

Summaries for Funded Research Project at Montana State University for FY 2007

Title: A Strategic Matching Investment in Agricultural Research Centers for Small Grains Research in Montana

Principal Investigator: Dr. Jeff Jacobsen, Director

Amount Funded: \$267,300

Objectives:

- Provide Agricultural Research Center personnel with resources to replace aging equipment and/or expand wheat and barley research capabilities.

Results: (as of 13 Feb. 2007)

The Montana Agricultural Experiment Station, the Department of Research Centers, and the individual Research Centers identified in this grant collaborated to identify resources that provided more than a full match on the awarded funds. With an award of \$267,300 from MWBC, we were able to purchase \$557,800 worth of much-needed equipment for the Research Centers. All of the pieces of equipment identified for purchase under this grant are either purchased and on-site, ordered and awaiting delivery, or, in one case, in the process of being negotiated with the manufacturer.

Summary: (*as of 13 Feb. 2007*)

The funds awarded in this grant provided an opportunity to address top-priority equipment needs at six of the MAES Agricultural Research Centers. Match from other sources doubled the value of the grant in terms of equipment purchased.

Title: Evaluation of Various Materials and Practices Contributing Toward Economic Crop Production Under Flexible, Continuous and Other Cropping Systems in Montana

Principal Investigator: Superintendents of Research Centers

Amount Funded: \$108,000

Objectives:

- To evaluate the effects of differing systems on crop and variety performance under diverse environments represented across the Montana Agricultural Experiment Station – Research Center network.
- To evaluate the potential fit of other materials, concepts and techniques with various cropping systems employed.

Summary:

See <http://www.sarc.montana.edu/mwbc/> for full report.

Title: Winter Wheat Breeding/Genetics

Principal Investigator: Phil Bruckner

Amount Funded: \$70,000

Objectives:

- Develop improved cultivars of winter wheat adapted to Montana climatic conditions and cropping systems, which possess superior on-farm production characteristics (grain

yield, winter hardiness, adequate and durable pest resistance, stress tolerance, agronomic characteristics) and superior end-use quality characteristics.

- Isolate, as much as possible, our foreign wheat customers from variations in wheat quality performance by development and release of suitable cultivars and production research to develop strategies to maximize quality consistency for wheat produced in Montana.
- Investigate environmental, genetic, and management factors which influence wheat productivity and end-use in Montana including 2006 projects: feasibility of combining low polyphenol oxidase (PPO) and high grain protein in wheat; and field verification of molecular markers for backcross transfer of stem solidness into elite lines.
- Coordinate Montana Statewide winter wheat variety testing program and provide long-term performance data necessary for cultivar release decisions, variety recommendations, and producer management decisions.

Summary: *(as of 13 Feb. 2007)*

Progress has been made in winter wheat cultivar development. Yellowstone and three improved Clearfield winter wheat cultivars were released in 2005. Yellowstone represents the highest-yielding winter wheat line ever developed at MSU. The cultivar has also yielded well in North Dakota and Idaho trials. Our program is exploring market-assisted selection technology to enhance efficiency of solid stem imidazolinone-tolerant cultivar development efforts. We are transitioning toward development of 2 gene-imidazolinone cultivars.

Title: Spring Wheat Breeding and Genetics

Principal Investigator: Luther Talbert

Amount Funded: \$70,000

Objectives:

- Develop spring wheat varieties for Montana producers
- Manage the variety testing program for Montana State University
- Conduct experiments to improve the efficiency of the breeding program

Summary: *(as of 21 Feb. 2007)*

A recent release from the Montana spring wheat breeding program is Choteau. Vida spring wheat was released in 2006, and is intended for dryland production areas. Vida has shown very good grain yield throughout the state. Foundation seed will be available to seed growers in 2007. We are incorporating longer green leaf duration into sawfly resistant strains. Additional crosses to develop hard white wheat varieties were conducted. Choteau spring wheat has found a place in sawfly infested areas of Montana. Vida spring wheat, with extended green leaf duration after heading, will be available to seed growers in 2007.

