

Fall 2014

To subscribe please email: cgahrinfo@ars.usda.gov

Inside this issue:

Arthropod-Borne Animal Disease Research Unit

- Research Highlight.....2
- Meetings/Conferences.....3
- Visitors.....3

Grain Quality & Structure Research Unit

- Research Highlight.....4
- Meetings/Conferences.....5
- Visitors.....5

Hard Winter Wheat Genetics Research Unit

- Research Highlight.....6
- Meetings/Conferences.....6
- Visitors.....6

Stored Product Insects and Engineering Research Unit

- Research Highlight.....7
- Meetings/Conferences.....8
- Grants.....8
- Visitors.....9

Center News

- Personnel News.....10

ARS and CGAHR Restructuring Area Office Mergers

After a prolonged period of declining and flat budgets, ARS made a number of adjustments to strengthen priority programs. One of the changes was to reduce the number of Area Offices from 8 to 5, through mergers. One of these mergers combined the Northern Plains and Southern Plains offices into a new Plains Area office. The Plains Area includes 9 states stretching from the Canadian border to the Mexican border. The Area Office is located in Fort Collins, CO and Dr. Larry Chandler is the Area Director.

CGAHR Changes: Wind Erosion Research Moves to Colorado; Engineering and SPIRU Merge

In addition to changes in the organizational structure of ARS, some adjustments were made to consolidate programs. At CGAHR these changes included transferring 3 support scientists working in the area of wind erosion, to the Agricultural Systems Research Unit in Ft. Collins, CO. This move consolidates resources focused on the management of natural resources in agricultural systems. ASRU research is focused on modeling crop growth and soil processes, and the wind erosion work fits well in this group. In addition, the Engineering group, formerly in EWERU, was merged with SPIRU to form the Stored Products Insects and Engineering Research Unit (SPIERU). The layout of this Update reflects the change from five to four Research Units in the CGAHR.

Dr. Frank Arthur Wins NPA Senior Scientist Award

Dr. Frank Arthur, Research Entomologist in CGAHR's Stored Product Insect Research Unit (SPIRU), was selected to receive the 2014 'USDA-ARS Senior Scientist Award' for the Northern Plains Area. This award recognizes Frank for his sustained research productivity, impact on science and technology, and scientific leadership.

Congratulations, Frank!



Dr. Frank Arthur (L) receives the Senior Scientist Award for the Northern Plains Area for Area Director Dr. Larry Chandler (R).



Research Highlight

Meetings/Conferences

William Wilson traveled to Pretoria, South Africa 19-26 Jul. to help set up a collaborative project between ARS, Kansas State University (KSU), Onderstepoort Veterinary Institute, and the Medical and Veterinary Schools of the University of Pretoria. The project's purpose is to evaluate a Rift Valley fever (RVF) fluorescent microsphere immunoassay with sera sample already characterized and cannot easily be imported to the US due to presence of Foot and Mouth Disease in South Africa.

Lee Cohnstaedt traveled to the North American Elk Breeders association meeting in Kansas City, MO, 1-2 Aug. 1-2 to give a presentation on "Reducing epizootic hemorrhagic disease transmission in elk".

Scott McVey traveled to Boston, MA to present research relevant to vaccine development for Rift valley fever vaccines at The Bioprocessing Summit on 18 Aug. The poster is titled "Utility of Antibody Avidity for Rift Valley Fever Virus Vaccine Potency and Immunogenicity Studies."

William Wilson, Barbara Drolet, Lee Cohnstaedt, Dana Nayduch, and Mark Ruder traveled to Rome, Italy 4-7 Nov. to participate in the IV International Conference on Bluetongue and related Orbiviruses meeting. This meeting was organized by the World Organization for Animal Health (OIE). The OIE World Organization for Animal Health meeting has established this International special topics meeting once approximately every ten years to facilitate technology exchange and international cooperative research.

