Summary of ADF Projects, 2013
Crops Research Funding

38 crop-related research projects	$6,494,634

Breakdown by Commodity

Cereals	$2,195,300
Oilseeds	$1,845,701
Pulses	$1,545,899
Other/General	$907,734

Breakdown by Organization

University of Saskatchewan	$4,017,841
Agriculture and Agri-Food Canada	$792,211
Flax Council of Canada	$500,000
Alliance Grain Traders	$250,000
Prairie Tide Chemicals	$304,500
Prairie Agriculture Machinery Institute	$267,618
Ecotech Research Ltd.	$91,315
Bioriginal Food and Science Corp.	$129,999
Saskatchewan Food Industry Development Centre	$75,000
Prairie Oat Growers Association	$66,150

Cereals

Obtaining High Wheat Yields While Maintaining Baking Quality
Objectives:

- To evaluate wheat lines under different fertilizer regimes in order to produce higher yields while maintaining protein and baking quality requirements; and
- To assist in providing scientific data to support reducing the protein requirements for the variety registration committee in wheat (Prairie Recommending Committee for Wheat, Rye and Triticale).

Funding: $200,950
Contact: Pierre Hucl, Crop Development Centre, (306) 966-8667

Effect of Wheat Quality on Low Sodium Bread Processing
Objectives:

The overall aim of this research project is to develop industry-ready strategies for combatting dough stickiness in the processing of low-sodium white breads, through the understanding of effects of wheat quality on water mobility within the gluten (dough) matrix. Specific objectives include:

- Re-evaluating quality tests for different wheat varieties using low-salt dough formulations, that is, substantially below the 2-per-cent industry standard;
- Investigating the effect of wheat variety, salt content, damaged starch level and the presence of pentosans on water mobility, dough rheology and dough stickiness;
- Investigating the performance of mediating ingredients to help control gluten hydration (fibre, glycols, etc.);
- Evaluating low-salt bread characteristics and scale-up of selected formulations (on the pilot scale) at Canada Bread's test facility;
- Making recommendations to the baking industry with respect to variety selection for low-sodium baked goods and strategies to combat dough stickiness; and
- Making recommendations to the Canadian Food Inspection Agency via the Wheat, Rye and Triticale Committee of the Prairie Grain Development Committee on standard practices for evaluating wheat quality for low-salt bread applications.

Funding: $111,000
Contact: Michael Nickerson, University of Saskatchewan, (306) 966-5030

Improving the Nutritional Value of Oats
Objectives:

- The project aims to improve the nutritional value of current oat varieties by increasing the level of water-soluble beta-glucan using molecular approaches. Beta-glucans are known to be associated with reducing cholesterol levels and the risk of cardiovascular diseases in humans.

Funding: $150,000
Contact: Xiao Qiu, University of Saskatchewan, (306) 966-2181

Development of a High-Tech Vision System to Assess Sprout Damage in Canadian Wheats
Objectives:

- The project aims to quantify sprout damage in wheat grain samples using rapid, efficient and portable state-of-the-art imaging system (high-tech machine vision system) in order to provide accurate grading of the wheat produced in Saskatchewan.

Funding: $125,506
Contact: Oon-Doo Baik, Engineering, University of Saskatchewan, (306) 966-5320

Developing Fusarium Head Blight-Tolerant Cereals through Genomics and In-Vitro Screening
Objectives:

- The project aims to expand the resources available to wheat breeders for Fusarium head blight-resistant variety development using laboratory-based screening techniques (immature spike cultures) and advanced molecular technologies such as ionizing mutagenesis and RNA sequence methods.

Funding: $218,831
Contact: Ravindra Chibbar, University of Saskatchewan, (306) 966-4969

Novel Strategies to Exploit High-Yield Potential for Wheat in Saskatchewan
Objectives:

- The project aims to improve wheat productivity in Western Canada by developing hybrid wheat varieties using conventional and high throughput genome sequencing approaches.

