

# DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING

Vol. 4 No. 2

NEWSLETTER OF ACHIEVEMENT

DECEMBER 2008

## Environmental Management Research

Somewhere, a feedlot is getting wet. What happens when the rain hits the manure is a research focus of Dr. John Gilley, an Agricultural Engineer with the USDA-Agricultural Research Service and adjunct faculty member in the BSE Department. He has spent the past 26 years designing and conducting experiments for analyzing runoff from farms and feedlots, and identifying the environmental effects of that runoff.

Approximately 1.5 billion bushels of corn are raised annually in Nebraska. Of that total, approximately 500 million bushels are used for ethanol production; Nebraska is ranked second largest in America's production of ethanol. Wet Distillers Grains (WDGS) are a by-product of the ethanol production process, and are an excellent cattle feed. Ethanol production concentrates the phosphorus content, by a factor of 3, in WDGS. This summer, Dr. Gilley compared several feedlots in controlled studies at the U.S. Meat Animal Research Center near Clay Center, Nebraska. Some cattle were fed a traditional corn-only diet, while other cattle received a mixture with 40% WDGS added to the corn. Part of the study was to analyze the change in manure phosphorus content of the two feeding systems. With four students from the Department as assistants (pictured at right), a rainfall simulator was set up in several lots, and runoff samples from simulated rainfall were collected over established time intervals.

At the same site, Dr. Jason Vogel of the USGS, was analyzing the effects of the biological processes of certain bacteria used to break down the cellulose in the manufacture of ethanol. In order for those bacteria to do that work, antibiotics are used to inhibit the growth of other bacteria during the process. Dr. Vogel is measuring the number of bacteria in the runoff and any antibiotic resistance carried over from ethanol production. The studies will determine how the bacteria are affecting cattle, and identify the bacteria competing in the cattle's system when WDGS are added to the diet. Since the components in the manure change as the diet changes, this also alters the environmental impact and odors associated with the feedlots.

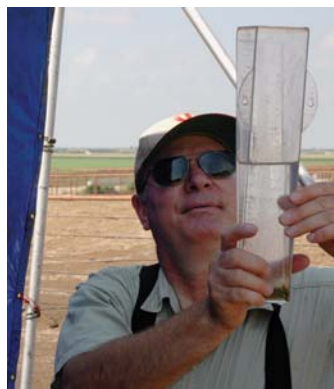
Loose, unconsolidated material (that's manure to you and me) is removed periodically from feedlots. How does the removal of the loose material, and how often it is removed, affect the components found in the runoff? And how is this

runoff handled? There are two primary systems used to collect feedlot runoff: a holding pond or a vegetative treatment system (VTS). In a holding pond, the solid material separates from the liquid. This liquid is eventually pumped and applied to fields via an irrigation system. In the VTS, the material is consolidated as it is applied to vegetative strips designed and constructed to utilize the runoff.

All feedlots must have containment systems, and more than one system may be required to handle the specified volume. The 4.7 million head of cattle fed and marketed in Nebraska each year easily outnumber the state human population of 1.7 million—so that's a lot of manure to deal with. These studies eventually help the farmer: land applications of manure save money, reduce chemical fertilizer applications, help build the soil, and provide a means to safely dispose of animal manure.

Dr. Gilley's research is presented through technology transfer in regional, technical, and producer meetings, through publications such as NebGuides or published papers, and through Extension, NRCS, and the NE Department of Environmental Quality. Dr. Gilley also works on committees with the Nebraska Cattlemen. The U.S. Meat Animal Research Center is a valuable resource for faculty and students in the Department. The cooperative experiments with USDA, USGS, and the University of Nebraska bring a wide variety of disciplines together to provide real-life learning experiences for students, and valuable collaborations for faculty.

To read more about this research, go to:  
<http://bse.unl.edu/faculty/Gilleypubs.shtml>



Dr. John Gilley reads a rain gauge at the completion of a rainfall simulation event.



