Black Engineering on the 5 kg/hr gasifier and mass spectral data was recorded on December 17th during an oxygen steam gasification trial.<br>The data has been analyzed and will provide more information on the containments in the gas stream. | | | | |
| **Plans** | Over the next period, we will be comparing 2D and 3D simulations for biomass particles and compare the simulations to our imaging data. We will also be evaluating producer gas emissions during the next period. | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Jacek Koziel, Principal Investigator | | | $81,848 | |
| **Description of Project** | Purification and Quality Enhancement of Fuel Ethanol to Produce Industrial Alcohols with Ozonation and Activated Carbon | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | We developed a novel process for ethanol purification utilizing ozonation, granular activated carbon (GAC) adsorption, and gas stripping. This process is capable of purifying fuel grade ethanol to industrial, pharmaceutical, and beverage grades. This process addresses many of the disadvantages of traditional distillation. The approximate cost of treatment is < $0.005/gallon. The following was accomplished since the last report: M.S. thesis based on this research was defended and deposited with ISU; Two national-conference presentations based on this work were made; Three manuscripts for peer-review have been in various stages of preparation with the goal of submitting them by August 15, 2008; Research proposal to the GIVP program titled "Purification and quality enhancement of ethanol by inexpensive means" was submitted by Jenks and Koziel; Research proposal to the ISU-Sloan Biobased Products Industry Center Seed Grants Program titled "Optimization of ethanol purification and process-based cost analysis of ozonation, granular activated carbon and gas stripping as an alternative to distillation" (by Koziel, van Leeuwen, Jenks) was submitted; Presentation of results was made to the GIVP on June 3, 2008; Presentation of results was made to the GPC in Muscatine, IA, May 2008. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY06 | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Hans Van Leeuwen, Principal Investigator | | $52,129 | $29,874 | |
| **Description of Project** | Converting Low Value Thin Silage from Dry Milling Ethanol Plants into High Value Fungal Biomass | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | Bioreactors were operated to treat thin stillage, the centrate of the distillation leftovers from a dry-grind ethanol plant, Lincolnway Energy with fungi. The aerated reactors were inoculated with spores of Rhizopus oligosporus. Tests were conducted with an airlift reactor, in which the diffused air itself causes the water and fungi to rise in a draft tube inside the reactor with continuous water recycle in the annulus between the reactor wall and the draft tube. This was done in order to satisfy the oxygen requirements more rapidly. This caused the fungi to grow to large densities within two days and also to grow into pellets, which are denser and readily harvested with mesh screens. Another reactor was developed and built with external recirculation to avoid problems of fungal biomass attachment. Mycelial growth was visible within two days after inoculation. The total organic concentration of the thin stillage, characterized as chemical oxygen demand (COD) of 94 g/L, was lowered by 60 to 80%. Continuous operation could achieve up to 93% COD removal. Total suspended solids in the samples decreased from 30 to less than 0.1 g/L. Water from thin stillage could be recovered without evaporation.<br>The fungal biomass has a protein content of 38% and contains high levels of lysine and methionine, making the fungal biomass suitable for monogastrics.<br>The results were used to show that substituting the current process of evaporating thin stillage with the fungal process would save 18c/gal ethanol produced and another 2c on water and enzyme recycling.<br>Another 7.5c income per gallon could be expected from the fungal biomass as animal feed.<br>Allowing for capital amortization and operational cost, the net savings and income would be about 18c/gal ethanol with a payback on investment of 6 to 8 months. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY08 | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Pamela White, Principal Investigator | | $6,400 | $61,909 | |
| **Description of Project** | Designing Corn Lines with Dietary fiber to Produce Ethnic Foods with<br>Enhanced Health Benefits | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | Aim #1. Develop specialty corn lines with high resistant starch (RS) for the U.S. Corn Belt.<br>Specialty corn lines with properties ideal for use in native Hispanic foods were previously planted and crossed with corn lines containing high amounts of resistant starch (RS) as a dietary fiber. These lines include corn types with different numbers of mutant amylose-extender (ae) and floury-1 (fl1) alleles. In summer/fall 2008, our commercial partner, Dr. Alix Paez, Genetic Enterprises International (GEI), continued to develop these lines to increased corn yields. The lines were self pollinated during summer 2008 to create lines with fixed starch properties, and harvested in fall 2008, with enough material for evaluation as noted in aim #3.<br>Aim #2. Characterize the new lines for basic composition and potential RS<br>The RS % in the original starches were: #1, aeaeae, 54.6%; #2, fl1fl1fl1, 1.1%; #3, aeaefl1, 5.1%; and #4, fl1fl1ae, 1.9%. Starch from corn types having more amylose (ae) genes (#1 and #3) also had greater amounts of the longer chain lengths in the starch molecules. Alternatively, starch from corn types having more floury (fl) genes (#2 and #4) had greater percentages of the smaller chain lengths. The RS from all starch types were evaluated, and were determined to have no amylopectin (branched-chain) or high molecular weight amylose molecules present, affirming the importance o corn starch having high amounts of low molecular weight amylose to produce greater amounts of RS and thus, fiber, for various food applications.<br>Aim #3. Evaluate the functional and sensory properties of flours from the new corn lines.<br>Procedures for dry milling the new corn lines in the Center for Crops Utilization Research (CCUR) pilot plant were developed. The resulting flours, containing varied amounts of the RS dietary fiber are being evaluated in tortillas by using sensory and objective tests. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY06 | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Richard Larock, Principal Investigator | | 57,409.41 | $38,591 | |
| **Description of Project** | Commercialization of a Corn/Soy Oil-Based Composite Hog Feeder | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | We have developed a commercially viable vegetable oil resin and corresponding biocomposites for use in a hog feeder or other commercial possibilities. The composition of the soybean /corn oil-based resin, the ratio of resin to glass fibers, the cure kinetics and the processing conditions have all been carefully investigated. We have successfully obtained very hard composites from several different bio-based resins reinforced with 45-55 wt % glass fibers. The bio-based resins contain at least 50 wt % of soybean, corn or linseed oils. The mechanical properties of the biocomposites meet the requirements for a viable hog feeder and other commercial applications. We have dramatically shortened the cure time of the composites from 24-48 hr to just a few minutes with no reduction in the thermal and mechanical properties. These times are suitable for a commercial molding process.<br><br>We have also developed high performance vegetable oil-based resins by ring opening metathesis copolymerization. The composition of the resins, the cure time and temperature, the amount of catalyst, and the properties of these resins have been investigated. The Young's modulus and tensile strength reach 650 MPa and 21 MPa, respectively. Glass fiber reinforced biocomposites have also been prepared by a composite molding process.<br>These biocomposites show excellent mechanical properties.<br>The tensile strength and Young's modulus of the composites reinforced with 40 wt % glass fiber reach 150 MPa and 1545 MPa, respectively. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Suzanne Hendrich, Principal Investigator | | | $66,960 | |
| **Description of Project** | Flaxseed Lignans for Heart Health | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | The human feeding study of a flaxseed lignan supplement began with the first cohort of 24 individuals in December 2007, after 4 months of subject recruitment and screening. An additional cohort of 21 subjects completed the trial in April 2008, with 17 completing the study in Dec 2008. To date 58 subjects have completed the trial, with another cohort of 32 to begin in January 2009, with the trial completed by April 2009 with at least 90 subjects completed. Subjects' blood lipids, glucose, and blood biomarkers of treatment compliance, as well as blood pressure and dietary records are under analysis. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY08 | Allocated Dollars FY 2007 | |
|---|---|---|---|---|---|
| | Ruth MacDonald, Principal Investigator | | 21,000 | $44,000 | |
| **Description of Project** | Role of complex Carbohydrates on Colon Health | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | To date we have established a protocol for inflammatory bowel disease (IBD) in mice that provides a suitable model for the human disease. We have used the model to study dietary interventions to reduce the severity of inflammation. In addition, we are developing techniques to quantify cellular events associated with the model. This includes several cytokines to be measured using the Luminex system, Western immunoblotting and ELISA. In addition, we plan to screen for global protein expression changes using 2-D electrophoresis. Through these studies we will identify potential mechanisms through which dietary factors may reduce the symptoms of inflammatory bowel disease. Our goal is to complete these studies by May 2010. | | | | |

