

Summary of ADF Approved Projects 2008

(Approved December 5, 2007)

Total ADF funding awarded for 58 projects in 2008\$8,288,176.00

University of Saskatchewan\$6,359,822

College of Agriculture and Bioresources.....\$4,444,368

Plant Science and CDC\$2,909,095

Soil Science\$167,048

Animal and Poultry Science\$478,298

Food and Bioproduct Sciences\$889,927

College of Arts and Sciences.....\$148,959

Geography.....\$148,959

College of Engineering\$682,149

Agriculture and Bioresource Engineering.....\$682,149

Western College of Veterinary Medicine\$250,915

Large Animal Clinical Sciences.....\$250,915

Vaccine and Infectious Disease Organization (VIDO).....\$833,431

University of Regina.....\$129,150

College of Arts and Sciences.....\$129,150

Department of Biology.....\$129,150

Other research organizations.....\$1,210,381.50

Prairie Swine Centre\$428,861

Prairie Agricultural Machinery Institute (PAMI).....\$404,382

Agriculture and Agri-Food Canada\$550,420

National Research Council.....\$415,541

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(Approved December 5, 2007)

University of Saskatchewan

College of Agriculture and Bioresources

Department of Animal and Poultry Science

Room 6D10 – 51 Campus Drive, Saskatoon, SK S7N 5A8

Project number 2007-0079

Approval: \$172,748.00

VALUE OF ETHANOL BY-PRODUCTS AS FEED FOR HIGH-PRODUCING DAIRY COWS

Objectives:

- To determine optimum inclusion levels of DDGS in diets for high-producing dairy cows;
- To determine the impact of the inclusion of DDGS in diets for high-producing dairy cows on milk production and milk composition
- To determine the impact of the inclusion of DDGS in diets for high-producing dairy cows on nitrogen digestion and whole-body nitrogen and phosphorus balance, nitrogen and phosphorus excretion into the environment, rumen fermentation characteristics, rumen microbial protein production and total protein flow to the small intestine.

Contact: Timothy Mutsvangwa (306) 966-5350

Project number 2007-0042

Approval: \$50,000.00

NOVEL FEED PRODUCTS BASED ON GLYCEROL CO-GENERATION PRODUCT FROM BIODIESEL PRODUCTION

Objectives:

- Develop novel high value, glycerol-based feed products and feeding methods for the dairy sector and transition cow feeding, taking advantage of the unique glucogenic and metabolic properties of glycerol to reduce metabolic stress and improve metabolic efficiency.
- Develop novel economical feed products and feed processing methods to promote high rumen bypass rates of glycerol-based feed products.
- Develop glycerol-based liquid drench as a therapeutic glucogenic product for use in ruminants.

Contact: Bernard Laarveld (306) 966-5350

Project number 2007-0075

Approval: \$35,730.00

NOVEL NUTRACEUTICAL FEED PRODUCTS FROM BRASSICA JUNCEA ORIENTAL MUSTARD CAKE FROM BIODIESEL PRODUCTION

Objectives:

- To determine if Oriental Mustard biodiesel co-gen product can be used as feed supplement for dairy cows to produce milk with allyl isothiocyanate (AIT) levels so that the milk produced can be marketed with nutraceutical claims.
- To identify optimal feeding levels and feeding management of the co-gen product for dairy cattle to achieve consistent secretion of AIT in milk.
- To create a new milk product with nutraceutical properties, leading to increased market demand and expansion of the milk quota in Saskatchewan under the innovative product development category.

Contact: Bernard Laarveld (306) 966-5350

Project number 2007-0093

Approval: \$121,203.00

HEALTH PROPERTIES OF ETHANOL CO-PRODUCTS: POTENTIAL FOR VALUE ADDED

Objectives:

- To evaluate possible health and pre-harvest food safety benefits of wheat-based ethanol co-products and co-product fractions in poultry and swine diets.

Contact: Andrew van Kessel (306) 280-7487

Project number 2007-0179

Approval: \$98,617.00

IDENTIFICATION OF CATTLE MUTATIONS INVOLVED IN THE APPETITE PATHWAY OF CATTLE

Objectives:

- Examine the role of the MC4R gene, and the AGRP gene in the appetite pathway searching for polymorphisms in the DNA sequence of beef cattle.

Contact: Sheila Schmutz (306) 966-5350

Department of Food and Bioproduct Science

51 Campus Drive, Saskatoon, SK S7N 5A8

Project number 2007-0101

Approval: \$148,740.00

DEVELOPMENT OF NOVEL MICROBIAL BIOPESTICIDE FOR EFFICIENT FUSARIUM/FHB BIOCONTROL

Objectives:

- To evaluate methods of delivery for the most promising biocontrol agents.
- To evaluate selected indigenous microbial isolates for (1) their ability to reduce Fusarium incidence in greenhouse, in vitro and field trials, (2) their efficiency to prevent deoxynivalenol (DON) contamination, and (3) for their compatibility towards beneficial microbial diversity in wheat and barley.
- To develop new biotechnological tools for Fusarium/Fusarium Head Blight (FHB) biocontrol work.
- To train highly qualified personnel to enhance the innovation capacity within Saskatchewan's bioeconomy.
- To closely collaborate with the Saskatchewan bioinoculant companies and organic growers, thus ensuring versatility of new biotechnology and profitability of Saskatchewan's bioeconomy.