Funding: $742,864
Contact: Curtis Pozniak, Crop Development Centre, (306) 966-2361

Development of Adapted Canadian Wheat Lines with Modified Starch
Objectives:

- The project aims to identify wheat breeding lines with novel starch characteristics such as lines with higher natural sugar levels or “Sweet Wheat” that are better adapted to Western Canada using molecular approaches.

Funding: $129,999
Contact: Patricia Vrinten, Bioriginal Food and Science Corp., (306) 657-7309

Oats: Preventing Equine Disease
Objectives:

- Demonstrate that, at similar levels of starch intake, oats produce smaller disturbances in Lactobacilli spp., celluloytic bacteria, lactate-fermenting bacteria and selected pathogens of the hindgut in comparison to other starch sources.
- Demonstrate that, at similar levels of starch intake, the microbial community of oat-fed horses has a better functional capacity (ability to digest fiber) than the microbial community of horses fed other starch sources.

Funding: $66,150
Contact: Shawna Mathieson, Prairie Oat Growers Association, (306) 530-8545

Addressing the Challenges of Growing Canary Seed
Objectives:

The project aims to:

- Develop shorter canary seed cultivars that would improve harvest index and potentially increase yield stability of the crop in Western Canada;
- Evaluate the benefits of using fungicides to control Septoria leaf mottle disease in canary seed; and
- Add molecular resources in canary seed to assist breeders in early selection of potential breeding lines.

Funding: $450,000
Contact: Pierre Hucl, Crop Development Centre, (306) 966-8667

Oilseeds

Emergence Timing and Management of Cleavers in Saskatchewan Canola Crops
Objectives:

The project aims to:

- Identify cleaver weed populations that have tolerance to herbicides (glufosinate and glyphosate) in Saskatchewan;
- Determine timing of germination and emergence of cleavers for practical management of the weeds by the growers; and
- Provide new herbicide options for cleavers control to reduce yield losses in canola.

Funding: $57,594
Contact: Christian Willenborg, University of Saskatchewan, (306) 966-8354

Adding Value to Flax Peptides
Objectives:

Examine how flax cyclolinopeptides interact with visible light and biological systems by developing standardized peptide mixtures and examining potential peptide interactions with:

- Cancerous and normal cell lines as anti-cancer agents;
- Photolabelling technology to generate peptide mixtures used in photodynamic therapy;
- Novel technology utilizing peptides as drug carriers; and
- Photovoltaic technology to generate solar harvesting complexes using peptides.

Funding: $359,000
Contact: Martin Reaney, University of Saskatchewan, (306) 966-5027

Development of a Pollination Control System in Ethiopian Mustard
Objectives:

- The project aims to improve the yields of the potential Ethiopian mustard (Brassica carinata) hybrids to meet market standards and to promote better adaptability to Saskatchewan growing conditions.

Funding: $85,882
Contact: Kevin Falk, Agriculture and Agri-Food Canada, (306) 956-7614

Expression QTL Mapping of Canola Resistance to Blackleg
Objectives:

The main objectives of this research are to:

- Identify blackleg resistance genes in canola, which are highly durable over multiple years and locations in Saskatchewan and Western Canada.
- Develop molecular markers for use in early selection of blackleg-resistant canola breeding lines.
- Use molecular approaches to understand the different defence mechanisms of resistant genes controlling the blackleg disease in canola.

Funding: $160,121
Contact: Hossein Borhan, Agriculture and Agri-Food Canada, (306) 956-2827

Developing Unique Herbicide-Tolerant Canola Germplasms
Objectives:

- The project addresses the lack of weed management options in mustards and is trying to find solutions in both Carinata and Juncea canola by screening of a large mutagenized population for tolerance to different herbicides under both greenhouse and laboratory conditions.

Funding: $187,000
Contact: Eric Johnson, Agriculture and Agri-Food Canada, (306) 247-2011

Extent of Infestation and Potential for Eradication of Clubroot at Sites in Saskatchewan
Objectives:

- The project will help researchers gain further understanding of clubroot disease in canola under various soil depths. This may lead to the development of new control measures as well as assess the feasibility of using soil fumigants to reclaim clubroot-affected areas.