Lee Cohnstaedt, Dana Nayduch, and Bob Pfannenstiel traveled to Portland, OR to present at the Entomological Society of America annual meeting, 16-19 Nov. Dr. Cohnstaedt will moderate two symposiums on mosquito research and Sand Flies and Gnats and present two papers: "A snapshot in time: Single season continental scale mosquito collections", November 16, 3 pm; "Hessian fly, *Mayetiola destructor*, behavioral responses to potential attractants", November 17, 8:48 am. Dr. Nayduch will present "Highlights of Veterinary Entomology", November 17, 1:35 pm; "Gene discovery and differential expression analysis of humoral immune response elements in female *Culicoides sonorensis* (Diptera: Ceratopogonidae)" November 18, 8:48 am. Dr. Pfannenstiel will present research entitled "Emergence of *Culicoides sonorensis* (Diptera: Ceratopogonidae) from potential breeding habitats in northeastern Kansas", November 19.

Visitors

Dr. Johanna Lindahl a Research Associate at the International Livestock Research Institute in Nairobi, Kenya, visited during the week of 25 August. She was in Manhattan for two weeks for technology exchange as part of a three-way collaboration that also includes the Kansas State University, Department of Diagnostic Medicine and Pathobiology.

Research Highlight

End-Use Wheat Quality Evaluation For U.S. Hard Winter Wheat Breeding Programs

One of the most important objectives of hard winter wheat (HWW) breeding programs is to develop new wheat varieties with exceptional end-use functionality in wheat-based products. End-use wheat quality attributes such as wheat physical kernel characteristics, protein quantity and quality, dough rheology, milling and baking potential, and other physical-chemical aspects are significantly influenced by genotype, environment and their interaction.

It takes approximately 10-12 years (at a cost of \$1-2M) to develop and release a new wheat variety if conventional breeding methods are utilized. Use of non-traditional methods such as backcrossing, double haploids, or marker assisted selection *may* shorten that timeframe by as much as 50%. During this period of segregation and selection, wheat quality attributes are evaluated at various stages of development in these “experimental” lines in order to ensure desired genetic traits are inherited to the next generation and to help the breeder (Fig. 1).



Figure 1. Seeds from early generation wheat varieties.

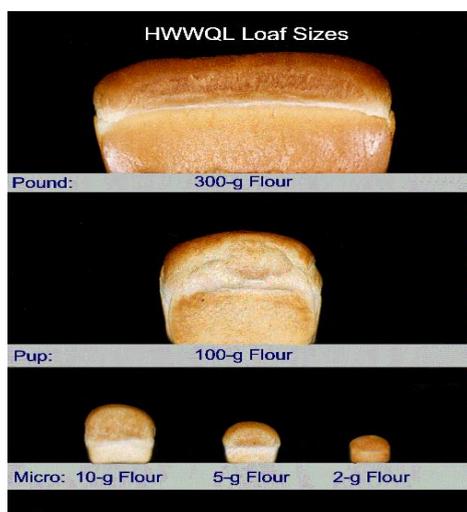


Figure 2. Bake test results.

The Hard Winter Wheat Quality Laboratory (HWWQL) is one of four U.S. Dept. of Agric. (USDA) regional laboratories that evaluate the end-use quality of a specific class (or classes) of wheat. Scientists at the HWWQL work with hard winter wheat breeders in the Great Plains growing region to conduct quality tests on thousands of experimental breeding lines, coordinate regional hard winter wheat projects (e.g. HWW Crop Quality Survey, Regional Performance Nursery, Wheat Quality Council), as well as evaluate the quality of HWW adapted outside its traditional growing area. The wheat breeding lines and existing hard winter wheat varieties are evaluated using well-established officially approved methods, such as test baking (Fig. 2).

The results from these tests play a significant role by assisting wheat breeders in meeting their goal of only advancing wheat lines that are as good as, or better than, those currently in production. Without these results, the development of high quality wheat varieties would be very difficult, resulting in a decline or loss of end-use quality in wheat that could have an enormous and negative impact on the U.S. economy.

For more information contact: Dr. Brad Seabourn (785) 776-2751, Brad.Seabourn@ars.usda.gov

Meeting/Conferences

Tom Herald attended a Sorghum Industry Dinner, Sponsored by the United Sorghum Checkoff Program on 11 Sep.

Michael Tilley, Jeff Wilson and **Yuanhong (Richard) Chen** attended the AACCI meeting in Providence, RI from 5-8 Oct.