Title: Developing Improved Barley Varieties for Montana Farmers

Principal Investigator: Dr. Tom Blake

Amount Funded: \$60,000

Objectives:

- Develop, release and have adopted improved malt barley varieties

- Improve our understanding of the genetic bases of variation for quality and adaptation
- Lay the groundwork for improved drought tolerance in Montana-adapted germplasm

Summary: *(as of 13 Feb. 2007)*

The yield advantages of our recently-released feed barley varieties, Haxby and Eslick, over Harrington and Metcalfe should allow them to compete favorably with these Canadian imports. Our group of colleagues successfully located and marked genes controlling rate of rumenal fermentation, grain protein deposition, and grain hardness during the past five years. Moving these genes out of their ill-adapted genetic backgrounds into the improved Montana barley genetic base now available is the primary focus of the MSU-MAES barley improvement project. Our three new malting varieties, Craft, Hockett, and Geraldine, all out-perform Harrington. Craft will enter commercial production in 2007, with Hockett and Geraldine expected to enter commercial production in 2009 and 2008, respectively.

Our current focus is on the development of novel germplasm resources that will increase the frequency with which dryland barley makes malt grade and on a trait that we think will lead to fundamental improvement in barley quality.

Barley genetics took a huge leap forward this past year. A new genetic mapping technology was developed by colleagues in the US and Europe that permits rapid construction of high density maps, and our program is scheduled to be among the first users of this system. Through funding from our CSREES-supported Barley for Rural Development project we purchased a micro malting unit and several pieces of analytical equipment that will permit us to evaluate malting quality in our breeding lines. This funding is an important complement to the support we receive from the Montana Wheat and Barley Committee and the American Malting Barley Association.

Title: Breeding Between Market Classes of Wheat

Principal Investigator: Jaime D. Sherman

Amount Funded: \$40,000

Objectives:

- Use recently developed molecular markers to interconvert current spring and winter wheat varieties.
- Develop the tools to allow inter-conversion of red and white-seeded wheat breeding germplasm.
- Develop protocols for routine marker screening for spring and winter wheat.

Summary: *(as of 13 Feb. 2007)*

Using funding from the MWBC, we have been able to use a marker we developed for spring vs. winter habit to develop winter-habit versions of McNeal, Choteau, and Reeder; and spring-habit versions of Yellowstone, NuSky, and Paul. We have one more generation of selection in order to identify pure-breeding lines from this crossing project. Our goal is to have both spring- and winter-habit lines planted in the field in 2007 for initial agronomic evaluation. These newly developed lines will serve as a genetic bridge to allow the spring and winter wheat programs to share superior genes for yield and quality.

There will be several practical benefits of this research. First, we will create molecular markers so that breeding can occur easily between market classes. These markers will facilitate the movement of traits between market classes. We will develop sets of materials that will be used to determine if there are genetic causes for the differences in protein and

yield between spring and winter, and between red and white. Through this research we will determine the feasibility of variety improvement by breeding between market classes. The ability to rapidly convert between classes may help the breeders produce higher yielding spring wheats, higher protein winter wheats, and/or a high yielding, high protein white. This strategy may be particularly useful in the development of a yield-competitive hard white spring wheat for Montana.

Title: Monitoring and Redistribution of Wheat Stem Sawfly Parasitoids after Inoculative Establishment, Extension Catalyzed Implementation Program

Principal Investigator: David Weaver

Amount Funded: \$33,000

Objectives:

- To continue a pilot program of monitoring and making inoculative releases of braconid parasitoids in selected areas with a history of high levels of wheat stem sawfly damage.

Results: *(as of 13 Feb. 2007)*

As we have indicated in the past, the data we report includes samples that have been processed up to the final week that the report is due. Sample processing is not completed until the end of April, but before the end of the funding cycle in June. Overall patterns continue to show small, mostly insignificant fluctuations in numbers, with a few exceptions. An expected trend is the increase of sawfly populations with repeated planting of hollow stem wheat, with parasitoid increases lagging. Despite concerns this might raise, it is likely that the parasitoids are slowing these increases, benefiting the growers by having to return to solid stem varieties later than might otherwise occur.