Funding: $86,604
Contact: Bruce Gossen, Agriculture and Agri-Food Canada, (306) 956-7259

Developing Sunflower Hybrids for Saskatchewan with Improved Oil Profiles
Objectives:

The overall project objective is to:

- Evaluate sunflower hybrids developed by United States sunflower breeders under Saskatchewan growing conditions to match the oil quality demanded by the processing industry; and
- Identify high-yielding sunflower varieties better suited to Saskatchewan.

Funding: $105,000
Contact: William May, Agriculture and Agri-Food Canada, (306) 695-5225

Development of Non-Genetically Modified Herbicide-Tolerant Flax
Objectives:

- The proposed research aims to accelerate the development and acceptability of non-genetically modified herbicide-glyphosate tolerant flax in Western Canada.

Funding: $500,000
Contact: Kelley Fitzpatrick, Flax Council of Canada, (204) 982-2115

Total Nutraceutical Recovery from Flax
Objectives:

This project's overall goal is to develop a complete intellectual property portfolio that will enable PTC to take a lead in commercialization of natural health products from flax and will be accomplished by:

- Comparing mucilage, lignan, cyclolinopeptide, oil, protein, and omega-three fatty acid yield, composition, and functionality of approved cultivars in Western Canada; and
- Developing pilot methods to sequentially recover mucilage, lignan, cyclolinopeptides, oil, and omega-three fatty acid from flaxseed.

Funding: $304,500
Contact: Martin Reaney, Prairie Tide Chemicals, (306) 290-4960

Pulses

Design of a Commercial Process for Producing Chickpea and Lentil Byproducts

Objectives:

The overall aim of this project is to scale-up benchtop protein isolate protocols to a commercial wet extraction process for chickpea and lentil. Specific objectives include:

- Refining a benchtop extraction process to optimize yield and extraction efficiencies;
- Identifying suitable spray drying conditions;
- Scaling-up protein isolate production to the pilot plant level;
- Characterizing the physical, chemical and functional properties of the end commercial spray-dried products;
- Determining mass balance and energy requirements for the process; and
- Producing product samples for further testing in-house or with prospective companies.

Funding: $114,000
Contact: Michael Nickerson, University of Saskatchewan, (306) 966-5030

Genetic Analysis for the Improvement of Assisted Selection in Chickpea

Objectives:

The project aims to:

- Examine the genetic variation of existing resistance genes controlling ascochyta blight resistance and understand their defence mechanism using the latest molecular approaches such as DNA sequencing; and
- Identify new genes responsible for conferring resistance to ascochyta blight using genetically diverse chickpea population and genome-wide association mapping.

Funding: $142,678
Contact: Bunyamin Taran, Crop Development Centre, (306) 966-2130

Development of Genetic Markers for Blight Resistance in Pea

Objectives:

- The project aims to use the latest molecular genomics resources to fine-tune the identification of genes related to mycosphaerella disease resistance in peas.

Funding: $53,677
Contact: Tom Warkentin, Crop Development Centre, (306) 966-2371

Development of nanoemulsion Technology in Pulse Crops
Objectives:

This project seeks to complete pilot–scale work using nanoemulsion technology developed by the SRP Proteins Chair. Specific objectives include:

- Optimization of the interfacial properties of lentil, pea, and chickpea proteins for use in nanoemulsion formation and stabilization;
- Development of pulse protein-stabilized, food-grade, oil-in-water nanoemulsions, loaded with lipophilic bioactive ingredients;
- Assessment of stability of entrapped bioactive ingredients in nanoemulsions as a function of storage time, thermal fluctuation and changes in the solution properties;
- Optimization of release behaviour of nanoemulsion-encapsulated bioactive ingredients using in-vitro digestion studies;
- Development of prototype functional food beverage, based on pulse protein-stabilized nanoemulsions and evaluation of stability and release of bioactives over time;
- Test the versatility of this technology in feed applications (i.e., formulation and post-production stability of the feeds infused with nanoemulsions); and
- Economic evaluation of nanoemulsion production.