| Plans | | | | | |
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| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2007** | |
| | Anumantha Kanthasamy, Principal Investigator | | | $50,000 | |
| **Description of Project** | Development of Novel Gene therapy Approach for Parkinson's Disease | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | The overall objective of our project is to develop a gene therapy approach for Parkinson's disease by targeting the cleavage site of a proapoptotic kinase PKC □. As reported in our previous biannual report, we first developed lentiviruses coding for the PKC□ cleavage motif triplet peptides QDAM3, DMQD3 and DMQA3, and tested their transfection efficiency in cell culture and animal models of Parkinson's disease. We found that lentiviral vector-mediated expression of the peptide sequences worked well in cell culture models, but the expression was very low when injected in animal models. To overcome this problem, we tested Adeno Vector AAV2-1CMVeGFP from the Gene Transfer Vector Core (GTVC) facility (University of Iowa). This adenoviral-mediated delivery into the mouse SN also did not yield sufficient expression. Next, we cloned DMQD3 and DMQA3 into BamH1 and Mlu1 sites in the PLVPT-tTR-KRAB vector obtained from Addgene.org. This inducible vector has been previously used for long-term expression of recombinant proteins in the CNS in a tetracycline-regulatable manner without producing toxicity. We have produced the viruses coding for the LacZ, DMQD3, DMQA3 and QDAM3 in HEK 293-FT cells. We tested their efficiency in cell culture models before proceeding to animal models. This vector showed a low level expression in 293 cells, but not enough expression in dopaminergic neuronal c<br><br>We have also started a collaborative arrangement with Prof. Tusenya Ikezu at the University of Nebraska Medical Center to adopt AAV1/2 hybrid viral vector in our studies. Recently, Dr. Ikezu's group has used this vector in an animal model of Alzheimer's disease.<br>We already tested the AAV1/2 GEP in cell culture models and animal models. The preliminary results are quite promising, and we are in the process of obtaining appropriate plasmids from the Gene Therapy Program at the University of Pennsylvania for cloning QDAM3, DMQD3 and DMQA3 in the AAV1/2 vector.<br>After the completion of cloning, we will test in animal models to determine efficacy of this hybrid vector based gene therapy. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2007** | |
| | Don Reynolds, Principal Investigator | | | $38,000 | |
| **Description of Project** | Modular BL3 Facility at Veterinary Medicine. | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | To date, funds have been expended on the planning of the BL3 modular laboratory. This planning has resulted in various sites being considered for the BL3 at the VMRI and at the Vet Med complex. It was revealed that VMRI is at capacity with regard to utilities and adding more facilities is not possible without major expansion of infrastructure. However, due to the City of Ames needing to expand it electrical infrastructure the project can now be sited at the VMRI. The planning has now been completed and approvals from the University and the Board of Regents have been sought and obtained. The project is being bid and it is anticipated that construction will begin in the fall of 2008 with completion in the following spring. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2008** | |
| | Johnny Wong, Principal Investigator | | | $100,397 | |
| **Description of Project** | Quality Assessment Tools for Colonoscopy | | | | |
| **Anticipated End Results** | To enhance and integrate proof-of-concept software for objectively measuring the quality of colonoscopy and to test its value in a high volume, world-class colonoscopy practice in preparation for commercialization. | | | | |
| **Results achieved to Date** | 1. Two systems were installed at two endoscopy rooms at University of Iowa Hospital. We continue our ongoing collaboration with two physicians at UI.<br>2. We are in the final testing phase for the first version of the automated analysis software for quality of colonoscopy.<br>3. We applied for external funding as listed above. Our proposal for the NSF STTR Phase IB was recommended for funding. We are waiting to receive the grant money.<br>4. The installation of our systems at IDDC was put on hold as IDDC and EndoMetric are not able to reach an agreement on the terms for software testing.<br>5. We continue to test and develop better algorithms and metrics to quantify the amount of the colon mucosa seen by the endoscopist during the procedure.<br>6. We continue to prepare our proposal for the NSF STTR Phase II, which is due in Summer 2009. This grant will significantly help with further technology commercialization and business development. | | | | |