Contact: Vladimir Vujanovic (306) 966-5048

Project number 2007-0127

Approval: \$198,600.00

FUNCTIONAL AND NUTRITIONAL CONSEQUENCES OF PROTEIN CO-PRODUCTS FROM HIGH TEMPERATURE ETHANOL PROCESSING

Objectives:

- To develop methodologies for protein separation from pre-processed wheat and samples taken after various temperature treatments during ethanol processing.
- To characterize changes to protein structure and functionality of heat processed wheat protein for non-feed utilization.
- To assess the nutritional quality of heat processed wheat protein for feed, using broiler chickens as a model for monogastric species.
- To access the market opportunities for differentiated products from the DDGS stream.

Contact: Michael Nickerson (306) 966-5030

Project number 2007-0153

Approval: \$33,975.00

GENOTYPE X ENVIRONMENT EFFECT ON STARCH FUNCTIONALITY OF FIELD PEA AND FABABEAN VARIETIES

Objectives:

- To determine the impacts, if any, of genetics (line, variety) and environment, and their interaction, on the content, chemistry and functionality of starch in field pea and fababean grown in Saskatchewan.

Contact: Shannon Hood (306) 280-7487

Project number 2007-0184

Approval: \$181,612.00

ENZYMATIC CONVERSION OF GLYCEROL TO PLATFORM CHEMICALS

Objectives:

- Establishing stable supply of glycerol dehydratase (GD)
 - a) Cloning of *Lactobacillus reuteri* GD
 - b) Over expression of GD in *Escherichia coli* and yeasts
 - c) Establishment of a supply of GD enzyme for prototype commercial process
 - d) Isolation of GD-producing microorganisms from ethanol plant thin stillage
- Converting glycerol into valuable products at a laboratory scale using GD
 - a) Characterization of recombinant GD
 - b) Development and evaluation of immobilized GD enzymes
 - c) Development of applications of GD in glycerol conversion from stillage and biodiesel residue
 - d) Conversion of glycerol to 1, 3-propanediol using thin stillage microbial isolates
- Developing methods for isolation of converted glycerol, products from the reaction mixture

Contact: Takuji Tanaka (306) 966-5350

Project number 2007-0185

Approval: \$327,000.00

INDUSTRIAL PRODUCTS FROM VEGETABLE OILS

Objectives:

- Develop industrial processes for improving both physical and chemical properties of vegetable oil based consumer and industrial non-food products and reduce the industrial processes to practice.
- Develop low conductivity oil for use in electrical transformers using flax oil as a starting material.
- Development of an oil with high oxidative stability and low pour point for use as a base oil in synthetic lubricants using an oil that has a low saturate content.

Contact: Martin Reaney (306) 280-7487

Department of Plant Sciences

51 Campus Drive, Saskatoon, SK S7N 5A8

Project number 2007-0014

Approved: \$22,000.00

INNOVATIVE TREATMENTS TO ENHANCE SKIN COLOUR AND REDUCE SCAB IN TABLE POTATOES

Objectives:

- To determine whether foliar application of non-toxic dosages of the herbicide 2,4 D and/or the plant growth regulator abscisic acid can be used to enhance the skin color of red-type potatoes, while also reducing the incidence of scab lesion on the tuber surface.
- Optimizing the rate and timing of application of these plant growth regulators.

Contact: Doug Waterer (306) 966-5350

Project number 2007-0015

Approved: \$112,500.00

AGRONOMIC PROGRAMS FOR NEWLY RELEASED POTATO VARIETIES SUITED FOR LOCAL CONSUMPTION AND/OR EXPORT SEED MARKETS

Objectives:

- Support continuation of the collaboration between the U of S, and the seed and table potato production sectors to evaluate newly developed potato lines for licensing and production in Saskatchewan.
- Support continuation of the collaboration between the U of S and the Saskatchewan Seed Potato Growers Association (SSPGA) in developing agronomic packages for new potato cultivars of interest to the SSPGA.

Contact: Doug Waterer (306) 966-5350

Project number 2007-0016

Approved: \$103,500.00

NEW VEGETABLE CROPS AND CULTIVARS ADAPTED TO SASKATCHEWAN GROWING CONDITIONS AND MARKET NEEDS

Objectives:

- Evaluate newly released cultivars of vegetable crops of commercial significance in Saskatchewan, comparing their field performance against presently recommended cultivars in replicated trials.
- Assess new cultivars for their vigor, yields, pest resistance, profitability and suitability to local and export market demands.
- Comparisons of cultivar performance across test years will allow Saskatchewan's vegetable growers to select the cultivars that are consistently suited to their location, production practices and changing market needs.

Contact: Doug Waterer (306) 966-5350

Project number 2007-0023

Approved: \$263,100.00

DEVELOPMENT OF HIGH OLEIC FLAX WITH ENHANCED OIL CONCENTRATION

Objectives:

- The development of breeding lines of flax seed with 70-80 per cent oleic acid.
- The development of flax breeding lines with 55 per cent oil dry weight in the seed.