Summary: *(as of 13 Feb. 2007)*

The data show that parasitoids are probably continuing to suppress the wheat stem sawfly at some locations. The results continue to support that parasitoids are an important but relatively unknown regulating factor that occurs naturally in wheat stem sawfly populations. The efforts undertaken with County Extension personnel were quite successful given the time demands these collaborators face. The ultimate goal of increasing the number of fields that have received parasitoids was successful. The participation was quite varied depending on the particular individual involved.

Title: Improved Quality of Montana Hard Red and Hard White Wheats

Principal Investigator: Deanna Nash

Amount Funded: \$30,000

Objectives:

- Evaluate end-use quality of hard red and hard white wheat lines developed by MSU spring and winter wheat breeding programs.
- Showcase Montana's newest varietal releases for visiting Trade Teams while they tour the Cereal Quality Lab (CQL) testing facilities.
- Participate in the milling and baking contests for the Central Montana Fair and the Chouteau County Fair.

- Promote Montana wheat quality by conducting tours and hands-on demonstrations through the Cereal Quality Lab to interested students, faculty and legislators.
- Participate in research projects, designed to determine ways to improve end-use quality parameters of new wheat varieties, by cooperating with Montana Agricultural Experiment Station researchers and producers as well as cooperating with the general public and industry to improve cereal quality.
- Refine extensibility testing methods in the CQL.

Results: *(as of 13 Feb. 2007)*

To date we have completed the expanded testing for ash in the spring wheat evaluations and we are approximately a quarter ways through the 2006 as evaluations for winter wheat. We have started polyphenol oxidase (PPO) testing on all spring and winter nurseries and expect to have completed all quality evaluation testing for spring and winter wheat by May 18, 2007.

We are in the process of conducting full mill and bake analyses on approximately 1700 of these 2006 lines grown across numerous locations in Montana. Data from the Cereal Quality Lab (CQL) along with agronomic data is used in making decisions regarding the recommendation for release. Additionally, the CQL participated in the milling and baking contests by milling and baking bread for the Chouteau County Fair in the summer of 2006 and at the 2007 Montana State Winter Fair. We processed a total of 75 samples and traveled to Fort Benton and to Lewistown to announce the winners of the contest and to talk to the participants.

Throughout the year the CQL has hosted numerous tours from Future Farmers of America (FFA) to visiting legislators. In an effort to promote Montana wheat quality and explain exactly what we do, we have conducted several hands-on demonstrations to educate faculty and students about Montana's wheats. We have participated in the Follow the Grain class, which is a crop production class, as well as the Field Crop Production class.

We participate in numerous research studies each year designed to test the influence of various genetic factors upon grain quality.

Refining our extensibility testing method is in progress.

Beyond our work with the MSU breeding programs, the CQL continues to cooperate with MAES researchers and the general public for addressing end-use quality attributes of experimental material. We actively participate in collaborations across the Pacific Northwest (PNW) in order to promote Montana wheat and to be contributing members in the society of wheat researchers.

Title: Follow the Grain – STUDENT SCHOLARSHIPS (Long-Term Funding)

Principal Investigator: David Buschena

Amount Funded: \$20,000

Objectives:

- To establish long-term funding for the course "Follow the Grain," AGEC 31. The funding will provide for a leadership-level commitment to initially establish a permanent endowment for student scholarships for this course, and will be more than matched by funding from industry and other sources. Once successful, this funding effort will provide student scholarships for students taking the course, or its successor, in perpetuity.