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| **Plans** | | | | | |
| **Iowa State University** | **Project** | | **Allocated FY07** | **Allocated Dollars FY 2008** | |
| | Ann Somani, Principal Investigator | | $ 34,669.50 | $61,535 | |
| **Description of Project** | Work with EnSoft to develop the next generation of SimDiff, a tool for differencing control software models. | | | | |
| **Anticipated End Results** | EnSoft, an ISU based software tools company at the ISU Research Park, has developed an innovative tool for users of Simulink software. Simulink is a software modeling tool widely used for developing control systems. EnSoft's tool, SimDiff, analyzes Simulink software models and presents the results in an easy-to-comprehend visual form. The SimDiff tool has huge potential for commercialization because of the vast proliferation of software enabled control. Control software is everywhere – in thermostats, watches, cell phones, microwave ovens, cars, tractors, pacemakers, airplanes, spacecrafts, and so on. Control software continues to be harnessed to achieve more functionality and efficiency. | | | | |
| **Results achieved to Date** | This is a follow-up project. The first GIVF project was aimed at enhancing the SimDiff product from EnSoft. This GIVF project is aimed at creating another product with the eventual goal of building a product family for developing highly reliable control systems software. The project has resulted in following:<br>– We have built a testbed for testing graph differencing algorithms and we are conducting experimental studies.<br>– Using our research, EnSoft has built a prototype tool and obtained feedback from several companies, EnSoft has identified companies in USA for beta testing and the testing is expected to begin in the first quarter of 2009.<br>– The SimDiff tool is now licensed by 73 companies in 9 countries. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2008** | |
| | Brad Bosworth, Principal Investigator | | | $82,437 | |
| **Description of Project** | Viral replicon particle discovery research for development of improved vaccines for swine | | | | |
| **Anticipated End Results** | To prove the efficacy of RS and RP vaccines in swine and position Sirrah, LLC as a credible choice for an exclusive field of use license for economically important diseases of swine. | | | | |
| **Results achieved to Date** | One study was conducted utilizing replicon particles expressing a single antigen. Post-vaccination immune responses were weak, suggesting inadequate antigen exposure. Following challenge with virulent virus, there were no differences between vaccinated and non-vaccinated animals. The dose of replicon particle vaccine used in this study was lower than in previous work, which may have contributed to the lack of immune response. Currently, the same replicon particle vaccine is being evaluated at higher doses to find the optimal dose. After one dose of vaccine, pigs receiving higher doses than the first study showed a specific immune response by Western blot. This indicates that a relatively high dose of replicon particle vaccine may be required to induce protective immunity. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2008** | |
| | Jay-Lin Jane, Principal Investigator | | | $66,960 | |
| **Description of Project** | Resistant and slowly digestible starch from cornstarch through ingredient processing | | | | |
| **Anticipated End Results** | To develop a commercial food product with slowly digestible starch | | | | |
| **Results achieved to Date** | Normal cornstarch and partially acid-hydrolyzed normal cornstarch were subjected to batch cooking and drying to produce resistant and slowly digestible starch. The cooked normal cornstarch consisted of 26.2% resistant-starch and 11.4% slowly digestible starch, whereas the cooked acid-modified starch consisted of 32.7% resistant-starch and 8.2% slowly digestible starch. Both cooked normal cornstarch and acid-modified cornstarch were subsequently treated at a high-temperature of 110°C for three days. The resistant starch content of the heat-treated normal cornstarch increased to 32.9%, whereas that of the treated acid-modified cornstarch slightly decreased to 31.4%. These results showed that partially acid-hydrolyzed starch, which had smaller molecular weight, retrograded faster than the normal cornstarch to form resistant starch. The acid-modified cornstarch required less water content than did the normal cornstarch to develop resistant starch. The cooked normal cornstarch produced more resistant starch when it had moisture content greater than 70%. The acid-modified cornstarch was also subjected to extrusion cooking, and the extrudate was processed with and without manual stretching.<br>The extrudate samples were analyzed for their resistant starch contents and their crystallinity using X-ray diffractometry. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY07 | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Jay-Lin Jane, Principal Investigator | | 75,120.34 | $74,440 | |
| **Description of Project** | Enzyme hydrolysis of uncooked dry-grind corn for ethanol production | | | | |
| **Anticipated End Results** | Improved production yield of ethanol from dry grind corn | | | | |
| **Results achieved to Date** | Fifteen selected corn lines were used for ethanol yield study. After 96 h fermentation, the ethanol yield varied from 17.9% to 19.4%, and the conversion efficiency of starch to ethanol varied from 88.1% to 93.7%. The conversion efficiency is directly related to the structure, properties, and digestibility of starch, whereas the ethanol yield is depending on both the starch content of the corn and the enzyme digestibility of the starch. Delays on planting corn caused by bad weather are known to result in decrease in corn yield, but it is not known how it may affect corn quality and starch properties. To understand how the late-planted corn may affect the yield of ethanol production on the same mass basis, we analyzed quality of corn planted on different dates from early to late May in 2008. Results showed that the starch content of corn was the largest for corn planted on May 11, and the ethanol production was faster with corn planted in early May. Starch hydrolysis rate was also affected by the drying temperature of corn grains. Starch of corn kernels dried at a higher temperature (e.g., 85ºC) was hydrolyzed more slowly than that dried at the ambient temperature. NIR spectrometry has shown promising results on predicting the ethanol yields. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Suzanne Hendrich, Principal Investigator | | | $18,594 | |
| **Description of Project** | Human feeding study of a novel dietary fiber | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | The human feeding study of a novel dietary fiber was completed Dec. 16, 2007. The trial consisted of 3 feeding periods of 14 days each, with a randomized crossover design, 12 subjects, 4 on each treatment (control, wheat bran, test fiber) during each feeding interval. All subjects completed the trial. Mean daily fecal weights, gut transit time, gastrointestinal symptoms, blood glucose response, 3-day food records and fecal calcium compared with dietary calcium are under study. Breakfast bars containing 15 g of dietary fiber were formulated and prepared, as well as a low fiber control. One bar of each type was consumed daily during each feeding period. When g wet fecal weight change/g dietary fiber added compared with the control breakfast bar was contrasted between corn and wheat bran, the two treatments did not differ significantly in their effect. Dietary fiber intakes of subjects were significantly increased by the addition of high fiber breakfast bars to their daily diets, with no adverse effects on gastrointestinal function. The lack of effects of either dietary fiber source on blood glucose after a 50 g glucose challenge is consistent with the literature, but such fibers may exert other diabetes preventive effects that deserve further study.<br>This trial supports the ability of corn bran to function as a dietary fiber similar to wheat bran. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY07 | Allocated Dollars FY 2008 | |
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| | Toni Wang, Principal Investigator | | $6,400 | $107,100 | |
| **Description of Project** | Oil Recovery from corn fermentation by-products | | | | |
| **Anticipated End Results** | Obtaining Oil from Corn Ethanol fermenation co-products | | | | |
| **Results achieved to Date** | Breaking the corn to smaller pieces did not cause more oil to go to the liquid fraction, which is what we intended to do so the oil can be separated by centrifugation. Extrusion, however, did release more oil from the cellular structure and made it more extractable by solvents but not by centrifugation. For down-stream oil extraction (once oil is in liquid phase), enzymatic hydrolysis and heating with gentle stirring (churning) are relatively effective to recover the oil. Further modifications of corn processing and fermentation are shown to be effective in recovering the oil and the new processes also resulted in co-products with higher purity than with conventional processes. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2008 | |
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| | Mike Wannemuehler, Pincipal Investigator | | | $150,444 | |
| **Description of Project** | Generation X vaccines: combining novel antigens and single dose delivery technologies | | | | |
| **Anticipated End Results** | | | | | |
| **Results achieved to Date** | The goals of this project are to develop a novel vaccination strategy using polyanhydride-based bioerodible polymers and aGal-modification of the vaccine candidate. This goal of the project is to develop a vaccine regimen that will induce protective immunity following immunization with a single dose vaccine that will improve patient compliance. The project focuses on the use of a recombinant protein (rF1-V) derived from Yersinia pestis, the causative agent of plague. For a vaccine to effectively induce protective immunity, cells of the immune system referred to as antigen-presenting cells (APC) must take up the vaccine material, process the antigen, and present it to T cells and B cells for the induction of immunity. During the past six months, we have evaluated the ability of polyanhydride nanoparticles or microparticles to be taken up by APCs. Using laser scanning confocal microscopy, we have evaluated the interactions of the polyanhydride particles with both human and mouse APCs. Polyanhydride nanoparticles composed of poly(sebacic anhydride) (SA), and 20:80 and 50:50 copolymers of 1,6-bis-(p-carboxyphenoxy)hexane (CPH) anhydride and SA were fabricated with similar spherical morphology and particle diameter (200 to 600 nm).<br>Exposure of the nanospheres to APCs showed that poly(SA) and 20:80 CPH:SA nanospheres were readily internalized whereas 50:50 CPH:SA nanospheres had limited uptake.<br>The chemistries also differentially enhanced the uptake of an antigen which lends to the observed adjuvant activity of the polyanhydrides.<br>These studies demonstrated that nanosphere and antigen uptake by monocytes (i.e., APCs) can be directly correlated to the chemistry of the nanosphere.<br>These results demonstrate the importance of choosing polyanhydride chemistries that facilitate enhanced interactions with antigen presenting cells that are important in the initiation of efficacious immune responses.<br>In addition to these studies, a novel combinatorial method to prepare nanoparticles was developed.<br>This method will facilitate the preparation of nanoparticles of multiple chemistries (i.e., ratios of CPH to SA) in which the vaccine antigen will be incorporated.<br>This will 1) reduce the amount of aGal-modified protein required for polymer fabrication and 2) facilitate the evaluation of multiple vaccine formulations. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | Allocated FY07 | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Eliot Winer, Principal Investigator | | $50,133 | $59,400 | |