Contact: Gordon Rowland (306) 966-8682

Project number 2007-0024

Approved: \$233,700.00

MINING OF CDC BETHUNE EST'S FOR THE DEVELOPMENT OF SEED SPECIFIC DNA MARKERS

Objectives:

- The identification and development of easily usable molecular markers for important seed coat characters of flax.

Contact: Gordon Rowland (306) 966-8682

Project number 2007-0025

Approved: \$190,000.00

RESISTANCE GENES AND MOLECULAR MARKERS FOR SPOT BLOTCH RESISTANCE COMBINED WITH NET BLOTCH RESISTANCE FOR SASKATCHEWAN BARLEY

Objectives:

- Identification of new sources of spot blotch resistance for Saskatchewan in domestic and international barley germplasm.
- Evaluate inheritance of spot blotch resistance in segregating barley populations and identification of resistance gene(s) and associated QTL (quantitative trait loci).
- Development of plant breeder-friendly PCR-based molecular markers linked to spot blotch resistance gene(s)/QTL for efficient molecular marker assisted selection (MMAS).
- Combine spot blotch and net blotch resistance gene(s)/QTL in locally adapted barley lines using

molecular markers.

- Field and Phytotron evaluation of newly developed barley lines for resistance to both diseases.

Contact: Brian Rossnagel (306) 778-7265

Project number 2007-0050

Approval: \$100,000.00

OFF-SEASON (WINTER) NURSERY FOR FLAX

Objectives:

- The growing, harvesting and return of seed from an off-season (winter) breeding nursery for flax. The seed of these lines will be evaluated to identify superior yielding lines for inclusion in a recurrent selection scheme for increased seed yield of flax.

Contact: Gordon Rowland (306) 966-8682

Project number 2007-0076

Approval: \$144,900.00

PRAIRIE FRUIT GENE BANK

Objectives:

- Preserve the diversity of fruit crops suitable for prairie growers, including verification of the correct identities with useful descriptions.
- Organize, catalog and maintain the collection in such a way that material (cuttings, seeds and budwood) can be made available for other researchers.
- Create a website that will facilitate the use of the Gene Bank and will make companies and the public aware of educational programs.
- Once the Prairie Fruit Gene Bank is set up, it is anticipated that greater co-operation will result with other institutions in Canada and internationally. We will be in a much better position to obtain future funding from other provinces, the federal government and non-profit groups.
- The Gene Bank will greatly enhance the fruit breeding efforts at the University of Saskatchewan. Fruit can be made available for research involving nutritional studies or creation of value-added products.

Contact: Bob Bors (306) 966-8583

Project number 2007-0077

Approval: \$98,186.00

ANALYSIS OF ALLELE DIVERSITY FOR IMPROVEMENT OF NUTRITIONAL PROFILE AND DISEASE RESISTANCE IN PEA

Objectives:

- To identify allele variations for candidate genes related to carbohydrate metabolism, protein deposition or resistance to ascochyta blight.
- To relate these variations with their phenotypic variations.
- Develop SNP markers as tools for assisted breeding to incorporate the diverse alleles into new pea cultivars adapted to Saskatchewan.

Contact: Tom Warkentin (306) 966-2371

Project number 2007-0086

Approval: \$123,750.00

UTILIZING NIR TECHNOLOGY TO EXPAND MARKETS FOR SASKATCHEWAN GROWN PEAS

Objectives:

- To assess pea samples by wet chemistry annually.
- To assess pea samples by NIR annually.
- To upgrade the NIR equations for six pea seed constituents annually.
- To assess pea samples using an in vitro assay to predict nutrient digestibility in hogs annually.
- To distribute the data from steps 1-3 to the members of Pulse Canada's Feed Pea Network, and other interested parties annually.
- To add data for protein and starch content of pea varieties to Varieties of Grain Crops, by the third year of the project.

Contact: Tom Warkentin (306) 966-2371

Project number 2007-0097

Approval: \$146,600.00

REDUCING PRODUCTION RISKS OF CHICKPEAS BY OPTIMIZING FUNGICIDE APPLICATIONS

Objectives:

- To investigate the effect of fungicide application timing and frequency on the control of ascochyta blight in the new generation of chickpea cultivars with partial resistance to *A. rabiei*
- To compare the efficacy of different fungicide rotations on ascochyta blight control.

Contact: Sabine Banniza (306) 966-8682

Project number 2007-0109

Approval: \$238,520.00

DESIGNER CEREAL GRAINS FOR THE BIOFUELS INDUSTRY

Objectives:

- Breed high yielding, high starch wheats (soft/hard) with yield potential 20-30% over AC Superb with a 2% reduction in protein and 1.5% increase in starch for targeted registration into the General Purpose wheat class.
- Incorporate major pest resistance genes (leaf rust/fusarium head blight/wheat midge) and full waxy-starch properties into high yielding soft white wheats.
- Evaluate the potential of “waxy”-wheat to reduce ethanol fermentation time and evaluate genetic variation for non-starch polysaccharides as a means to reduce ethanol mash viscosity.
- Identify variation for total phosphorus and phytic acid content in wheat grain, with the longer term objective of developing wheat varieties with decreased total phosphorus and in bio-available form.