Funding: $195,000
Contact: Supratim Ghosh, University of Saskatchewan, (306) 966-2555

Assessment of Fungicide Effects on Pulse Crops in Saskatchewan
Objectives:

- Provide valid and independent research on the use and benefits of strobilurin fungicides such as Headline and Quadris in pulses; and
- Help make proper recommendations for using these products in order to prevent development of insensitivity against diseases such as ascochyta, mycosphaerella and colletotrichum diseases in pulses.

Funding: $73,373
Contact: Sabine Banniza, Crop Development Centre, (306) 966-4959

Generating Multiple-Fungal Disease Resistance in Lentil: Can we Score a Hat Trick?
Objectives:

- The project aims to use the latest genomics approaches to identify genes conferring resistance to all three major diseases in lentils: anthracnose, ascochyta and stemphyllium.

Funding: $137,662
Contact: Sabine Banniza, Crop Development Centre, (306) 966-4959

Genetic Improvement for Stress Tolerance in Common Bean
Objectives:

- The project aims to develop genetic improvement of common beans by transferring drought-, heat- and cold-tolerant genes from Tepary beans using both conventional and molecular breeding approaches.

Funding: $78,765
Contact: Kirstin Bett, University of Saskatchewan, (306) 966-4947

Use of Pea Starch as a Stock in Liquid Sucrose and Fructose Syrup Production
Objectives:

The objective of this research is to investigate the utilization properties of pea starch as a stock in liquid sucrose and fructose production.
Specific objectives are to:

- Develop the benchtop model and processing technology for liquid sucrose and liquid fructose production from pea starch;
- Characterize and economically analyze the feasibility of the use of pea starch as a stock for liquid sucrose and liquid fructose production;
- Develop the pilot model which can be benchmarked for full-scale production; and
- Test the liquid sucrose and fructose products in model food systems and validate the product quality.

Funding: $250,000
Contact: Mehmet Tulbek, Alliance Grain Traders (306) 244-5622

To Enhance the Nutritional Quality and Value of Field Peas as Feed through Processing applications
Objectives:

Develop and evaluate a dual-stream technology to improve nutritive value of steam flaked field pea for ruminants and monogastrics by:

- Optimizing rumen fermentation of processed steam flaked peas;
- Evaluating feed value of ground steam flaked peas;
- Providing an alternative use for lower-quality peas; and
- Increasing competitiveness of Canadian field peas.

Funding: $52,500
Contact: Bernard Laarveld, University of Saskatchewan, (306) 966-4972

Effect of Genetics and the Environment on the Quality and Utilization of Faba Beans
Objectives:

The goal of this project is to examine how genetics and environment affect quality and utilization of faba bean protein concentrates. Specific objectives include:

- Developing processing technologies for generating faba bean protein concentrates;
- Characterizing physical, chemical, and functional properties of concentrate isolated from a variety of cultivars; and
- Testing the performance of a select number of concentrates in various food model products.

Funding: $113,500
Contact: Michael Nickerson, University of Saskatchewan, (306) 966-5030

Evaluating Rhizobia Strains for Nitrogen Fixation in Faba Beans
Objectives:

- Evaluate rhizobia strains from the USDA collection and the local isolates from native legumes for effective nodulation of selected faba bean cultivars.
- Compare the nitrogen-fixation ability of the best selected faba bean strains to three commercial pea/lentil innoculants.

Funding: $80,570
Contact: Diane Knight, University of Saskatchewan, (306) 966-2703

Biochar and Soil Microorganism Analysis in Pulse Crops
Objectives:

- Explore whether biochar can be used as an alternative carrier for effectively delivering rhizobia in pulse crop inoculants.