| **Description of Project** | Commercialization of a 3D interactive digital medical software for surgical planning and training | | | | |
| **Anticipated End Results** | Commercial application for surgical planning and training | | | | |
| **Results achieved to Date** | All of the project budget is a subaward to Visual Medical Solutions, LLC. (VMS). Here are the milestones completed by VMS in the past six months:<br>• Hired Curt Carlson as President/CEO of company.<br>• Awarded Wellmark venture funding in the amount of $100,000.<br>• Beta testing BodyViz software at several partner sites including:<br>o Stryker Medical<br>o Des Moines University Medical School<br>o Texas Methodist Hospital System<br>• VMS presented BodyViz to venture capitalist forum organized by Steve Carter. Follow-ups are currently being pursued.<br>• Negotiating agreement with Med-Tech Consultant Partners, LLC for East coast distribution.<br>• BodyViz chosen as platform for earmark research project for Marshalltown Medical Center. Proposal facilitated by Mechdyne Corporation. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Halil Ceylan, Principal Investigator | | | $93,775 | |
| **Description of Project** | Ethanol Plant by-product uses for pavement geomaterials stabilization | | | | |
| **Anticipated End Results** | Utilization of DDG's for pavement stabilization | | | | |
| **Results achieved to Date** | During this period, the research efforts mainly focused on obtaining the bio-oil/lignin test materials and studying the engineering property of these materials. Potential lignin samples have been obtained by contacting industry (Dynamotive Energy Systems, Inc. and Grain Processing Corporation of Muscatine, Iowa, Inc.) and Iowa State University's biofuel research labs. The research team consulted the Iowa Department of Transportation engineers to identify potential soil types which will benefit from lignin treatment both from structural and economic perspective. The research team collected the identified potential soil materials from new construction site near US 20 in Calhoun County, Iowa. The research team has characterized the engineering properties of obtained soil materials trough national standard laboratory specifications including Grain size distribution (AASHTO T 27), Atterberg's limit test (AASHTO T 89/90) and the Moisture/density relationship (AASHTO T 99). Preliminary test factorials have been completed to study the lignin-soil/aggregate mixtures and to examine the effect of lignin addition on the strength and overall engineering characteristics of the lignin-soil mixtures. Preliminary test results gave very encouraging results in terms of using the bio-oil/lignin samples for soil geomaterial stabilization purposes.<br>Future research will focus on optimizing the test parameters (additive concentration level, moisture content, curing time, etc.) for achieving maximal performance in terms of lignin/bio-oil - soil stabilization. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Terry Meyer, Pincipal Investigator | | | $86,814 | |
| **Description of Project** | Laser-based diagnostics of next generation combustion systems | | | | |
| **Anticipated End Results** | New system for evaluating and diagnosing problems with combustion systems | | | | |
| **Results achieved to Date** | We are building up the facilities and instrumentation that will allow us to develop advanced laser-based sensors for analyzing combustion systems that burn alternative fuels. The end product will be improved combustion sensors and improved combustor designs given detailed knowledge of alternative fuel sprays, fuel-air mixing, and energy release. Below is an update on tasks required for this work.<br><br>Task 1. Install laser systems for achieving narrowband, tunable radiation.<br>This task has been completed in Q3 of 2008 as planned. It includes the following accomplishments: (a) demonstration measurements of soot and combustion species within the flame zone of a biofuel combustor and (b) extension to high-speed measurements at rates up to 20,000 frames per second.<br><br>Task 2. Acquire detection hardware, including photodetectors and imaging systems.<br>This task has been completed in Q4 of 2008 as planned. It includes the acquisition of special cameras for recording flame data and photodetectors for tracking particulates and signals from fuel sprays. A second camera is being acquired to allow simultaneous recording of multiple parameters.<br><br>Task 3. Assemble and characterize measurement system for studying multiple combustion parameters.<br>This task is underway, with measurements of multiple parameters being completed using lasers and detection systems described above. Simultaneous acquisition of multiple parameters will be completed when another camera is acquired by Q1 of 2009 as planned.<br><br>Task 4. Assemble test apparatus and study two-phase combustion processes using alternative fuels.<br>This task is the payoff for the efforts described above. It is underway and will continue into Q1-Q3 of 2009. Thus far a bio-fuel combustor has been constructed and is undergoing testing, and a diesel spray chamber has also been constructed and is undergoing testing. Both will be used for studies of alternative fuels using the instrumentation described above. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Stephen Gilbert, Principal Investigator | | | $100,000 | |
| **Description of Project** | Multi-touch technology: application to homeland security and ISU research | | | | |
| **Anticipated End Results** | Open a new market for P5 (previously infiscape) in the area of homeland security | | | | |
| **Results achieved to Date** | Launch of Sparsh-UI 1.0<br>With guidance from Priority 5, the ISU team developed Sparsh-UI, and open source platform that supports multitouch software development across systems, e.g. Windows, Mac, Linux. It can also accommodate different languages, e.g. C++ or Java. Sparsh-UI 1.0 was placed in Google Code in October 2008, and as of January 2009 there have been over 700 downloads worldwide. This fact illustrates that Sparsh is a worthwhile platform, and discussions continue with P5 about how to tweak it so that it would be fully usable out of the box by P5 in their commercial products. The target for this advance is Spring 09.<br><br>Usability Analysis and Interface Prototyping<br>We also worked with P5 to help them design a new interface for their TACCS software. The usability analysis at ISU was helpful to P5 so that it could continue focusing on implementation. The multitouch hardware market continues to be problematic, e.g. it's hard to be good multitou hardware off the shelf. P5 and ISU compare notes on what they can find. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2008** | |
| | Guru Rao, Principal Investigator | | | $70,000 | |
| **Description of Project** | Development of Novel Digestion-Resistant Starches from Corn to Combat Human Disease | | | | |
| **Anticipated End Results** | Develop food products with slowly digested starch | | | | |
| **Results achieved to Date** | Previous laboratory analyses of starch from genetically modified corn plants producing a long-chain amylopectin starch (LCAPS) show it is enzymatically converted to glucose more slowly than normal cornstarch (60% of normal rate). Current objectives are to analyze the digestion properties of new starches based on LCAPS, and to demonstrate that incorporation of these modified starches into food will result in protracted release of glucose into the bloodstream in humans.<br>Approaches: 1) Genetically modified LCAPS corn lines that were crossed to the mutant lines amylose extender and dull1 to produce novel starches termed LCAPS2 and LCAPS3, respectively, were analyzed to determine starch fine structure and digestibility to glucose by hydrolytic enzymes over time. 2) New food products were designed and laboratory tested for use in human feeding trials. These include a corn flour based cookie, corn bread, and an arepa-type food product.<br>Accomplishments: 1) LCAPS3 is near final characterization. This modified starch has a different structure compared to LCAPS, with more long chains. Both modified starches are less viscous than normal starch. Analyses indicate LCAPS3 has a higher gelatinization temperature, and is digested to glucose more slowly than LCAPS or normal starch. This suggests LCAPS3 has promise as a slow energy release food ingredient.<br>Scanning electron microscopy of LCAPS and LCAPS3 granules showed both are smaller than normal, and have narrower granule size distributions and smoother surfaces.<br>These features may confer properties of interest for certain food applications.<br>Characterization of LCAPS2 is in progress. 2) Food product development is in progress for human feeding trials, including analysis of starch concentration and time of storage.<br>Laboratory analysis of corn flour based cookies showed the LCAPS cookie was not digested more slowly than the cookie containing normal corn flour.<br>Consequently, research currently is focused on alternative food products containing fewer non-starch ingredients. | | | | |
| **Plans** | | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2008** | |
| | Marian Kohut, Rick Sharp; Principal Investigators | | | $92,777 | |
| **Description of Project** | Effectiveness of EpiCor in improving immune function, inflammation, and performance after intense exercise | | | | |
| **Anticipated End Results** | Demonstrate that EpiCor decreases recovery time after intense exercise and provides enhanced immunity | | | | |
| **Results achieved to Date** | All subjects have been recruited and participated in the exercise treatment. Blood samples have all been collected. Approximately 75% of all blood assays have been completed. Remaining blood assays are due for completion in spring 2009. A preliminary data analysis has begun on the assays that have been completed. | | | | |
| **Plans** | | | | | |