Contact: Curtis Pozniak (306) 966-8667

Project number 2007-0124

Approval: \$262,244.00

MINING THE PULSE SEED COAT FOR DIETARY BENEFITS AND ECONOMIC ADVANTAGES

Objectives:

- Screen agronomically-superior pulse cultivars (dry bean, faba bean and field pea), that are grown in Saskatchewan, for their functional food profile, as defined under the Context section.
- Use the phytochemical profile of targeted secondary metabolites that naturally accumulate in the seed coats to identify pulse crops that strongly express functional food attributes.
- Develop a biochemical catalogue of pulse seed coats that reflect their functional food profile, together with the variability of the trait as determined by different classes within each species.

Contact: Kristin Bett (306) 966-5350

Project number 2007-0186

Approval: \$142,575.00

GENETIC IMPROVEMENT OF BIOAVAILABLE SELENIUM CONTENT IN LENTIL SEEDS

Objectives:

- Determine the genetic and environmental distribution of selenium content of lentils grown in 14 key lentil growing regions of the world and compare this information to Saskatchewan grown lentils;
- Determine the average selenium content of lentils delivered to selected commercial cleaning and exporting plants across the main lentil growing regions of Saskatchewan.
- Determine the range of differential selenium uptake for a wide range of lentil genotypes considered to be cornerstones of future genetic improvement in the CDC breeding program.
- Determine the spatial variability of selenium content in high selenium soils in Saskatchewan.
- Determine the heritability of selenium uptake of lentil in Saskatchewan.
- Determine the bioavailability form and speciation of selenium in lentils using synchrotron techniques.

Contact: Albert Vendenberg (306) 966-5350

Project number 2007-0191

Approval: \$62,080.00

REDUCING SEED DORMANCY IN PRAIRIE CARNATION

Objectives:

- Know the physiological basis for dormancy in cow cockle. Based on an initial experiment we believe that cow cockle (and lines derived from wild populations) has a high level of seed dormancy. This dormancy seems to be controlled by light, soil moisture and temperature.
- Know the influence of genotype and selection on dormancy in cow cockle. We will assay at least three and up to five different seed sources, including wild cow cockle seed, "semi-domestic seed" (wild seed that has been re-grown for several years at Scott) and Prairie Carnation (which was selected from semi-domesticated seed from Scott). Based on an initial experiment, we know that although the dormancy is somewhat reduced in the semi-domesticated seed, there is still a large proportion of seed which does have secondary dormancy.

Contact: Steven Shirliffe (306) 966-4959

Project number 2007-0192

Approval: \$68,780.00

THE BIOLOGY AND CONTROL OF WHITE COCKLE

Objectives:

- Better understand the biology and ecology of white cockle so that control can be more effective.
 - a) Understand the risk of invasion posed by individual white cockle plants on a given field
 - b) Understand the population dynamics of white cockle persistence in no-till production
- Screen herbicides for pre-seeding, in-crop and pre-harvest control.
 - a) Develop herbicide recommendations for the most promising candidates
 - b) Provide data to support herbicide registrations, either directly or via Minor Use Registration.

Contact: Steven Shirliffe (306) 966-4959

Project number 2007-0010

Approved: \$492,800.00

CANARYSEED HYBRIDIZATION PROTOCOL, DISEASE RESISTANCE AND DNA MARKER DEVELOPMENT

Objectives:

- Develop gametocide-based crossing protocols based on the use of Surf-Excel detergent.
- Evaluate interspecific canary seed lines for leaf mottle resistance and backcross resistance to elite breeding lines.
- Identify molecular markers (SSRs) that are polymorphic in canary seed for hybridity testing and mapping purposes.

Contact: Pierre Hucl (306) 966-5350

Project number 2007-0011

Approved: \$103,860.00

EVALUATION OF HIGH-PIGMENT CONTENT WHEAT FOR ANTIOXIDANT POTENTIAL

Objectives:

- To quantify the antioxidant properties of wheat lines selected for elevated anthocyanin levels.
- To generate the required agronomic and disease reaction data packages required for cultivar registration.
- To combine the high anthocyanin trait with another key pigment in wheat: lutein.

Contact: Pierre Hucl (306) 966-5350

Department of Soil Sciences

51 Campus Drive, Saskatoon, SK S7N 5A8

Project number 2007-0020

Approved: \$28,400.00

POTENTIAL FOR USING BIOFUEL, CROP AND ANIMAL PROCESSING BY-PRODUCTS AS SOIL AMENDMENTS TO INCREASE FERTILITY

Objectives:

- To provide basic information on how the land application of processing by-products, including wet distillers grain, glycerin and canola meal protein extraction by-product, influences soil conditions and plant growth in Saskatchewan soils. If product is available, a small trial with gasified animal processing by-product (ash) would also be included.