Left to right: Students Andrew Volkmer (AGEN), Ben Robison (MSYM), Chance Thayer (BSEN), and Jared Koch (AGEN), take a break between moving the rainfall simulator, from one feedlot to another.



UNIVERSITY OF NEBRASKA-LINCOLN

BIOLOGICAL SYSTEMS ENGINEERING DEPARTMENT

# From the Department Head



Ron Yoder

In this newsletter you will note a decidedly environmental theme, with a thread of bioenergy woven through it. The livestock feeding industry is strong in Nebraska and the tie of the industry to the production of bioenergy is also strong. Our front-page article covers the research of John Gilley as he measures the impact of feeding Distillers Wet Grains (DWGS) on nutrients in runoff from feedlots. Faculty member John Hay is coordinating educational programs for producers who store and feed DWGS. Our featured faculty member, Rick Stowell, is working extensively with the air quality challenges encountered by livestock feeding operations. Bruce Dvorak and the interns in the P3 (Partners in Pollution Prevention) program are working successfully with industry partners to conserve resources and to decrease waste streams from those industries, with documented savings of nearly \$1 million per year across Nebraska. And our featured alumnus, Kathryn Farrell-Poe, leads water quality programs from her faculty position at the University of Arizona. All of this highlights the fact that Agricultural Engineers and Biological Systems Engineers are uniquely qualified to address many environmental quality issues facing our society.

Other highlights in the newsletter are welcoming Dr. Shadi Othman to our faculty with his expertise in engineering mechanics and in Magnetic Resonance Elastography (MRE), and the numerous national awards received by our faculty members. Dr. Othman joined us in August and we are looking forward to his contributions in the bioimaging area. Your continued contacts and feedback are important to us; please let us know what is happening in your life and your career.

Ron Yoder

## Biological Systems Engineering Newsletter

Ron Yoder . . . . . Editor

Gail Ogden . . . . . Editorial Coordinator

Sheila Smith . . . . . Graphics and Design

Contributors . . . . . Kathryn Farrell-Poe, Crystal Powers, John Hay

Any mention of trade names in this publication does not imply endorsement by the Biological Systems Engineering Department.



Department physicist, **Dr. David Billesbach**, monitors a weather station at the UNL Gudmundsen Sandhills Laboratory. Used to collect data concerning water balance (rain in/water vapor out), these stations are set up for long-term research on how the prairie grass cover interacts with the aquifer. This grass is the underpinning for the Sandhills cattle industry. Photo used with permission.



The fall staff meeting took place at the ARDC, located near Mead, Nebraska. Mark Schroeder (1980, B.S.; 1985, M.S., MSYM), the Acting Director, gave a tour of the facility.

# Meet the Faculty

*This section features newer faculty members, highlighting their unique expertise and commitment to excellence. In research, teaching, and extension, our faculty provide the creative energy that makes this Department so widely acclaimed.*

Dr. Rick Stowell came to the Biological Systems Engineering (BSE) Department seven years ago. He is an animal environment specialist with an appointment in Extension (BSE and Animal Science) and teaching (BSE). Gerald Bodman (Extension) and Jim DeShazer (teaching/research) were Rick's predecessors at UNL in engineering animal environments. Rick's classes, Animal Housing Systems, and Light Structure Design, serve both Mechanized Systems Management and Agricultural Engineering students.

A native of Wisconsin, Rick grew up on a dairy farm near Burlington. Bragging rights for the town include being the location of the famous Liars Club, and the hometown of Tony Romo. It is nicknamed Chocolate City USA because of a large Nestlé manufacturing plant and the annual Chocolate Festival. Rick completed his undergraduate and master's degrees in Agricultural Engineering at the University of Wisconsin in Madison, and his Ph.D., also in Agricultural Engineering, at Michigan State University in East Lansing. Rick is registered as a Professional Engineer in Wisconsin.