Title: Managing Root and Soil Health for Montana's Wheat

Principal Investigator: Dr. Alan T. Dyer

Amount Funded: \$14,000

Objectives:

- Amplify spring and winter wheat lines with resistances to Fusarium crown rot and root lesions nematodes (*Pratylenchus thornei* and *P. neglectus*)
- Evaluate the impacts root lesion nematodes (*Pratylenchus thornei* and *P. neglectus*) have on Montana's re-cropped wheat acreage.
- Determine the mycorrhizal fungal community composition in wheat plants of varying Fusarium crown rot severity.

Results: *(as of 13 Feb. 2007)*

Wheat lines with Fusarium crown rot and nematode resistances arrived in November of 2006 from the laboratory of Dr. Richard Smiley. These lines will be used for initial field screenings starting this spring along with the most popular spring wheat cultivars from Montana. To evaluate Montana's situation, a survey was conducted in 2006 to determine statewide distribution and population densities of root lesion nematodes (RLN). Of the 148 samples examined, 14% of the samples had RLN populations which exceeded the damage threshold of 2500 nematodes/kg of dry soil. High populations were primarily found in three counties: Chouteau, Fergus, and Cascade. Ranking in counties show that nematode populations centered on the "Golden Triangle" region of central Montana while populations from eastern Montana were considerably lower. No *Pratylenchus thornei* nematodes were found in Montana. This finding makes breeding efforts simpler by reducing the number of resistance genes that need to be incorporated in wheat lines.

The arbuscular mycorrhizal fungi (AMF) colonization of wheat roots was low at the Post Farm, averaging 12.4% (+-1.4 SE). There was no apparent relationship between severity of Fusarium crown rot (FCR) disease and degree of AM colonization. Due to the low AM colonization, the number of amplicons from polymerase chain reaction (PCR) was low. Thus, our ability to compare AMF communities between the two groups was limited, but the restriction fragment (RFLP) patterns indicate no strong divergence between healthy and diseased roots.

Our objectives were to research the relationships of FCR severity with AMF colonization and community composition in durum wheat. While we did not observe any apparent relationship, we cannot rule out that a relationship exists in soil with higher AMF abundance than that observed at the Post Farm. Future research should determine the underlying reasons for the low AMF abundance at the MSU research farm and potential losses of ecosystem services resulting from this low abundance. It is possible to manage agricultural systems to encourage mycorrhizal colonization, and a study at sites other than the Post Farm may enable us to find systems with higher AMF populations.

Title: Enhanced Field Selection for Wheat Stem Sawfly Resistance

Principal Investigator: Phil Bruckner

Amount Funded: \$14,000

Objectives:

- Subject early-generation segregating winter wheat bulk populations and derived lines to heavy selection pressure for wheat stem sawfly (WSS) resistance and select plant phenotypes resistant to WSS infestation and cutting damage.
- Evaluate spring and winter wheat cultivars and advance lines for resistance to infestation and cutting damage by WSS and for yield performance under heavy infestation by WSS.
- Provide a field site, representative of sawfly-infested production regions, for research and demonstration to producers of effective sawfly management strategies including use of resistant cultivars.

Summary: *(as of 13 Feb. 2007)*

Progress has been made in winter wheat cultivar development. Genou hard red winter wheat was released in 2004 and is increasing in acreage. Genou represents significant genetic improvement in yield potential and cold tolerance relative to Rampart. At north Havre we had high levels of sawfly infestation and cutting which made phenotypic selection for tolerance to sawfly quite effective in that tolerant genotypes were visually distinguishable from susceptible genotypes. Lines also were cut by wheat stem sawfly at Havre and usable resistance ratings were obtained. The ability to select for our primary breeding objective in environments where reasonable selection pressure for sawfly normally occurs has strengthened the Montana winter wheat cultivar development programs.

Title: Evaluation Winter Wheat Germplasm with Different Levels of Polyphenol Oxidase and Grain Protein for Noodle and Bread Quality

Principal Investigator: Phil Bruckner

Amount Funded: \$12,000

Objectives:

- Evaluate selection groups that represent high and low protein and high and low polyphenol oxidase for agronomic and bread and noodle quality.
- Use known DNA markers to screen winter wheat varieties and segregating populations for high and low polyphenol oxidase.