Contact: Jeff Schoenau (306) 966-5350

Project number 2007-0039

Approval: \$106,648.00

SOIL ACTIVITY OF P SOLUBILIZING MICROORGANISMS

Objectives:

- Evaluate the effectiveness of single inoculation and co-inoculation with Jumpstart and Arbuscular Mycorrhizal Fungi (AMF) on phosphorus (and nitrogen) uptake in a cereal, a pulse and a Brassica species.
- Evaluate the competitiveness of the inocula (Jumpstart and AMF) in soils with high (select organically managed soil) and low (select conventionally managed soil) inherent microbial activities.
- Evaluate inoculation of plant species in rotation on subsequent levels of inocula in the soil.

Contact: J. Knight (306) 966-2703

Project number 2007-0084

Approval: \$32,000.00

EVALUATION OF RHIZOBIUM TRANSCONJUGANTS FOR THE POSSIBILITY OF N₂-FIXATION IN NON-LEGUMES

Objectives:

- Evaluate select Rhizobium transconjugants for viability, the ability to infect root systems of the non-legume target plants (wheat, barley, and canola), form nodules, and fix atmospheric N₂.

Contact: Richard Farrell (306) 280-7487

Department of Geography

9 Campus Drive, Saskatoon, SK S7N 5A8

Project number 2007-0083

Approval: \$148,959.00

LAND USE AND WETLAND DRAINAGE EFFECTS ON PRAIRIE WATER QUALITY

Objectives:

- Does wetland drainage result in changes in water quality constituent concentrations (e.g. nutrients, ions, bacteria) and loading to streams?
- To what extent is downstream water chemistry determined by wetland water quality?
- Does wetland drainage result in changes to ecosystem function as determined by macro invertebrate assemblages?

Contact: Cherie Westbrook (306) 966-1818

College of Engineering

Department of Agricultural and Bioresource Engineering

10 Research Drive, Saskatoon, SK S7N 5A9

Project number 2007-0013

Approved: \$110,079.12

AN INTEGRATED PROCESS FOR THE PRODUCTION OF XYLITOL AND BIOCOMPOSITES FROM LIGNOCELLULOSIC BIOMASS (OAT HULLS)

Objectives:

- To determine the kinetics of dilute acid hydrolysis of hemicellulose fraction of the lignocellulosic biomass (oat hull) under agitated and non-agitated conditions.
- To determine the effect of parameters on kinetic constants and activation energy in hydrolysis process of hemicellulose.
- To optimize the parameters for xylose extraction, such as acid concentration, duration of hydrolysis process and agitation speed in the reactor.
- Co-application of over liming-carbonation with activated charcoal for medium detoxification with precipitated calcium carbonate (PCC) and study the morphology of the precipitate.
- To evaluate the performance of biocomposite-immobilized cell (biofilm) fermentation system in comparison to free cell system in xylitol production.
- To investigate xylitol production under different styles of aeration in free and immobilized cell methods of fermentation.
- To investigate the potential of phosphate buffers in controlling pH and on xylose to xylitol bioconversion efficiency.
- Mathematical modeling of the fermentation process based on the fermentation parameters in a concentrated medium.
- To investigate the performance of dilute acid-treated fiber (hydrolysis byproduct) and its lignin content on typical properties of thermoplastic-based biocomposites.

Contact: Lope Tabil (306) 966-5350

Project number 2007-0096

Approval: \$110,000.00

INFRARED TREATMENT ON FUNCTIONALITY OF RESISTANT STARCH IN FOOD APPLICATIONS

Objectives:

- To adapt/develop methodology for the determination of SDS and RS levels in, and sensory and functional characteristics of, locally-grown cereal grains (wheat, barley) and pulses (lentil, chickpea) subjected to hydrothermal treatment (micronization, microwave heating, high-temperature extrusion).
- To identify process conditions (micronization and microwave heating, singly and in combination, and high temperature extrusion; time, temperature, moisture) which result in maximum levels of SDS and RS in cereal grains and pulses while maintaining/developing satisfactory product sensory quality and functionality.
- To compare, on the basis of ultimate SDS and RS levels and sensory and functional characteristics, the relative suitability of hullless barley, waxy hullless barley, high amylase barley, wheat, soft white wheat, hard white wheat, lentil and chickpea as substrates for production of RS-enhanced ingredients by hydrothermal treatment.
- To evaluate selected products in actual food systems, e.g. bread, pasta, noodles, cookies, muffins, etc.
- To determine the glycemic response of selected products, if resources permit.

Contact: Venkatesh Meda (306) 966-5350

Project number 2007-0104

Approval: \$73,170.00

DEHUMIDIFICATION IN GREENHOUSES

Objectives:

- To develop and adapt one or more effective and economical dehumidification technologies and to test these technologies in commercial greenhouses in Saskatchewan.

Contact: Huiqing Guo (306) 966-5350

Project number 2007-0128

Approval: \$87,000.00

OPTIMIZATION OF DDG GASIFICATION

Objectives:

- To determine the optimum process conditions to convert wet and/or dried distiller's grain (WDG and/or DDG) from wheat ethanol production into additional ethanol, heat and electrical energy through gasification of the WDG and/or DDG to produce syngas.
- To determine the agronomical value of the resulting ash.

