

Grain Quality Newsletter

News and Highlights from NC-213: Marketing and Delivery of Quality Grains and BioProcess Coproducts.

Volume 31:3

NC-213 The U.S. Quality Grains Research Consortium

Veterinary and Microbiological Sciences Department Head Named



Charlene Wolf-Hall

Charlene Wolf-Hall has been named head of NDSU's Department of Veterinary and Microbiological Sciences.

Wolf-Hall, a professor in the department, begins her duties October 16.

"Dr. Wolf-Hall brings a number of very positive skills and experiences to the position, and I am sure that she will provide excellent leadership for the department," says Ken Grafton, interim vice president for Agriculture and University Extension, director of the North Dakota Agricultural Experiment Station and dean of NDSU's College of Agriculture, Food Systems, and Natural Resources.

Wolf-Hall joined NDSU as a laboratory technician in 1996 and became an assistant professor in 1997, an associate professor in 2004 and a full professor in 2010.

She has taught an extensive range of food science and food safety courses, including Food Microbiology and Food Toxicology, and advises graduate students.

She also serves half time as assistant dean for the College of Graduate and Interdisciplinary Studies, is on the leadership

team for NDSU FORWARD (Focus on Resources for Women's Advancement, Recruitment/Retention and Development) and is a Food Systems Leadership Institute Fellow. From September 2006 to August 2007, she served as interim director of NDSU's Great Plains Institute of Food Safety.

Her research focuses on foodborne molds, mycotoxins and grain microbiology.

She earned her bachelor's and master's degrees in microbiology from South Dakota State University, Brookings, and her doctorate in food science and technology from the University of Nebraska-Lincoln.

"I am very excited about this new role in this terrific department and very grateful for the support of the many students, staff, collaborators, colleagues, mentors, coaches, friends and family who have had roles in my professional development and advancement," Wolf-Hall said.

Reprinted with permission from NDSU News, on-line, October 7, 2011.

You have probably heard about the International Center effort that is happening among GEAPS, Iowa State and K State. This is the current, edited version of the fact sheet. As the ICGOP moves forward, it will have substantial connection and impact in NC213.

International Center for Grain Operations and Processing: Updated Fact Sheet—August 2011

Overall Vision

Issues caused by the increasing loss of experienced employees at a time of rapid market growth will be alleviated by an integrated education and research center serving the entire global grain supply chain. The grain supply chain, seed bag to pre-retail processing, will have an internationally supported center of excellence covering three industry sectors:

- **Grain Handling and Distribution**—grain elevators and transportation networks
- **Grain Processing and Product Utilization**—ethanol, feed, crushing, wet milling
- **Sustainability/Environmental Stewardship**—carbon, food/feed safety, worker safety

Mission

The International Center for Grain Operations and Processing (ICGOP) will be the primary education and applied research partner to the global grain handling and commodity-utilization industry. The Center will be a current, complementary and comprehensive *knowledge source* for the world of grain operations, processing and utilization.

Background

Specialized knowledge and research efforts are shrinking within the global grain industry, causing companies to struggle to find qualified employees. New professionals may not recognize

industries in the grain supply chain as exciting, growth oriented places to have rewarding careers.

There is no comprehensive center of thought, education, applied science and action in the United States, or anywhere else in the world, dedicated to system support of grains as a multiple use (feed, food, fiber, fuel and biomaterials) product. Industry professionals of tomorrow need to be well grounded in the science and technology of grains, and also need to have a total supply chain view of a larger, more efficient and sustainable food system.

New technologies, complex global markets, multiple regulatory authorities and public concerns are affecting the grain industry in significant ways. At the same time, there is no independent industry-oriented focal point for thought, policy evaluation and technology application.

Other sections of the fact sheet include:

- **Responding to the Need: The Value Proposition**
- **Establishment, Partnership, and Resources**
- **Programs**

For the complete version, please contact one of the researchers listed below.

Kansas State University—Dr. Dirk Maier,
e-mail: dmaier@k-state.edu

Iowa State University—Dr. Charles R. Hurburgh, Jr.,
e-mail: tatry@iastate.edu

Calendar Items of Interest

- March 6–7, 2012: NC-213 Annual Meeting/Technical Sessions. Hilton Minneapolis, Minnesota. This year's event will begin with Technical Sessions at 1 P.M. on the 6th. We will be joining GEAPS for the banquet. Complete details will soon be available.
- Andersons Research Grant Program—Regular Competition. Awarded proposals will be announced soon.

The Grain Quality Newsletter is published and distributed at no charge to NC-213 (formerly NC-151) participants and supporters of research on "Marketing and Delivery of Quality Grains and BioProcess Coproducts."