Summary: *(as of 13 Feb. 2007)*

Both Polyphenol Oxidase (PPO) activity and protein are known to affect noodle color characteristics. Our experiment is designed to determine the relative importance of each of these factors. The most noteworthy result was that selecting for low PPO reduced grain yield in one population, increased grain yield in a second, and had no effect in the third. These results suggest that the genetic mechanism affecting PPO activity and grain yield may not be entirely independent, and these mechanisms may be different in the three populations. The grain protein differences between high and low grain protein selection groups were, for the most part, maintained in this evaluation phase, although that

difference was less than in our initial selection groups. Generally, selecting for either PPO activity or protein in early generations had minimal effect on other agronomic traits.

We were able to differentiate high versus low PPO genotypes for two of the three populations using a DNA marker. The classification using DNA marker matches was obtained from measuring PPO over a two-year period in the populations we tested. This DNA marker will be useful for identifying low PPO genotypes in breeding programs because it measures true genetic differences and it is not affected by the environment.

Title: Herbicide Injury Potential to Montana Wheat Varieties

Principal Investigator: Bob Stougaard

Amount Funded: \$12,210

Objectives:

- Determine if wheat varieties differ in tolerance to recently developed herbicides, and assess herbicide effects on stem pith development.

Summary: *(as of 13 Feb. 2007)*

The extent of herbicide-induced crop injury varied by location, with herbicide damage being more apparent at Kalispell compared to Huntley. Silverado was generally more phytotoxic at Kalispell, while Everest caused the greatest injury at Huntley. However, there was general agreement between the two locations regarding cultivar susceptibility, with injury being most severe for Choteau. The effect of herbicides of stem solidness was minimal in 2006.

Title: Follow The Grain – COURSE ACTIVITIES (Producer Outreach)

Principal Investigator: David Buschena

Amount Funded: \$10,000

Objectives:

- To establish long-term funding for the course activities in "Follow the Grain," AgEcon. This funding will provide for a leadership-level commitment to establish initial funding for this course, and will be more than matched by funding from industry and other sources. Course activities include faculty travel, distance delivery systems, and in-state class travel expenses. Once successful, this funding effort will support the course, or its successor.

Title: Early Generation Durum Selection and Germplasm Improvement

Principal Investigator: Joyce Eckhoff

Amount Funded: \$10,000

Objectives:

- To produce improved durum germplasm for development of varieties for Montana producers
- To develop value-added characteristics in durum for manufacture of specialty products

Summary: *(as of 13 Feb. 2007)*

Durum production continues to increase in Montana and the Mondak region. This project is developing germplasm appropriate to Montana conditions using both conventional breeding methods and double-haploid technology. The germplasm is tested in each generation for agronomic and quality characters. The NIR will be calibrated to test for semolina color, and germplasm will be tested for this character in each generation, a solid stem program was initiated in 2005 with 86 solid-stemmed lines identified and crossed onto male sterile lines to establish a solid-stemmed population.

Title: Comparing Low and High Input Strategies in Diversified Cropping Systems

Principal Investigator: Perry Miller

Amount Funded: \$9,240

Objectives:

- Compare diversified no-till and organic cropping systems for crop productivity and quality and resource use efficiency.
- Compare low and high input strategies for crop productivity and quality and resource use efficiency.
- Provide a field laboratory to facilitate collaborative research and hands-on learning in diversified cropping systems.

Summary: *(as of 13 Feb. 2007)*

This rotation study has contributed importantly to the understanding of cropping systems principles in Montana.