Contact: Terry Fonstad (306) 966-5350

Project number 2007-0129

Approval: \$194,500.00

GROUNDWATER CHEMISTRY BELOW MORTALITIES DISPOSAL SITES

Objectives:

- Investigation of the movement of ions from mass mortality burial sites.
- Installation of monitoring equipment at several mass mortality burial sites.
- Continued development of predictive capabilities in order to assess site suitability for mass mortality burial sites.

Contact: Terry Fonstad (306) 966-5350

Project number 2007-0147

Approval: \$107,400.00

FLAX OIL-BASED RESIN AND PLASTICIZER FOR BIODEGRADABLE AG-FIBRE-BASED COMPOSITES (PHASE I)

Objectives:

- Develop and optimize a process for developing a new flax oil based biodegradable resin and plasticizer.
- Evaluate the resin and the plasticizer properties.
- Use the resin as a binder matrix in a 100% biodegradable biocomposite.
- Produce plastic composites using this innovated resin as the binder matrix and flax and hemp fibers as reinforcement. Target up to 100% biodegradable composites. Evaluate the engineering and market performance of the biocomposite.
- Patent application for the resin and plasticizer will be submitted based on performance.

Contact: Satyanarayan Panigrahi (306) 966-5350

Western College of Veterinary Medicine

Large Animal and Clinical Sciences

52 Campus Drive, Saskatoon, SK S7N 5B4

Project number 2007-0107

Approval: \$50,940.00

IDENTIFICATION OF EFFECTIVE STRATEGIES FOR PRIORITIZING HAZARDS AND APPROPRIATE INTERVENTIONS IN THE CANADIAN SWINE INDUSTRY

Objectives:

- Provide a framework for prioritizing food safety pathogens from swine identified in the Canadian Quality Assurance Program® (CQA®) through the development, validation and implementation of research synthesis/translation tools for generating evidence-based risk profiles and through the development of a multi-criteria decision analysis tool for prioritizing food safety pathogens in swine. Prioritize identified key food safety pathogens using the developed tools.
- Identify and prioritize appropriate interventions for Salmonella, a priority food safety pathogen from swine. This will be undertaken utilizing transparent Evidence Synthesis/Translation (EST) and MCDA methods for ranking multiple farm-level interventions according to multiple relevant criteria (e.g. cost, practicality, etc.).

Contact: Sarah Parker (306) 966-5350

Project number 2007-0125

Approval: \$163,150.00

JOHNES DISEASE IN CALVES

Objectives:

- To determine the effect in neonatal calves of low dosages of oral K-10 MAP on key cell mediated immune responses (intra-dermal and interferon test results), and their relationship to immune protection against MAP in a challenge model.
- To use neonatal low dose oral vaccination with K-10 MAP, or BCG treatment as a strategy against subsequent infective high dose MAP challenge.
- To determine if intra-dermal skin testing with Purified Protein Derivatives and measurement of blood interferon gamma levels and IgG isotypes are useful in detecting chronic MAP infection both in experimentally infected calves and naturally infected calves in on-farm field situations.
- To determine if calfhood responses to intra-dermal PPDs, and blood interferon levels, and IgG isotype results relate to subsequent fecal shedding in adult cattle.

Contact: Claire E. Card (306) 966-7410

Project number 2007-0142

Approval: \$36,825.00

DOES BOVINE RESPIRATORY DISEASE TREATMENT STRATEGY INFLUENCE CHRONIC PNEUMONIA AND POLYARTHRITIS SYNDROME EXPRESSION?

Objectives:

- To determine if two particular management factors (injectable antimicrobial metaphylaxis at arrival in the feedlot and/or treatment management strategy) have an effect on the incidence of chronic pneumonia and polyarthritis syndrome (CPPS).

Contact: Steven Hendrick (306) 966-5350

University of Regina

College of Arts and Sciences, Department of Biology

Regina, SK S4S 0A2

Project number 2007-0195

Approval: \$129,150.00

MAINTAINING FOOD SAFETY BY PROTECTING IRRIGATION WATER FROM FECAL CONTAMINATION

Objectives:

- To increase food safety by ensuring irrigation water in Saskatchewan is protected from contamination by biological hazards.

Contact: Chris Yost (306) 525-5223

Project number 2007-0143

Approval: \$151,999.90

EVALUATING NEW SAINFOIN GERMPASM/ALFALFA MIXTURES TO ACHIEVE BLOAT-SAFE GRAZING

Objectives:

- Demonstrate and confirm the improved persistence of new sainfoin selections in mixtures with alfalfa under grazing or simulated grazing.
- Determine the impact of environmental differences (locations and years) on forage yield and forage quality of new sainfoin selections.
- Monitor cattle grazing mixtures of alfalfa with new sainfoin selections for bloat symptoms.

Contact: Alan Iwaasa (306) 778-7251

Other research organizations

Prairie Swine Centre

2105 – 8th Street East, Saskatoon, SK S7H 5N9

Project number 2007-0033

Approved: \$124,000.00

DETERMINING THE FLOOR SPACE REQUIREMENT FOR GROUP HOUSED SOWS

Objectives:

- To determine the space required to accommodate the postures of sows exhibited over a 24 hour period throughout the gestation period.
- To determine the amount of space required to decrease the aggression associated with group formation.
- To determine the amount of space required to accommodate normal behaviour patterns in sows after a stable social structure has been established.
- To determine if grouping sows with specific behavioural characteristics minimizes the aggression in group housing.

