

Grain Quality Newsletter

News and Highlights from NC-213: Management of Grain Quality and Security in World Markets.

Volume 26:1

Visit the NC-213 web site at: <http://www.oardc.ohio-state.edu/nc213>



Calendar items of interest ...

Upcoming deadlines and events

- NC-213 Annual Meeting 2008: Our next Annual Meeting is scheduled for Feb. 26-27, 2008, in Omaha, Nebraska. We will meet with the Grain Elevator Processing Society (GEAPS) and enjoy a joint banquet on Tuesday, Feb. 26. More information to follow.
- Anderson Research Grant Program — Regular Competition 2007: Projected announcement date is June 2007 for a projected due date for RFP of Sept. 1, 2007.
- The 48th Annual Corn Dry Milling Conference, jointly sponsored by the North American Millers' Association and the National Center for Agricultural Utilization Research, will be May 31-June 1, 2007, at the National Center for Agricultural Utilization Research, USDA, Peoria, Illinois. The program and registration form are on NAMA's web site at http://www.namamillers.org/2007_CDMC.html. The registration deadline is May 11, 2007. The Planning Committee was led this year by Keith Smith, Cargill Corn Milling. Other members of the committee are Will Duensing, Bunge Milling, Inc.; Robert Harper, Hopkinsville Milling Company; Jeff Maple, Wilson's Corn Products, Inc.; Bruce Roskens, PepsiCo/Quaker Oats; and Don Sullins, ADM Milling Company.
- The Distillers Dried Grains Council meeting is May 16-17, 2007, in Louisville, Kentucky. Details are at <http://www.distillersgrains.org/symposium/>.

The Grain Quality Newsletter is published and distributed at no charge to NC-213 (formerly NC-151) participants and supporters of research on "Management of Grain Quality and Security in World Markets."

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



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Maier Receives Andersons 2007 Award of Excellence



Dr. Dirk E. Maier of Purdue University received the 2007 Andersons Cereals and Oilseeds Award of Excellence for his research to improve grain quality, his professional involvement, his leadership in strengthening the reputation of NC-213, and his efforts to make U.S. grains top-quality products.

Maier is associate department head and professor with the Department of Agricultural and

Biological Engineering at Purdue University. The award was presented during the NC-213 Annual Meeting and Winter Technical Session held February 21-22, 2007, in Kansas City.

The awarding of the 2007 Andersons Cereals and Oilseeds Award of Excellence provides highly deserved recognition for Maier's many significant contributions to the marketing and delivery of quality cereals and oilseeds and to the education of grain industry professionals.

In addition, Maier has a strong record of professional accomplishment and has contributed significantly to the protection of stored products and the delivery of identity-preserved, traceable, and biosecure quality grains to end users. His research and outreach programs have attracted more than \$9 million in funds, including \$3.5 million in direct support for his research.

Additional accomplishments include:

- Creating a research team that successfully developed technology for biomonitoring of stored grain.
- Conducting field research that has been complemented by the development and refinement of a comprehensive IPM-based stored-grain ecosystem model.
- Heading a research team that developed, tested, and refined the Variable Heat Fan and Burner In-Bin Drying Control Strategy.
- Initiating a grain composition analysis service through the Purdue University Grain Quality Laboratory to assist grain producers, handlers, and processors in moving toward value-added grain marketing.

This year's awardee has been a participating and contributing member of NC-213 (formerly NC-151) for many years and has rotated through all of the NC-213 offices and served as an Objective Chair for many years.

Maier holds memberships in many professional organizations, including:

- American Association of Cereal Chemists (AACC)
- American Society of Agricultural Engineers (ASAE)
- Grain Elevator and Processing Society (GEAPS)
- International Commission of Agricultural Engineering (CIGR)

Arvid Hawk Receives Industry Leader Award



Arvid Hawk, a grain-industry veteran who worked at the Grain Research Laboratory at Cargill, Inc., and traveled the world as a technical expert, received the Grain Elevator and Processing Society (GEAPS) Industry Leader Award during the GEAPS Exchange February 27.

The award, which had been bestowed only nine times previously in GEAPS' 80-year history, gives special recognition to individuals who have made "extraordinary contributions to the advancement of operations safety, health, environmental responsibility, efficiency, and stored-grain quality preservation excellence in the stored-grain and processing industries."

"I really don't think we could have found anyone more qualified or deserving to receive this award tonight," said GEAPS International President Mike Myrick, who made the presentation at the Exchange banquet. "I have looked carefully at his resume, and it just is remarkably impressive. It reflects so much knowledge, skill, and hard work that you might think we're combining the careers of two or three people.... It just is a unique, solid, and prolonged record of industry service and success."