Jeff Wilson and **Tom Herald** attended USDA-ARS Sorghum Research Meeting in Lubbock, TX and gave presentations on 27 Oct.

Tom Herald attended the USDA Functional Food meeting in San Diego CA from 17-19 Nov.

Grants

Visitors

Hiroyuki Kazehaya, Nippon Flour Mills, Co, Kanagawa, Japan visited with Brad Seabourn regarding flour quality. 8/6/2014

Dr. Cristina Rosell, Institute of Agrochemistry and Food Technology, Valencia, Spain toured the MU and met with SYs. 8/4

Dr. John Burke, RL, ARS-Lubbock visited the MU and discussed sorghum research. 8/25

Approximately 20 Chilean producers visit and toured the MU 8/25

Training

Tawanna Ross attended CON112 – Operating Practices in Contract Administration during October 13-17, 2014.

Research Highlight

Training for high-throughput DNA extraction using a 96-well pipetting robot. Trainees learn how to extract DNA in 96-well plates for throughput of up to 16 plates (1,536 samples) in 1.5 days. Use of the robot improves speed, precision, and uniformity. Methods developed here at the USDA Central Small Grain Genotyping Lab using SDS and CTAB for extraction are taught. We do this type of training on an as-needed basis. DNA extraction training occurs approximately 2 to 3 times every semester. Other lab methods and procedures are taught several times every semester. We also host protocols for DNA extraction and other lab procedures on our website (<http://hwwgenotyping.ksu.edu>). According to our website logs, our lab protocols are our most often downloaded files, serving more than 1,500 unique visitors and more than 5,000 files per month.



We also occasionally host larger and more formal training sessions. Pictured here are students and visiting scientists from 5 universities in neighboring states learning PCR methods, genotyping detection methods using SSR, STS, SNP, KASP, and sequencing, and also other issues related to genotyping. Students and visiting scientists that we train are mostly from Nebraska, Colorado, Kansas, Oklahoma, and Texas, however we do have many visiting scientists from around the world that come to our lab for 1 or more semesters.



For more information contact: Dr. Robert Bowden (785) 532-2368, Robert.Bowden@ars.usda.gov

Meeting/Conferences

Bob Bowden traveled to California 12-17 Jun. for an advisory panel meeting for the GrainGenes website.

John Fellers traveled to Columbia, MO 3-5 Sep. to attend the Danforth 16th Annual Fall Symposium

Guihua Bai and **Erena Edae** attended the ASA (spell out) meeting in Long Beach, CA 3-5 Nov.

Visitors

Mehraj Abbassov (with what organization, where from, why here?)

Grants

Research Highlight

Developing New Stored Grain Packing Factors

Cereal grains such as wheat and corn are commonly stored in concrete or corrugated steel bins. Grain stored in bins is subject to packing from overburden pressure, primarily due to particle rearrangement, which increases grain bulk density and, thus, storage capacity (fig. 1). The recent, rapid increase in bin sizes has heightened the need for accurate pack factor values for determining grain bin inventory from volume measurements. Three different sets of pack factors are commonly used in the U.S. for grain bin inventory determinations. The USDA Risk Management Agency (RMA) and the USDA Farm Service Agency warehouse group (FSA-W) use two different sets of empirically-derived pack factor values for insurance and warehouse auditing purposes, respectively. The third set is in a standard (ASAE EP413.2 FEB2010, Procedure for Establishing Volumetric Capacities of Cylindrical Grain Bins) from the American Society of Agricultural and Biological Engineers, which uses a science-based model, WPACKING, to predict pack factors. Prior to this work there was very little field data in the literature on the accuracy of this model and no data giving the accuracy of the other two methods.

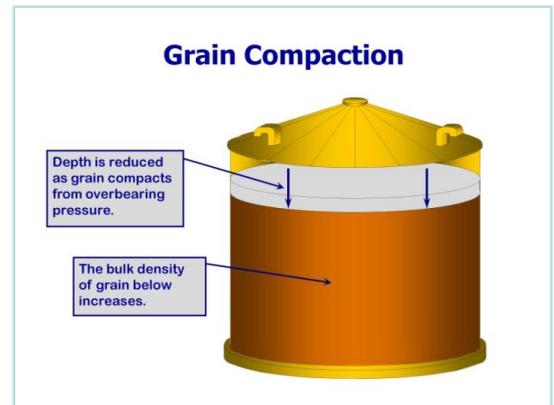


Figure 1. Pack factors account for grain compaction from overburden pressure in grain bins.