Contact: Harold Gonyou (306) 667-7443

Project number 2007-0081

Approval: \$115,460.80

DEVELOPMENT OF DIETS FOR LOW BIRTH-WEIGHT PIGLETS WHICH OPTIMIZE NET RETURNS TO THE PRODUCER

Objectives:

- Develop a phase 1 diet which improves survivability, viability and growth of the very light birth weight piglets.
- Develop a least cost diet which maintains adequate growth of the heavier birth weight piglets.
- Determine the appropriate birth weight to feed the complex or simple diet based on survivability and growth
- Use economic modeling to determine phase 1 diet cost efficiencies and define an optimum feeding program to maximize net returns.

Contact: Denise Beaulieu (306) 667-7444

Project number 2007-0082

Approval: \$189,400.00

IS GLUCOSE AN ESSENTIAL NUTRIENT FOR THE GROWING PIG?

Objectives:

- Determine the glucose requirement of growing pigs.
- Determine the inclusion level of starch requirement to meet the requirement for glucose.
- Determine if the inclusion of wheat DDGS into swine rations can be increased if starch is considered in the ration formulation.

Contact: Denise Beaulieu (306) 667-7444

Prairie Agricultural Machinery Institute (PAMI)

Western Beef Development Centre

Box 1900, Humboldt, SK S0K 2A0

Project number 2007-0155

Approval: \$207,900.00

B8-5-2 A COMPARISON OF POTENTIAL NUTRIENT EXPORT IN RUN-OFF FROM IN-FIELD VERSUS TRADITIONAL DRYLOT/YARD OVERWINTERING SYSTEMS

Objectives:

- To evaluate soil nutrient levels (phosphorous, nitrogen) pre- and post-management of winter feeding beef cows from wintering site landscapes.
- To document and compare potential movement of phosphorus, nitrogen and coliforms off-site in run-off water from in-field feeding (bale, swath, chaff grazing) to traditional drylot in-yard corral feeding.
- Develop management strategies to mitigate the impact of nutrients from beef cow wintering sites.

Contact: Bart Lardner (306) 682-3139

Project number 2007-0171

Approval: \$196,482.00

GRAIN MOISTURE MEASUREMENT BASED CONTROL SYSTEM FOR NATURAL AIR DRYING T-PS-1.5.A03.07

Objectives:

- Determine if the control and measurement strategy envisioned will work to measure grain moisture reliably in a bin and to determine the accuracy obtainable and drying control parameters.
- Develop simple software to correlate air humidity readings with grain moisture content in the bin from equilibrium moisture content curves and air temperature. Determine time, air flow, and temperature and humidity parameters to find the most accurate measurement parameters. Work towards a system that will integrate with a web-based control system.

- Test the measurement system on a full-sized natural air drying (NAD) bin through a drying cycle with grain sampling moisture content correlation.
- Use a computer and programmable controller to control a bin through a complete drying cycle and measure accuracy of control.

Contact: Phil Leduc (306) 682-5033 ext. 224

Agriculture and Agri-Food Canada

Box 1030 SPARC Swift Current, SK S9H 3X2

Project number 2007-0029

Approved: \$8,500.00

ECONOMICS AND ENERGY USE EFFICIENCY OF ALTERNATIVE CROPPING STRATEGIES FOR THE DARK BROWN SOIL ZONE OF SASKATCHEWAN

Objectives:

- To determine and compare the economic merits and non-renewable energy use efficiency of nine cropping systems, representing three levels of input usage (high, reduced, and organic), and three levels of cropping diversity (low crop diversity, diversified with annual grains, and diversified with annual grains and forages), over a 12-year period (1995-2006) for the Dark Brown soil zone of Saskatchewan.

Contact: Robert Zentner (306) 778-7265

Agriculture and Agri-Food Canada

P.O Box 1240, Melfort, SK S0E 1A0

Project number 2007-0092

Approval: \$231,321.00

AGRONOMIC AND QUALITY IMPACT OF MIDGE ON WHEAT

Objectives:

- Mimic seed production and resistance management practices, including farm-saved seed production to assess impact on varietal blend stability over generations of production and potential loss of midge resistance. Evaluate the change in frequency of plants with and without the midge resistance gene Sm1 in varietal blends grown in environments with and without the presence of wheat midge.
- To determine the agronomic value of midge resistance and protection of market grade.
- To study impact of the presence of midge resistance on end-use quality.

Contact: Cecil Vera (306) 752-2776

Agriculture and Agri-Food Canada

107 Science Place, Saskatoon, SK S7N 0X2

Project number 2007-0121

Approval: \$54,600.00

FUNGICIDE RESISTANCE IN POPULATIONS OF ASCOCHYTA RABIEI IN SASKATCHEWAN

Objectives:

- Collect isolates of *Ascochyta rabiei* from chickpea to represent the pathogen population in Saskatchewan.
- Assess the frequency and distribution of strobilurin fungicide resistance in these isolates.
- Develop baseline values of efficacy for the new classes of fungicides that have been registered for management of ascochyta blight on chickpea.
- Assess registered protectant fungicides to ensure that they are still efficacious.