| Iowa State University | Project | | | Allocated Dollars FY 2008 | |
|---|---|---|---|---|---|
| | Charlie Hurburgh | | | $51,450 | |
| **Description of Project** | Automated phenotyping of biomass crops - part I | | | | |
| **Anticipated End Results** | Develoment of a rapid sphenotype screening system to increase selection and development of biomass crops. | | | | |
| **Results achieved to Date** | No update was provided | | | | |
| **Iowa State University** | **Project** | | | **Allocated Dollars FY 2008** | |
| | Lie Tang | | | $52,180 | |
| **Description of Project** | Automated phenotyping of biomass crops - part II | | | | |
| **Anticipated End Results** | Development of a rapid phenotype screening system to increase selection and development of biomass crops. | | | | |
| **Results achieved to Date** | The primary objective of this project is to design and control a plant screening station, which eventually will help researchers in collecting phenotype related data with minimal human intervention in a greenhouse environment. Plants are carried to the station on conveyor belt. Each plant is attached with a Radio Frequency Identification (RFID) tag. Once the plant reaches the center of the screening station, the conveyor belt stops, an RFID antenna identifies the plant, and a camera starts capturing images of the plant. The camera is attached to a lead-screw which is rotated with the use of a stepper motor, which in turn defines the vertical position of the camera. On the other hand, the lead-screw is also connected by a horizontal arm to another motor, which is used to rotate the whole inverted L-shaped structure, and defines the circular position of the camera. The system worked satisfactorily. Both the DC motor and stepper motor were controlled as desired. But because of lack of braking system, the motor could not be stopped as required and there was undesirable back and forth movement after the motor was stopped. On the other hand, the stepper motor had a nice feature that allowed us to set the number of steps or pulses after which the motor would stop automatically.<br>We will keep developing this screening station platform development.<br>In particular, we will investigate the option of rotating plant instead of rotating the camera.<br>In the meantime, we have developed a basic software platform that allows us to capture 3D images in a synchronized fashion with external positioning sensors such as encoder.<br>We have also incorporated RFID system into the registration of plant tags. | | | | |