Send your contributions, comments, suggestions, and subscription requests to:



F. William Ravlin
Grain Quality Newsletter
The Ohio State University
OARDC
1680 Madison Avenue
Wooster, OH 44691-4096
e-mail: ravlin.1@osu.edu

University of Illinois Agricultural and Biological Engineering Department to Offer Two Short Courses

Corn Wet Milling—January 9–11, 2012

Course location: University of Illinois, ACES Library, Urbana, Illinois

Purpose: To provide fundamental understanding of the corn wet milling process, equipment, unit operations and industry trends for representatives of the wet milling industry and allied industries. The course is ideal for corn wet millers, equipment vendors, enzyme companies, trade organizations and companies allied with the corn processing industry.

Content (tentative): Kernel structure, composition and cereal chemistry, Corn dry grind and dry milling, Mycotoxins in corn, Cellulosic ethanol overview, Steeping Process simulation, Methods to predict wet milling yields, NIR prediction of starch yield, Alternative corn fractionation processes, Enzymatic wet milling, Modified starch products, Starch products and applications, Separations: germ, fiber, gluten, starch; hydrocyclones, screens and centrifuges, Removal of water: steepwater, corn gluten feed, corn gluten meal; dewatering and drying.

Course director and contact:

Kent Rausch, University of Illinois
217-265-0697
krausch@illinois.edu

Registration (approximate): Advanced: \$995 (until Oct. 10, 2011)
Regular: \$1,395 (after Oct. 10, 2011)

New Technologies in Ethanol Production—May 21–23, 2012 (tentative)

Course location: University of Illinois, ACES Library, Urbana, Illinois

Description: For those wanting a fundamental understanding of the technology and science associated with production of ethanol from cereal grains and biomass. Will cover feedstock development, unit operations, process design and simulation, enzymatic technologies, coproducts, fractionation and other new technologies. For a broad audience to serve representatives from dry grind ethanol and allied industries.

Course content (tentative): Corn structure and composition, Overview of corn wet milling, dry milling and dry grind corn processes, Corn fractionation, dry grind ethanol and corn quality laboratories, Corn quality, cleaning and milling, Conversion of starch into sugars, Liquefaction Saccharification and fermentation, Distillation and coproduct recovery, Biomass deconstruction, Cellulosic ethanol, microbiology, fermentation and new technologies, Process simulation and modeling NIR for prediction of corn quality and process optimization, Corn & DDGS fractionation technologies, Technologies to increase rate of fermentation and final ethanol concentration, New coproducts and feedstocks in dry grind, New enzymatic technologies in dry grind ethanol, New uses of DDGS from fractionation technologies, Use of conventional and modified DDGS in swine and poultry diets.

Registration (approximate): Advanced: \$995 (until Feb. 20, 2012)
Regular: \$1,395 (after Feb. 20, 2012)

NC-213 Engineers, Scientists and Economists share their research...

Prediction of Kernel Density of Corn Using Single-Kernel Near Infrared Spectroscopy

Authors: P. Armstrong, J. Tallada

Submitted to: Computers and Electronics in Agriculture

Corn hardness is an important property for dry and wetmillers, food processors and corn breeders developing hybrids for specific markets. While several methods are used to measure hardness, kernel density provides one of the most repeatable methods to quantify hardness. Near infrared spectroscopy (NIRS) provides an attractive method to measure kernel density as it is nondestructive and can also measure other kernel attributes that may be related to processing the grain or hybrid development. Currently, some commercial NIRS instruments do measure density of bulk samples. Singleseed NIRS, however, may provide additional information and capabilities by measuring single kernels. This has potential applications for breeders or quality control personnel wishing to look at variability within samples and for sorting. This study found that NIRS could roughly determine density of corn samples by averaging single kernel values and that sorting individual samples into high and low density fractions was possible. The latter may be particularly useful for breeders wishing to increase hybrid kernel densities.

Contact Paul Armstrong, telephone 785-776-2728, e-mail: Paul.Armstrong@ars.usda.gov

Pilot-Scale Processing of Sorghum Protein Concentrates Using Extrusion-Enzyme Liquefaction

Authors: N. De Mesa-Stonestreet, S. Alavi, J. Faubion, S. Bean

Submitted to: Food Research International

Factors affecting the pilot-scale production of sorghum protein concentrates using extrusion-enzyme liquefaction were studied. Sorghum protein concentrates produced by extrusion-enzyme liquefaction had higher protein purity and in vitro protein digestibility (62 to 70%) than either raw or batch liquefied sorghum flour. Extrusion-enzyme liquefaction is a high throughput method for producing sorghum protein concentrates with a potential for commercial scale-up. Sorghum is safe for consumption by celiac patients, and sorghum protein concentrate may improve the nutritional and functional qualities of gluten-free foods.