Contact: Bruce Gossen (306) 956-7259

Agriculture and Agri-Food Canada

Box 10, Scott Research Farm, Scott, SK S0K 4A0

Project number 2007-0130

Approval: \$104,000.00

AGRONOMY OF BRASSICA CARINATA AND CAMELINA SATIVA

Objectives:

- To develop basic agronomic practices for optimal production of Camelina sativa and Brassica carinata.
- To develop recommendations to producers for production of Camelina sativa and Brassica carinata.

Contact: Eric Johnson (306) 247-2011

Vaccine and Infectious Disease Organization (VIDO)

120 Veterinary Road, Saskatoon, SK S7N 5E3

Project number 2007-0037

Approval: \$100,750.00

GENETICALLY ENGINEERED REPLICATION-DEFECTIVE PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS VACCINE CANDIDATE

Objectives:

- Deletion of the N gene (also known as ORF7 gene) in the infectious cDNA clone of a North American PRRSV isolate.
- Establishment of a complementing cell line and rescue of the N-gene deleted PRRSV.
- Characterization of in vitro growth of the N-gene deleted PRRSV and its genetic stability.
- Evaluation of immunogenicity, safety and protective efficacy of the N-gene deleted PRRSV vaccine in pigs.

Contact: Alexander Zakhartchouk (306) 966-1511

Project number 2007-0004

Approved: \$232,913.80

USE OF NOVEL ADJUVANTS FOR VACCINES AGAINST MYCOLASMA BOVIS

Objectives:

- To test, in vitro, the synergy of two novel vaccine adjuvants, AMP and CpG oligonucleotides
 - A. Determine if CpG will enhance the activation of CPCMC (bovine peripheral blood cells) when incubated with AMPs.
 - B. Determine if AMPs and/or CpG can overcome the suppression of BPBMC immune functions caused by M. bovis.
- Assess immune responses of beef calves to combinations of AMP-GAPDH + CpG
- Develop an M. bovis co-infection model relevant to the feedlot industry.
- Assess the efficacy of experimental vaccines in beef calves exposed to a relevant and rigorous challenge with combinations of M bovis, BVDV and BHV-1.

Contact: Jose Perez-Casal (306) 966-1511

Project number 2007-0045

Approval: \$150,000.00

DEVELOPMENT OF LIVE VIRAL VECTORED VACCINES FOR POULTRY

Objectives:

- Identify non-essential regions of turkey adenovirus (TAdV) genome for foreign gene insertion.
- Construct recombinant TAdV expressing poultry vaccine antigens.
- Evaluate the efficiency of recombinant TAdV to induce protective immune responses in poultry.

Contact: Suresh Tikoo (306) 966-1511

Project number 2007-0041

Approval: \$160,438.00

**PATHOGENESIS AND CONTROL OF MYCOBACTERIUM AVIUM SUBSPECIES
PARATUBERCULOSIS**

Objectives:

- Determine the response (genomic, proteomic and kinomic) of ileal macrophages and peripheral blood mononuclear cells to infection with MAP. (Years 1 and 2).
- Determine the response (genomic, proteomic and kinomic) of calves to infection with MAP using an intestinal loop model (Year 2 and 3).
- Determine the ability of various immunomodulators to activate macrophages for MAP killing (Year 2 and 3).
- Determine if local immunization results in protection against MAP (Year 3).

Contact: Andrew Potter (306) 766-7484

Project number 2007-0098

Approval: \$189,329.00

**NOVEL VACCINATION STRATEGIES FOR INDUCTION OF LONG-TERM IMMUNE MEMORY AND
PROTECTION TO BOVINE RESPIRATORY DISEASE**

Objectives:

- To develop delivery methods for BVDV DNA-based vaccines that will lead to enhanced and/or prolonged antigen production.
- To formulate BVDV DNA-based vaccines with defensins, also called host defense peptides, to recruit and activate DCs at the vaccination site and thus optimize antigen uptake and presentation.
- To evaluate the optimal BVDV vaccine formulation and delivery method for induction of long-term immune memory and protection from BVDV.

Contact: Sylvia Van Den Hurk (306) 966-1559

National Research Council

110 Gymnasium Place, Saskatoon, SK S7N 0W9

Project number 2007-0063

Approval: \$415,541.00

DOUBLE HAPLOIDY FOR OAT

Objectives:

- To develop a microspore culture protocol for the production of haploid embryos or calli from oat (*Avena sativa*).
- Screen a number of germplasm sources and *Avena* species for microspore culture response.
- Select the most responsive genotypes and evaluate factors influencing microspore embryogenesis, including: donor plant conditions, pre-treatments, pollen grain developmental stage, media composition, and culture conditions.
- Regenerate plantlets from microspore-derived embryos or calli.
- Evaluate double haploids produced by the project in the field at Saskatoon.

Contact: Alison Ferrie (306) 975-6100