Figure 2. Bins measured in western Kansas.

This research determined the field pack factors and stored grain mass for more than 100 individual concrete and steel bins containing corn or hard red winter (HRW) wheat. We obtained the scale-measured mass of grain in each bin from collaborators and compared to grain mass predicted using pack factors from each of the three methods. The error for each prediction method was calculated as the difference between predicted and measured grain mass for individual bins. Grain bin volume measurements (figs. 2 and 3) were collected from diverse geographic locations in the U.S. for bins with a wide range of dimensions — from small farm size to large commercial structures — providing a robust dataset.

For corn bins, which were mostly corrugated steel, the average error compared to scale-measured mass was significantly lower for the WPACKING model (0.90%) compared to the RMA and FSA-W methods (1.61% and 1.86%, respectively). The model exhibited less than half as many prediction differences above 1% (13 out of 51 bins) as did the RMA and FSA-W methods, which were 29 out of 51 and 33 out of 51 bins, respectively. The WPACKING median value of error (-0.27%) for corn, representing the overall bias of the method, was much smaller than the bias for the RMA and FSA-W methods, which were +0.90% and +1.45%, respectively.

Research Highlight cont.

For HRW wheat in steel bins, the average error compared to scale-measured mass for the WPACKING model (1.64%) was much lower than the error from the RMA (4.41%) and FSA-W (3.40%) methods. The overall model bias for wheat in steel bins for the WPACKING model was -1.26%. The RMA method overall bias was +1.91% and the FSA-W method overall bias was much higher than the other two methods at +3.86%. Seventy-five percent of measured steel bins containing wheat were overpredicted by the RMA method. For wheat in concrete bins, average errors compared to scale-measured mass for the three methods were closer together, but still significantly different, with the RMA method being lowest (3.25%), the model being the next lowest (3.75%), and the FSA-W method having the highest average error (4.34%). The RMA method also exhibited the smallest bias (+1.03%) for wheat in concrete bins, while the WPACKING model bias was +2.16% and the FSA-W method bias was +3.50% in this case.

The results of this study will be incorporated into WPACKING to further reduce the prediction errors with this model. The completed, user-friendly model will include additional crops; soybeans, barley, oats, and grain sorghum; and will be a practical tool for government auditors, grain elevator managers, and others working with stored grain inventory measurements. USDA-RMA is expected to replace their older pack factors with pack factors from the completed model.

For more information contact: Dr. Mark Casada (785) 776-2758, Mark.Casada@ars.usda.gov

Meeting/Conferences

Guy Hallman participated in the final Research Coordination Meeting on the Development of Generic Irradiation Doses for Quarantine Treatments of the Food Agriculture Organization of the United Nations (FAO) and the International Atomic Energy Agency (IAEA), in Vienna, Austria, 2-6 Jun.

Frank Arthur was invited to speak at the 2014 Wendell Burkholder Award Lecture at the 11th Fumigants & Pheromones Conference in Krakow, Poland on 2-4 Jun. He made a presentation, "New grain protectant research", and was given the 2014 Wendell Burkholder Award.

Guy Hallman attended the 2014 Technical Panel on Phytosanitary Treatments (TPPT) of the International Plant Protection Convention (IPPC), in Bali, Indonesia on 23-27 Jun. He participated as part of the panel to evaluate treatment submissions for scientific merit for the IPPC Treatment Manual.

Jim Campbell attended the 2014 Copesan Technical Committee Meeting in Tucson, AZ, 29-31 Jul 29-31, 2014. He presented, "Mating disruption of indianmeal moth in retail stores."

Brenda Oppert attended the USDA Arthropod Genomics Workshop and Training in Beltsville, MD, 17-19 Sep.