Funding: $86,570
Contact: Diane Knight, University of Saskatchewan, (306) 966-2703

Development of a Highly Reliable Biofertilizer for Pulse–Based Rotations
Objectives:

- Increase the productivity and nutrient efficiency of pea, lentil or chickpea by bringing to commercialization the newly-discovered rhizobacteria in pulse crops oxidizes H2 and promotes plant growth.

Funding: $167,604
Contact: Chantal Hamel, Agriculture and Agri-Food Canada, (306) 778-7264

General

Transformation of Seed-Placed Sulfur Fertilizers in Saskatchewan Soils
Objectives:

- Determine the forms (species) and plant availability of sulfur fertilizer after application to two Saskatchewan soils;
- Assess the interaction of sulfur placed in the soil in a band together with phosphorus fertilizer; and
- Develop methodology using SCRMB beamline at the Canadian Light Source Synchrotron for studying the forms and fate of sulfur fertilizers in soil.

Funding: $41,822
Contact: Jeff Schoenau, University of Saskatchewan, (306) 966-6844

Evaluation/Demonstration of New Biopesticides for Use in Stored Potatoes
Objectives:

- Compare and demonstrate the relative efficacy of the new biopesticides relative to standard agrichemicals as a means of managing sprouting and controlling diseases in stored seed and table potatoes.

Funding: $36,000
Contact: Doug Waterer, University of Saskatchewan, (306) 966-5860

Improving Weed Management for Saskatchewan Growers (Renewal of ADF Project 20080040)
Objectives:

- To provide valuable and unbiased information on weed control options and herbicide efficacy data to producers/government agrologists/private industry crop advisors for profitable crop production in Saskatchewan.
- Assist in the maintenance of the weed research program at the University of Saskatchewan and leverage funding from producer groups and private sector to develop viable herbicide solutions for the crop industry.

Funding: $290,979
Contact: Christian Willenborg, University of Saskatchewan, (306) 966-8354

Production of Electricity and Liquid Fuels with Biomass

Objectives:

The overall goal of this project is to further develop torrefaction (biomass densification) technology by:

- Determining combustion and gasification characteristics of Saskatchewan biomass;
- Improving consistency is biomass torrefaction systems;
- Enhancing control of systems; and
- Evaluating pretreatment methods on each feedstock to optimize torrefaction.

Funding: $105,000
Contact: Richard Evitts, University of Saskatchewan, (306) 966-4766

Effect of the Extrusion-Cooking Process on Crop Pathogens

Objectives:

The objectives of this project are:

- To determine if the combined effect of temperature, pressure and shear during extrusion of a high-moisture protein product is sufficient to remove potential pathogens from the extrudate; and
- To optimize extrusion parameters to combine product quality (texture characteristics) and food safety (destruction of microorganisms).

Funding: $75,000
Contact: Shannon Hood-Niefer, Saskatchewan Food Industry Development Centre, (306) 964-1819

Improving the Accuracy of Soil Conductivity Measurements

Objectives:

- Develop correction factors and/or formulas for soil salinity measurements in laboratory tests and with electromagnetic equipment in-field to provide accuracy in salinity mapping used for precision agriculture applications.

Funding: $91,315
Contact: Evan Morris, Ecotech Research Ltd., (306) 352-2468

Expanded Operating Trials Using the Solid State Anaerobic Digester Pilot Plant
Objectives:
Specific project objectives are to:

- Assess performance of pilot-scale solid state digester using a variety of feedstocks including solid feedlot manure, wet distiller's grains, deadstock, and cull potatoes;
- Assess fertilizer value of digested material;
- Evaluate effect of operating parameters (feedstock, temperature, mixing) on biogas production;
- Complete an economic and feasibility analysis of full-scale anaerobic digesters; and
- Demonstrate conversion of biogas to useful energy using a combined heat/power or microturbine unit (funded by SaskPower).

Funding: $267,618
Contact: Joy Agnew, Prairie Agricultural Machinery Institute, (306) 682-5033 Ext.280