Myrick cited Hawk's long record of volunteer work with GEAPS, where he has been an active member for more than 30 years, as well as with other industry groups, including the National Grain and Feed Association (NGFA), the North American Export Grain Association (NAEGA), the American Society of Agricultural Engineers (ASAE), and the American Association of Cereal Chemists (AACC).

Hawk served as an industry expert for the Codex Alimentarius Commission Committee on Cereals, Pulses, and Legumes; was chairman of the Near-Infrared Technology Committee of the American Association of Cereal Chemists; represented NAEGA on the International Maritime Commission, which worked on transportation of dangerous cargoes, and also as an expert on in-transit vessel fumigation of grain; and was a member of USDA's Foreign Agricultural Service's TCK working group.

He also was a member of the NGFA Explosion Research Council and chairman of its explosion-suppression and venting committee; chairman of USDA's GIPSA/FGIS Advisory Committee; and member and chairman of the U.S. Grain Quality Workshop.

In various industry technical capacities, Hawk has traveled to China, Russia, Egypt, the Soviet Union, Bulgaria, Turkey, Mexico, Sweden, Belgium, France, Spain, Germany, Kazakhstan, and elsewhere, serving industry groups as well as the U.S. Department of Agriculture.

"You can almost hear people clamoring for him to take part in their project or committee," Myrick said. "And the fact is that he did repeatedly take part, with almost unparalleled skill and generosity."

Hawk, now retired, will serve as a speaker at the GEAPS-NGFA Operations, Management, and Technology Seminar July 31 in St. Louis, Missouri.

Used with permission of the Grain Elevator and Processing Society.

NC-213 Annual Meeting in Review

At this year's NC-213 Annual Meeting and Winter Technical Session, NC-213 members had the opportunity to attend all or part of the Wheat Quality Council Annual Meeting. Some 50 NC-213 participants and individuals from industry attended the Annual Meeting, which was held February 21-22, 2007, at the KCI Embassy Suites, Kansas City, Missouri.

The NC-213 Executive Committee elected for the coming year is as follows:

Chair: Dr. Charlene Wolf-Hall, Associate Professor, Department of Veterinary and Microbiological Sciences, Great

Plains Institute of Food Safety, North Dakota State University.

Vice Chair, Dr. Stephen Kells, Assistant Professor, Department of Entomology, University of Minnesota.

Secretary, Dr. Mark Casada, Agricultural Engineer and Lead Scientist, Engineering Research Unit, USDA-ARS, GMPRC, Manhattan, Kansas.

Past Chair, Dr. Michael D. Montross, Biosystems and Agricultural Engineering, University of Kentucky.

NC-213 Engineers, Scientists, Economists Share Their Research...

Corroborative Study on Physical Properties and Milling Processes in Maize

The goal of this research is to compare determinations of maize quality and physical properties evaluated by several university and industrial laboratories aiming to provide information about the variance structure of the methods within and between laboratories as well as hybrids.

Eleven maize hybrids with broad genetic and environmental backgrounds were selected for physical, spectroscopic, and milling (dry and wet) processing tests from four clusters created by using 40 maize hybrids and multivariate statistical techniques. Well-equipped laboratories that have demonstrated great capability of the tests participated in this study.

Eleven samples were blind-duplicated and sent to collaborators with suggested standard operating procedures for tests. Data was duplicated or triplicated within each laboratory.

Analysis of variance of a corroborative study data was performed on each test.

Results from the corroborative study would enable us to compare laboratories' measurements of maize quality to provide the variance structure within and between laboratories as well as hybrids. This study may assist in establishing universal standard test procedures and data interpretation to help future research and industry partners.

Texas Agricultural Experiment Station, Office of the State Chemist, Texas A&M University. Lead P. I.: Lee, K. M.

Evaluating the Baking Quality of Texas Wheat Breeders' Samples

The objectives of this research included:

- Defining the attributes of wheat flours with excellent quality for flour tortillas.
- Evaluating the baking quality of Texas wheat breeder samples.
- Evaluating physical, chemical, and processing properties of sorghum and corn and developing improved food-quality cultivars.
- Improving aflatoxin tolerance and nutritional and processing quality of corn through breeding.

The PI has presented information on food products from sorghum in workshops in South Africa, Brazil, Central America, and the United States. The new sorghums are especially important as a new grain for use in gluten-free and ethnic foods. A source of good-quality sorghum is available for use in food and feed products, which has allowed production of new products.

The understanding of what happens during tortilla staling has led to improved flavor and texture of tortillas which could significantly increase their consumption since they are low in fat and contain significant levels of calcium and fiber. A combination of maltogenic amylases, hydrocolloids, and soy flour give tortillas longer shelf life in terms of rollability.

Soil and Crop Sciences Department, Texas A&M University. Lead P. I.: Rooney, L. W.