1. Organic systems can be economically competitive during the transition phase, especially during drought, but may carry greater risk in the long term from difficult to manager weeds and from declining soil fertility status. Results from this research were critical to obtaining a large grant at MSU from a nationally competitive source to conduct research on major sources of long-term risk in organic systems, related to these and other issues.
2. The yield potential of winter wheat is greater than spring wheat under normal rainfall conditions. However, during drought years spring wheat yielded similar to winter wheat, likely because winter wheat failed to attain its yield potential.
3. Rotational benefits of pea are superior to canola due to soil N contribution and water conservation.
4. Sunflower yields remarkably well despite summer drought, where deep stored soil water is available. However, deep rooted crops like sunflower reduce subsequent yields for two or more years.
5. Continuous wheat is more costly to manage than wheat in a rotation but is capable of sustaining high levels of production.
6. High N fertility regimes produce greater cereal crop yields and protein content in normal rainfall years, but not during drought. The nitrogen use efficiency of moderate N regimes are much greater than high N regimes.

Further, these rotation studies have served as valuable field laboratories for undergraduate and graduate instruction and numerous outreach activities. Importantly, these rotation studies have also facilitated collaborative research in soil nutrient status (Clain Jones) and greenhouse gas emissions (Rick Engel).

Title: Wild Oat Control with Silverado and Osprey in Malt Barley

Principal Investigator: Steven R. King

Amount Funded: \$8,000

Objectives:

- Evaluate the control of wild oat in malt barley with the herbicides Silverado and Osprey in Montana. To determine the tolerance of malt barley to applications of the two herbicides applied alone or in combination with various small grain herbicides. This is the second year of a two year study. In this second year, I plan to repeat the study in order to confirm the preliminary results obtained in 2005.

Summary: *(as of 13 Feb. 2007)*

In both 2005 and 2006, Osprey applied alone at either rate (low and high) caused greater injury on barley than fenoxaprop applied alone at 21 and 56 days after treatment (DAT). In both years, wild oat was controlled between 85 and 94% at 21 DAT and between 89 and 98% at 56 DAT with applications of Osprey and Silverado. Regardless of rate, wild oat control with either formulation was similar to that provided by fenoxaprop at 56 DAT. In 2005 and 2006, barley yield was equivalent between treatments of Osprey and Silverado to that produced by fenoxaprop. No difference in the percentage of plump kernels occurred between treatments of Silverado and fenoxaprop. The percentage of plump kernels was reduced 6 to 7% with treatments containing Osprey compared to treatments containing Silverado. Overall, Silverado was effective for the control of wild oat in malt barley. Low levels of malt barley injury occurred with this treatment; however, barley successfully recovered by harvest, and yield and quality were equivalent to fenoxaprop.

Title: Evaluation of Small Grains for Ethanol Production

Principal Investigator: Joyce Eckhoff

Amount Funded: \$5,000

Objectives:

- To identify best available barley, spring wheat, winter wheat, and durum varieties and new experimental lines for starch content and ethanol production.

Summary: *(as of 13 Feb. 2007)*

Removing hulls from normal hulled feed and malt barley lines did not reduce starch yield per acre. Soft white spring wheat had higher percent starch than other types of small grain under both irrigated and dryland conditions. Higher yielding soft white wheats produced the greatest starch yield per acre.

Title: Emergence Patterns and Seedbank Dynamics of Four Common Annual Weeds in Small Grains

Principal Investigator: Fabian Menalled

Amount Funded: \$7,307

Objectives:

- Assess weed seedbank composition in representative small grain fields of Montana.

- Quantify seedbank dynamics in a spring wheat-fallow system with varying burial depth, seeding density, and row spacing.

Summary: *(as of 13 Feb. 2007)*

Results from this study indicated that while cropping systems impact seedbank abundance and composition, there is a large overall variability. Despite this variability, our manipulative study showed that 1) higher seedbank density results in lower percentage emergence, 2) smaller seeds tend to emerge at higher rates from surface planting, 3) emergence dynamic is affected by tillage, and 4) seed burial depth and crop sequence affects seed dormancy and decay rates. These observations can be useful to producers in making management and cropping decisions.