University of Iowa - as of December 31, 2008
Grow Iowa Values Fund Appropriations

**FY 2006 GIVF Appropriation** **$1,925,000** Board of Regents approved August 2005

1 Phase I: ISTART - Iowa Startup and Entrepreneurship Fund $1,400,000
2 Phase I: IGROW - Iowa Growth and Development Fund $525,000

**FY 2007 GIVF Appropriation** **$1,925,000** Board of Regents approved August 2006

1 Phase I: ISTART - Iowa Startup and Entrepreneurship Fund $1,400,000
2 Phase I: IGROW - Iowa Growth and Development Fund $525,000

| University of Iowa | Project | List of all FY 2006 Revenue Sources | Revenue Dollars for FY 2006 | Amount of FY 2006 State Appropriations Expended as of 12/31/2008 | List of all FY 2007 Revenue Sources | Revenue Dollars for FY 2007 | Amount of FY 2007 State Appropriations Expended as of 12/31/2008 |
|---|---|---|---|---|---|---|---|
| 1 | **Phase I: ISTART - Iowa Startup and Entrepreneurship Fund** | FY 2006 State Appropriations (GIVF) | $1,400,000 | $1,400,000 | FY 2007 State Appropriations (GIVF) | $1,400,000 | $1,400,000 |
| | | FY 2006 Matching Funds (Other) | $1,400,000 | $1,400,000 | FY 2007 Matching Funds (Other) | $1,400,000 | $1,400,000 |
| **Description of Project** | The I-START program is targeted at facilitating university-private sector partnerships in entrepreneurship and the creation of new companies and jobs in Iowa. The university, through a competitive request for proposals process, identified four businesses with high potential for recruitment or advancement in Iowa. Individual projects were developed that support commercialization projects based on the university's or partner's intellectual property. | | | | | | |
| **Anticipated End Results** | Examples of results would include a faculty-launched start-up that produces diagnostic and therapeutic tools for healthcare and biodefense, and a Technology Innovation Center tenant company that markets software with applications in the detection and treatment of lung disease. | | | | | | |
| **Results achieved to Date/Plans** | Results include:<br>• Hired experienced technology transfer and economic development professionals to lead the IOWA Centers for Enterprise and other UI's commercialization initiatives;<br>• Retained prominent researcher, Dr. Hageman, and his company in Iowa.<br>• Conducted extensive tests and verified that acetone could be differentiated from other components that would be contained in breath at levels consisted with those found in diabetics.<br>• Designed handheld prototype to measure acetone levels.<br>• Allows user to access and understand vast amounts of data much more quickly.<br>FY 2006<br>• Renovated facilities used by tenants for meetings with collaborators, customers, venture capitalists, etc.<br>• Organized and conducted the Entrepreneur Ventures Group which provides monthly seminars on a variety of entrepreneurial subjects with invited experts<br>• Evaluated progress and advised faculty who received gap funds.<br>FY 2007 -<br>• Corporate outreach included 37 visits to Iowa companies and visits to 8 economic development groups, 9 campus visits, 3 business and community forums;<br>• Demonstrated efficacy of new drug compound intended for prostate cancer through animal testing - cancer tumor formation was halted by this new compound.<br>• Tested and integrated a new proprietary component with an existing large laboratory instrument as a key milestone toward creating a small, cost-effective portable hospital instrument.<br>• Targeted and randomly integrated cell lines to advance the study and treatment of human disease and in agricultural applications. Invention disclosure is being prepared, initial market research was conducted, deployment of business model is underway.<br>• Demonstrated critical steps toward creating a new cystic fibrosis porcine model.<br>• Based on research that organic light emitting diode (OLED) responds to external magnetic fields, procured small displays from commercial partners and focused on understanding the functionality of the magnetic pen and its requirements.<br>• Completed successful USB interface of a camera for diagnosing eye diseases such as macular degenerations and diabetic retinopathy and performed extensive analysis of market factors impacting the introduction and adoption of such a camera.<br>• Supported student lead business from software development for an innovative approach to bioinformatics to allow users to access and understand vast amounts of data more quickly, through business model development and launch of business.<br>• Hired firms to assist in preparing a signage plan, new covenants, architectural guidelines, marketing plans for entrepreneurial ventures.<br>• Speaker series continued with average attendance at 45+. Conducted four entrepreneurship workshops with average attendance of 30. Provided consulting services in excess of 1000 hours to help people launch new businesses. | | | | | | |

| University of Iowa | Project | List of all FY 2006 Revenue Sources | Revenue Dollars for FY 2006 | Amount of FY 2006 State Appropriations Expended as of 12/31/2008 | List of all FY 2007 Revenue Sources | Revenue Dollars for FY 2007 | Amount of FY 2007 State Appropriations Expended as of 12/31/2008 |
|---|---|---|---|---|---|---|---|
| 2 | **Phase I: IGROW - Iowa Growth and Development Fund** | FY 2006 State Appropriations (GIVF) | $525,000 | $525,000 | FY 2007 State Appropriations (GIVF) | $525,000 | $525,000 |
| | | FY 2006 Matching Funds (In-Kind) | $525,000 | $525,000 | FY 2007 Matching Funds (Other) | $525,000 | $525,000 |
| **Description of Project** | The IGROW program is designed to address middle to long-term commitments needed to strengthen the University's capacity to promote and sustain high tech entrepreneurship and to promote research and technology-driven economic development in Iowa. These funds will also be used to meet USDA standards necessary to produce supplies of drug materials used in human clinical trials. | | | | | | |
| **Anticipated End Results** | The university directs funds to promote high-tech entrepreneurship and build new networks among people with technical, financial, and business expertise and sustain the growth of industries that provide high-paying jobs for the citizens of Iowa. For example, fund dollars would help to recruit entrepreneurial faculty who plan to operate new companies in Iowa. | | | | | | |
| **Results achieved to Date/Plans** | The funds provided part of an essential start-up package that attracted Dr. Subramanian, a highly entrepreneurial faculty member, who accepted the position to serve as Director of UI Center for Biocatalysis and Bioprocessing. | | | | | | |