Brenda Oppert and **Lindsey Perkin** attended the XIVth International Symposium on Proteinases, Inhibitors and Biological Control, held in Portoroz, Slovenia, 6-10 Sep. Brenda presented "Functional analysis of C1 family cysteine peptidases in the larval gut of *Tenebrio molitor* and *Tribolium castaneum*." Lindsey presented "Expression patterns of cysteine peptidase genes across the *Tribolium castaneum* life cycle provide clues to function and evolutionary history."

Jim Campbell was invited to attend the Food Safety and Pest Management Symposium in Atlantic City, 8-9 Oct as an invited guest speaker. He presented, "Stored Product Pests and Technology."

Brenda Oppert attended the Biotechnology Summit 2014 in Huatulco, Mexico, 8-10 Oct. Brenda presented, Studies of Cry3Aa-intoxication identify strategies to increase potency."

Meeting/Conferences cont.

Jim Campbell attended the PestWorld 2014 Conference in Orlando, FL, 22-24 Oct. He presented, "Mating disruption of Indianmeal moth in retail stores."

Frank Arthur attended the 2014 Methyl Bromide Alternatives Conference in Orlando, FL, 3-6 Nov. He presented a talk titled, "Extraneous material affects residual efficacy of cyfluthrin."

Frank Arthur, Jim Campbell, John Diaz, and Erick Goes attended the 2014 ESA meeting in Portland, OR, 15-19 Nov. All presented a talk, or a poster at this meeting. Frank presented, "Protective packaging and stored product insects: Safeguarding the food supply;" Jim presented, "Developing mating disruption programs for Indianmeal moth in retail stores;" John presented, "Distribution of psocids in different moisture gradients in wheat;" and Erick, a KSU Grad Student, presented a poster titled, "Vertical movement of *Rhyzopertha dominica* (Coleoptera: Bostrichidae), the lesser grain borer, in the grain mass: Factors affecting dispersal behavior."

Frank Arthur and Jim Campbell attended the 11th International Working Conference on Stored Product Protection (IWCSP) in Chiang Mai, Thailand, 24-28 Nov. Frank presented "Trogoderma variable: A model species for control of Dermestids in museums," and "Aerosol efficacy and direct and indirect exposure of flour beetles." Jim presented "Using meta-analysis to analyze data from multiple flour mill studies."

Floyd Dowell attended the American Association of Cereal Chemists International Annual Meeting in Providence, Rhode Island, 5-8 Oct. Floyd serves on the Spectroscopic Methods technical committee for AACCI.

Floyd Dowell attended the US Wheat and Barley Scab Initiative's National Fusarium Head Blight Forum in St. Louis, MO, 7-9 Dec. He presented "Using Near-Infrared Spectroscopy to Select for Resistance to FHB."

Awards

Frank Arthur was once again given the Wendell Burkholder Award. He was presented with the 2014 Award while in Krakow, Poland, 2-4 Jun.

Frank Arthur was presented with the 2014 ARS Senior Scientist Award at the ARS Annual Award Ceremony in Beltsville, MD on 9 Sep. See front page.

Personnel News

Arrivals:

Departures:

JoAnne Gresens, Safety Officer, retired in August

Guy Hallman, Research Entomologist in SPIRU, retired in September

Brad Bandy, Administrative Officer, left the agency in September

Jim Adrianos, Facility Operations Specialist, left the agency in December

Rhett Kaufman, Biological Science Technician in GQSRU, left the agency in December

Feds Feed Families Food Drive:

CGAHR employees collected more than 1500 lbs of food for the local food bank as part of the annual Feds Feed Families Food Drive. This is the fifth year that CGAHR employees have been collecting food and donating it to the Flint Hills Breadbasket (FHB). The FHB serves Riley County, Kansas and provided food for more than 16,000 families in 2011.

This year employee's produced a 'People's Garden' (upper right) and donated the harvest to the Flint Hills Breadbasket. Another event was a 'silent auction' of various dessert items. Canned goods were used as currency in the bidding process, with all proceeds going to FHB.

Photos: Upper right: Laura Knapp, Matt Kucharski, Margo Caley and Ann Redmon take a break from weeding. Lower right: Desserts being auctioned for canned goods donated to the Flint Hills Breadbasket.



EEO/Non-Discrimination Statement

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.