Title: Evaluation of Spring Wheat for Hessian Fly Infestation and Tolerance

Principal Investigator: Sue Blodgett

Amount Funded: \$4,675

Objectives:

- Rate 20 spring wheat varieties for Hessian fly and wheat jointworm infestation.
- Evaluate insecticide seed treatments and tillage for HF control.
- Determine Hessian fly seasonal occurrence and abundance in area spring wheat crops.

Summary: *(as of 21 Feb. 2007)*

Hessian fly adults prefer younger plant stages for egg lay and it appears that eggs were laid for a longer period in Montana spring wheat compared with winter wheat. However, some Hessian fly was observed infesting winter wheat fields adjacent to the Loma plot area in May and June 2006 (Blodgett & Wargo).

Varietal preferences by the Hessian fly for both Montana spring durum wheats could be used by Montana producers to manage Hessian fly.

Based on evaluations under cropping conditions at Loma in 2006, seed treatments did not appear to be an effective management tool for Hessian fly.

Title: Continuing as an Underwriter for MONTANA AG LIVE!

Principal Investigator: Jack Rieseeman

Amount Funded: \$2,500

Objectives:

- MONTANA AG LIVE! Underwriting will create three benefits for the Montana Wheat and Barley Committee:
- The Committee will receive significant public exposure at modest cost. Underwriters are listed monthly in the KUSM program guide, which is received by the 5500 members of Montana Public Television. In addition, underwriters receive on-air credits during each of the 16 weekly programs.
- The Committee will help to provide grain producers and agricultural businesses with timely and relevant answers to their questions in a cost-effective manner.

- The Committee will help interpret the day-to-day issues facing ag producers to non-ag audiences. Given the growing tensions in some sectors of Montana between producers and non-producers, a forum such as MONTANA AG LIVE!, where the needs of farmers are clarified and addressed, offers a rational atmosphere for increased public awareness.

Summary: *(as of 13 Feb. 2007)*

Since it first aired in 1994, Montana Ag Live has grown steadily in viewership and production/content quality. Now, our signal can be viewed in 150 Montana communities. The number of calls has increased from less than 10 to 90 a show. Due to viewer response, MontanaPBS will increase Montana Ag Live from airing sixteen times a year to sixty-four times a year.

Title: Ag Appreciation Weekend 2006

Principal Investigator: Dr. Jeff Jacobsen

Amount Funded: \$1,000

Objectives:

- Provide students in the College of Agriculture at Montana State University the opportunity to participate and represent MSU at regional and national contests, conferences, and other important events. The net proceeds of funds generated from Ag Appreciation Weekend (AAW) go to support student activities. In addition, the weekend showcases agriculture in Montana by inviting the public to events from Friday afternoon to Saturday evening.

Summary: *(as of 13 Feb. 2007)*

Ag Appreciation Weekend serves as a primary recognition and modest fundraising event for the College of Agriculture and student clubs/organizations. Sponsors are continually recognized throughout the Weekend and at other events throughout the year. Without a doubt, we have raised the awareness of agriculture's importance on campus and throughout the state. With donor support and through the activities of the Weekend, we highlight agriculture's impact on Montana and promote the College of Agriculture to agricultural industries, ag and consumer groups, parents, alumni and potential students (recruitment). The disappointing aspect of the Weekend was a continuation of the 2005 decline in student participation required to create an excellent experience.

Title: Near Infra Red (NIR) Equipment Grant Proposal

Principal Investigator: Deanna Nash

Amount Funded: \$33,000

Objectives:

- This is a request for matching funds to allow the Cereal Quality Lab (CQL) to purchase an additional NIR whole grain analyzer.

Results: *(as of 13 Feb. 2007)*

Our new NIR whole grain analyzer arrived in July 2006. With this new NIR instrument we were able to stay on top of protein analysis for the winter wheat breeding program especially and it allowed us to complete all protein analyses an entire month earlier than anticipated. This new NIR instrument has reduced the protein analysis bottleneck in the

Cereal Quality Lab. It improved the overall efficiency of protein testing in the lab in several ways. Fewer outlier readings have resulted in less additional work.