University of Northern Iowa - as of December 31, 2008
Grow Iowa Values Fund Appropriations

| | | | |
|---|---|---|---|
| | **FY 2006 GIVF Appropriation** | **$950,000** | Board of Regents approved September 2005 |
| 1 | Technology Transfer and Business Incubation | $310,000 | |
| 2 | Rural Entrepreneurship | $155,000 | |
| 3 | Market Research | $120,000 | |
| 4 | Capacity building and Implementation for Regional Development | $140,000 | |
| 5 | National Ag-Based Lubricants (NABL) Center | $225,000 | |

| | | | |
|---|---|---|---|
| | **FY 2007 GIVF Appropriation** | **$950,000** | Board of Regents approved August 2005 |
| 1 | Technology Transfer and Business Incubation | $310,000 | |
| 2 | Rural Entrepreneurship | $200,000 | |
| 3 | Market Research | $110,000 | |
| 4 | Helping Regions Succeed | $130,000 | |
| 5 | National Ag-Based Lubricants (NABL) Center | $200,000 | |

| **University of Northern Iowa** | **Project** | **List of all FY 2006 Revenue Sources** | **Revenue Dollars for FY 2006** | **Amount of FY 2006 State Appropriations Expended as of 12/31/2008** | **List of all FY 2007 Revenue Sources** | **Revenue Dollars for FY 2007** | **Amount of FY 2007 State Appropriations Expended as of 12/31/2008** |
|---|---|---|---|---|---|---|---|
| 1 | **Technology Transfer and Business Incubation** | FY 2006 State Appropriations (GIVF) | $310,000 | $310,000 | FY 2007 State Appropriations (GIVF) | $310,000 | $310,000 |
| | | FY 2006 Matching Funds (Federal Support) | $1,158,299 | | FY 2007 Matching Funds (Federal Support) | $700,000 | |
| **Description of Project** | FY 2007 has been a productive year for both technology transfer and business incubation efforts. The Technology Transfer team is creating a supportive community culture for entrepreneurial development on campus through a planned schedule of events and educational opportunities for students, faculty and staff in the coming year. The Student Business Incubator continues to be a popular resource for UNI students, and the Innovation Incubator is nearing full completion with two entrepreneurs taking early tenancy in the new facility. Additional late-stage researchers and spin-off companies from the Cedar Valley are scheduled to enroll in the incubator this fall, as construction is completed. | | | | | | |
| **Anticipated End Results** | Create a supportive community culture for entrepreneurial development on campus through a planned schedule of events and educational opportunities. | | | | | | |
| **Results achieved to Date/Plans** | 18 new disclosures from a variety of colleges across campus were accepted, from among the 26 that were submitted.<br>Four of the five GIVF-funded, applied research projects submitted disclosures.<br>Four US patent applications were filed during the fiscal year, with three US patents and multiple foreign patents awarded to innovators across campus.<br>Three patents were licensed. | | | | | | |

| **University of Northern Iowa** | **Project** | **List of all FY 2006 Revenue Sources** | **Revenue Dollars for FY 2006** | **Amount of FY 2006 State Appropriations Expended as of 12/31/2008** | **List of all FY 2007 Revenue Sources** | **Revenue Dollars for FY 2007** | **Amount of FY 2007 State Appropriations Expended as of 12/31/2008** |
|---|---|---|---|---|---|---|---|
| 2 | **Rural Entrepreneurship** | FY 2006 State Appropriations (GIVF) | $155,000 | $155,000 | FY 2007 State Appropriations (GIVF) | $200,000 | $200,000 |
| | | FY 2006 Federal Support | $155,118 | | FY 2007 Matching Funds (Federal Support) | $175,662 | |
| | | | | | FY 2007 Matching funds (State Approp) | $9,616 | |
| | | | | | FY 2007 Matching Funds (Other) | $16,728 | |
| **Description of Project** | As of fiscal year end, twelve rural Iowa counties have launched MyEntreNet Rural Entrepreneurship Development Systems across the state. It was anticipated that MyEntreNet would serve 50 community leaders and 450 entrepreneurs (150 of them with advanced technical assistance or training) for a total of 500 rural participants during FY 2007. Those goals were exceeded across all segments, with over 900 community leaders and entrepreneurs receiving some kind of on-site technical assistance, training, mentoring or networking support during the past fiscal year, and a record 235 of these entrepreneurs receiving advanced technical assistance or training. | | | | | | |
| **Anticipated End Results** | Provide advanced technical assistance or training to rural entrepreneurs. MyEntreNet staff continues to fill gaps in service delivery areas and provide training in entrepreneurial development strategies for community and professional leaders. | | | | | | |
| **Results achieved to Date** | To date, more than 1,300 Iowa entrepreneurs have registered at www.myentre.net; 326 in the past six months alone. This represents nearly double the number of rural entrepreneurs registered online a year ago. Across all MyEntreNet regions, 167 new full time jobs were created by 45 new or expanding rural companies. An additional 32 jobs were saved by technical assistance provided to struggling companies in these regions. Of those entrepreneurs receiving advanced services, nearly 20% have opened or expanded a rural company in the past twelve months. | | | | | | |
| **Plans** | As reported in January, a unique partnership was developed this past year with the statewide system of Small Business Development Centers (SBDCs), in order to merge their online presence with MyEntreNet's online community. However, the statewide marketing campaign has been moved back to FY 2008 in order to include the SBDC system. Thus, GIVF resources have primarily been spent to augment the array of online learning, networking and technical assistance tools available to entrepreneurs via MyEntreNet. | | | | | | |