Development of Basic Knowledge, Science-Based Standards, and Technologies That Promote Crop Quality, Food Security, and Food Safety in Grain Markets (Ethanol Yield with FT-NIR)

The objective of this work was to investigate the feasibility of developing calibrations for ethanol yield based on ground corn samples using a Fourier-Transform Near Infrared (FT-NIR) Perkin Elmer Model 6750 Spectrum One NTS spectrometer.

Fourier-Transform NIR calibrations were made based on HPLC tests of fermented corn slurries. The wavenumbers (wavelengths) of 5170 cm⁻¹ (1934 nm), 4764 cm⁻¹ (2100 nm), 4518 cm⁻¹ (2210 nm), 5782 cm⁻¹ (1729 nm), and 5938 cm⁻¹ (1684 nm) were found to be important for the classification of corn hybrids for ethanol values.

U.S. ethanol production capacity was 4.4 billion gallons per year in February of 2006 and is expected to reach 7 billion gallons by the end of 2007, creating a huge surplus of Distillers Dried Grains with Solubles (DDGS). Value of DDGS can be improved by modified processes that reduce fiber and increase protein, but rapid measurement and monitoring of fermentation processes and variability in DDGS quality is needed.

Illinois Agricultural Experiment Station, Agricultural and Biological Engineering Department, University of Illinois at Urbana. Lead P. I.: Paulsen, M. R.

Investigation of Methods to Improve the Flowability of Distillers Dried Grains with Solubles (DDGS) During Processing, Handling, Storage, and Transport

Significant findings of the study on segregation during gravity-driven discharge of Distillers Dried Grains with Solubles (DDGS) are summarized here:

For the particle-size distribution of DDGS samples tested (*i.e.*, from an "old generation" ethanol plant), segregation of bulk particles during gravity-driven discharge is likely to occur during bulk handling. Syrup balls formed by caramelization of residual sugars were the largest-sized particles, and they are likely to segregate during gravity discharge as was observed in this study.

In addition, physical properties, such as bulk density, particle density, and the angle of repose, were determined. It was also established that DDGS exhibits funnel flow during gravity-driven discharge from a hopper with a circular orifice and behaves like a cohesive bulk solid.

The results of this research will improve the quality consistency of DDGS, especially with respect to better flowable product during processing, handling, transport, and storage.

Agricultural and Biological Engineering Department, Purdue University. Lead P. I.: Ileleji, K. E.

Outreach Programs for Supply-Chain Agriculture

The rapid expansion of Iowa's ethanol industry has changed corn distribution patterns to support more local processing. As more corn is used locally in fuel production, less is available for export, feed applications, and other processing. This has led to changes in grain transport, on-farm grain storage, and the function of local grain elevators.

The current plants and those under construction will use 1.61 billion bushels of corn annually. Thirty-three new plants or expansions have been announced. If all announced facilities are built and operating at capacity by 2010, fuel ethanol production of 7.5 billion gallons per year in and near Iowa would consume 2.68 billion bushels of corn. Construction of all announced plants would be an aggressive projection dependent on continued favorable economic conditions; this report does not evaluate the likelihood of their construction.

Dry-grind ethanol plants also produce distillers grains feed products (DGS) in various forms. Iowa ethanol plants currently produce about 4.3 million tons of DGS, which could grow to 22.5 million tons if all announced ethanol plants come online. Distillers grains can substitute for other ingredients in cattle rations (up to 50 percent of ration) and can also be used in swine and poultry rations at a lower rate (up to 10 percent).

Ethanol plants located close to cattle feedlots are able to save energy costs by selling wet distillers grains, but on average only 25 percent of distillers grains is sold wet at an average of 56 percent moisture. Nearly 60 percent of DGS is shipped by rail to users outside Iowa and is shipped as dried distiller's grains.

The Iowa State University Grain Quality Laboratory (ISU-GQL) provides instrument calibration and measurement services for composition of agricultural products. ISU-GQL is pursuing ISO 17025 accreditation which requires labs to have a quality-control program. The NIRS quality-control program includes data from NIRS daily check, duplicate differences, and NIRS comparison to references.

The activities include setting tolerances, developing appropriate control charts, handling and documenting data, writing Standard Operating Procedures (SOP) of quality control activities, and implementing a quality control program.

A quality control program for calibration was also developed. The reference data consists of internally generated tests (oven moisture and corn density) and externally outsourced tests (proximate analysis, amino acids, and fatty acids). Based on the results of the ethanol study, new Iowa State Extension efforts in grain storage training and in supply-chain evaluation were started.

Plants could increase ethanol output by about 0.1 gal/bu if inputs were more consistent. For a 100 MM gal/yr plant, this would be 4 million more gallons of ethanol or about \$8 million per year. DGS quality would be more consistent as well.

Department of Agricultural and Biosystems Engineering, Value-Added Agriculture Program, Iowa State University. Lead P. I.: Hurburgh Jr., C. R.