Contact Scott Bean, telephone 785-776-2725, e-mail: Scott.Bean@ars.usda.gov

Modulation of Kernel Storage Proteins in Grain Sorghum

Authors: T. Kumar, I. Dweikat, S. Sato, Z. Ge, N. Neresian, H. Chen, T. Elthon, S. Bean, B. P. Ioerger, M. Tilley, T. Clemente

Submitted to: Journal of Plant Physiology

Grain sorghum ranks fifth among the cereals world-wide with respect to its importance for food and feed applications. However, sorghum is known to have lower protein digestibility than other cereals such as wheat and corn. To address this issue, transgenic sorghum was developed that expressed a hybrid wheat protein along with lines that down regulated the gamma and alpha kafirins. Experimental sorghum lines were found to have altered protein body structure and digestibility. Such lines could have an impact on the utilization of sorghum in feed and bio-fuel applications.

Contact Scott Bean, telephone 785-776-2725, e-mail: Scott.Bean@ars.usda.gov

Food Source Provisioning and Susceptibility of Immature and Adult *T. castaneum* on Concrete Partially Treated with Chlorfenapyr (Phantom®)

Authors: F. H. Arthur, E. A. Fontenot

Submitted to: Journal of Pest Science

A new insecticide, Phantom®, will kill the red flour beetle, a major pest of stored products, but there is no information on how well it will work when food is present. We exposed adult red flour beetles, and also larvae and pupae, on a concrete surface that was partially treated with Phantom®. Food (flour) was put in the untreated area of the concrete. Some adults were able to escape insecticide exposure and lay eggs in

the flour. Larvae were more susceptible than adults and usually died before they could reach the adult stage, even if they reached the flour. Residual control of larvae lasted for several weeks. Results show mobile adults could escape exposure to Phantom®, but the larvae could not and were therefore more susceptible to the insecticide.

Contact Frank Arthur, telephone 785-776-2783, e-mail: Frank.Arthur@ars.usda.gov

Lethal and Sub-Lethal Effects from Short-Term Exposure of *Rhyzopertha dominica* on Wheat Treated with Storicide II®

Author: F. H. Arthur

Submitted to: Journal of Pest Science

When pest insects are exposed on treated stored grains, mortality may not immediately occur. A study was conducted by exposing adult male and female lesser grain borers on stored wheat treated with different concentrations of the insecticide Storicide II®, for different time periods, and then transferring them to untreated wheat. At the lower concentrations or shorter exposure times, the parent beetles survived exposure, females were less susceptible than males, and they were able to produce offspring on the untreated wheat. As the concentration and/or exposure time increased, the exposed parent beetles died and the production of offspring declined, indicating that death occurred before mating or egg-laying. Results show males may be more susceptible to Storicide II® than females, and there may be a delayed mortality effect on the exposed parental adults that will affect production of offspring.

Contact Frank Arthur, telephone 785-776-2783, e-mail: Frank.Arthur@ars.usda.gov

Reprinted with permission from the Center for Grain & Animal Health Research, USDA, Manhattan, Kansas

Center for Grain and Animal Health Research, Manhattan, Kansas, Update

Here is the latest news from CGAHR Manhattan, Kansas

Recent Awards

Drs. Tom Pearson and **Dan Brabec** (Engineering and Wind Erosion Research Unit-EWERU) won the Federal Laboratory Consortium Award for Excellence in Technology Transfer for an instrument they developed for rapid detection of insect infested grain. **Dr. Dick Beeman** (SPIRU) was selected for the Edminster Award for the best post-doctoral research proposal within ARS this year.

EWERU News

Grants

Tom Pearson received funding for a CRADA. He will be working with a company to develop a high-throughput sorting device. (\$37,500)

Meetings/Conferences

Tom Pearson and **Dan Brabec** traveled to Nashville, TN, on May 5 to receive the 2011 Federal Laboratory Consortium for Technology Transfer (FLC) Award for Excellence in Technology Transfer.

Mark Casada attended the American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting and Expo, Aug. 7–10, in Louisville, KY.

Mark Casada, **Larry Wagner** and **John Tatarko** presented papers at the International Symposium on Erosion and Landscape Evolution held Sept. 18–22 in Anchorage, AK.

Grain Quality and Structure Research Unit News

Jeff Wilson and **Scott Bean** received funding (\$12,000) from the Kansas Grain Sorghum to pursue research on the effect of starch content on the functional quality of sorghum.

Scott Bean is a co-PI on a funded project (\$27,000) from the United Sorghum Checkoff Program to study the effect of heating on the quality of sorghum DDGS.

Reprinted with permission from the Summer 2011 CGAHR Update.

The Ohio State University
Ohio Agricultural Research and Development Center
1680 Madison Avenue
Wooster, Ohio 44691-4096