| University of Northern Iowa | Project | List of all FY 2006 Revenue Sources | Revenue Dollars for FY 2006 | Amount of FY 2006 State Appropriations Expended as of 12/31/2008 | List of all FY 2007 Revenue Sources | Revenue Dollars for FY 2007 | Amount of FY 2007 State Appropriations Expended as of 6/30/2007 |
|---|---|---|---|---|---|---|---|
| 3 | **Market Research** | FY 2006 State Appropriations (GIVF) | $120,000 | $120,000 | FY 2007 State Appropriations (GIVF) | $110,000 | $110,000 |
| | | FY 2006 Matching Funds (General Funds) | $8,632 | | FY 2007 Matching Funds (General Fund) | $59,094 | |
| | | FY 2006 Matching Funds (Other) | $112,601 | | FY 2007 Matching Funds (Other) | $53,260 | |
| **Description of Project** | Quality market intelligence can significantly increase a business's opportunity for success. The purpose of devoting GIVF funds to market research projects for start-up businesses, existing businesses and tourism/quality-of-life ventures, is to help expand and stimulate economic growth across Iowa by providing businesses with invaluable insight on their target markets. Strategic Marketing Services (SMS) has allocated GIVF support towards three primary areas: 1) Assistance to UNI's technology transfer program, 2) Market Research Projects, and 3) Market Research Plans and Assessments. | | | | | | |
| **Anticipated End Results** | Improve competitive intelligence for Iowa companies.<br>Provide initial market screening and identify potential competitors for UNI faculty and staff research. | | | | | | |
| **Results achieved to Date** | Area 1: Assistance to UNI's Technology Transfer Program – SMS conducted six Phase One research projects for UNI Technology Transfer opportunities during FY 2007. GIVF funding supported 50% of these Phase One projects, with the UNI Research Foundation (UNIRF) contributing the other 50%.<br>Area 2: Market Research Projects – SMS has successfully completed five market research projects for Iowa-based businesses in FY 2007 with one still underway. Additionally, four other entities have expressed a sincere interest in utilizing SMS for market research, and are still under consideration. Costs for market research projects are split between the client and GIVF investment, with maximum GIVF support of $10,000 per project. | | | | | | |
| **Plans** | Projects currently under consideration as of June 30, 2007:<br>ASI Modulex, Grinnell<br>Northern Filter Media, Muscatine<br>Heavy Equipment, Bellevue<br>City of West Des Moines | | | | | | |

| University of Northern Iowa | Project | List of all FY 2006 Revenue Sources | Revenue Dollars for FY 2006 | Amount of FY 2006 State Appropriations Expended as of 12/31/2008 | List of all FY 2007 Revenue Sources | Revenue Dollars for FY 2007 | Amount of FY 2007 State Appropriations Expended as of 12/31/2008 |
|---|---|---|---|---|---|---|---|
| 4 | **Capacity Building and Implementation for Regional Development/Helping Regions Succeed** | FY 2006 State Appropriations (GIVF) | $140,000 | $140,000 | FY 2007 State Appropriations (GIVF) | $130,000 | $130,000 |
| | | FY 2006 Matching Funds (Federal Support) | $122,816 | | FY 2007 Matching Funds (General Fund) | $7,982 | |
| | | FY 2006 Matching Funds (Other) | $17,615 | | FY 2007 Matching Funds (Federal Support) | $88,755 | |
| | | | | | FY 2007 Matching Funds (Other) | $35,435 | |
| **Description of Project** | During FY 2007, the Institute for Decision Making (IDM) and local/regional economic development leaders built upon growing levels of trust and collaboration in order to strengthen partnerships and build capacity at the local level, thus enhancing the regional product. Specifically, IDM has focused its efforts in six regions and across multiple development initiatives. Steps have also been taken to prepare these regions for operating independent of state marketing money. | | | | | | |
| **Anticipated End Results** | Assisting regional organizations and agencies in job creation and adding businesses. | | | | | | |
| **Results achieved to Date** | IDM solicited reports from a cross section of economic development organizations (collaborative partners) involved in regions. Over the last year, each partner averaged three business leads attributable to regional activity, with each lead having a one in six chance of a follow-up business visit. In a typical region, the average investment by each collaborative partner organization was roughly $16,000 (53% monetary; 47% in-kind). Additionally, IDM has reviewed its partners' identification of regional metrics noting that *job creation* and *businesses added* were most often mentioned. Other highlights include two regions that developed concerted marketing and operating protocols and the receipt of testimonial letters from each region praising IDM's contributions. | | | | | | |
| **Plans** | Continue economic development partnerships and assistance. | | | | | | |

| University of Northern Iowa | Project | List of all FY 2006 Revenue Sources | Revenue Dollars for FY 2006 | Amount of FY 2006 State Appropriations Expended as of 12/31/2008 | List of all FY 2007 Revenue Sources | Revenue Dollars for FY 2007 | Amount of FY 2007 State Appropriations Expended as of 12/31/2008 |
|---|---|---|---|---|---|---|---|
| 5 | **National Ag-Based Lubricants (NABL) Center** | FY 2006 State Appropriations (GIVF) | $225,000 | $225,000 | FY 2007 State Appropriations (GIVF) | $200,000 | $200,000 |
| | | FY 2006 Matching Funds (Federal Support) | $248,492 | | FY 2007 State Appropriations | $40,032 | |
| | | | | | FY 2007 Matching Funds (Federal Support) | $226,358 | |
| **Description of Project** | The NABL Center has been a leader in the development of Iowa's biobased products industry for over 15 years. As the price of gasoline continues to surpass three dollars per gallon and the cost of petroleum-based lubricant products increases proportionately, the significance of developing a profitable, diverse, and well-accepted biobased industry within the state of Iowa has become paramount to Iowa's economic growth. | | | | | | |
| **Anticipated End Results** | Provide support for the growth of the state's biobased products industry. | | | | | | |
| **Results achieved to Date** | To provide support for the growth of the state's biobased products industry, the NABL Center has worked to expand its scope by:<br>Offering fee-based biobased lubricant testing services to entrepreneurs and biobased lubricant manufacturers.<br>Adding fee-based biofuels testing capabilities to serve the State's biodiesel and ethanol producers, and to provide quality assurance for biofuels consumers.<br>Leveraging NABL scientists' 17 years of vegetable oil-based expertise to provide biodiesel and ethanol troubleshooting services for producers.<br>Consulting with various biobased industry partners, in order to assist in product development projects. | | | | | | |
| **Plans** | In the last year, NABL has continued to provide fee-based testing to various private entities. Roughly, 169 tests were performed at the request of outside firms. Staff anticipates that this volume will increase significantly in the upcoming months due to the finalization of NABL's ISO certification and concerted marketing efforts. | | | | | | |