Rick began his academic career at The Ohio State University in the Department of Food, Agricultural, and Biological Engineering, working as an Extension Specialist in Animal Environments. He worked at OSU for five years before accepting his current position at UNL.

Rick likes that this department is well-aligned with his interests and that he is able to work collaboratively with faculty and staff in BSE and the Animal Science Department. Rick collaborates in research projects, primarily in two areas that feed into and integrate with his extension programs. One research area involves monitoring air emissions, mainly from beef cattle feedlots and swine waste lagoons. Rick also works



with Dr. Dennis Schulte and the Odor Footprint Tool (*see related article on page 8*) in modeling the movement of odor from animal facilities. Rick led the field-testing of this tool.

In his producer-oriented ventilation work, Rick works closely with colleagues in three neighboring states: South Dakota, Minnesota, and Iowa. A mobile ventilation lab, nicknamed "the ice house," is used for hands-on training for producers and continuing education for veterinarians. More than 75 workshops have been presented to date, which has led to a stronger collaborative effort in developing curriculum for the four-state region.

Rick has taken a two-pronged approach to the problem of odor drift from livestock operations: working with producers to

help them select suitable sites for livestock facilities and helping producers identify good options and practices for controlling odor. Crystal Powers, BSE Extension Engineer, and he are overseeing installation of a biofilter adjacent to a swine finishing building near Friend, NE. This biofilter is composed of wood chips, which provide an environment for microbes. The microbes consume odorous compounds as the air exits the building and flows through the bed of wood chips. Biofilters are proving to be one of the most effective means for dealing with odors.

Rick also works with community officials and planners to improve their ability to assess the anticipated air quality impact of livestock operations on their communities. The objectives are to find ways of dealing with expansion of livestock operations while maintaining good quality air for surrounding neighbors and the community.

Rick is looking at the interface of air quality and energy conservation as a future direction for his Extension program. He is working with collaborating faculty members in the four-state group to design a swine facility from scratch to create a greener pig barn. Re-imagining animal environments, what they will look like, how they will operate, and what impact they will have on the environment, are all areas of interest. Rick is also leading a national team of air-quality experts in a USDA grant-funded project: Air Quality Education in Animal Agriculture. The team is developing materials for classroom education and Extension outreach.

An active ASABE member, Rick participates in Mid-Central Conference planning and recently helped organize the 8th International Livestock Environment Symposium, which was held in Brazil. On a personal note, Rick and his wife, Amy, have two sons, Seth (3) and Grant (2) who were born in Lincoln. In the elusive spare time he has, Rick participates in the East Campus Golf League, and enjoys hiking, biking, and team sports.

# Alumni News

## 2000s

**Amy Jorde** (2006, B.S., BSEN; 2008, M.S., BSEN) is now living in San Mateo, CA, with her husband, Matt. Amy is working for SuccessFactors, a software company. They've been showing their dog, Perl, the sights and sounds of California.

**Manish Modi** (2006, M.S., BSEN) is working as a Process System Engineer for Bechtel Corporation in Houston, Texas.

**Reggie Rector** (2006, B.S., BSEN) is currently the Team Manager for the Applications Engineering department at National Instruments. He oversees about 20 new engineers and makes sure they have all the tools and training needed to be successful at NI. Reggie's main role is being a liaison between the sales force, the support channels, and R&D. Currently living in Austin, TX, he is looking forward to getting married next summer.

**Katrina Christiansen** (2005, B.S., BSEN; 2006, M.S., BSEN) has moved to Ames, Iowa, and is a Graduate Assistant for Dr. Raj Raman. She has begun her Ph.D. in biorenewables at ISU. Kat and her husband, Max, are new parents too. Henry Christiansen Post van der Burg was welcomed into the world in August.

After five years working in the Engineering Test Lab at CNH in Wichita, KS, **Rich Siefken** (2003, M.S., MSYM) and his wife moved to Beatrice in April. He is a Senior Test Technician in the Engineering Test Lab for Exmark Manufacturing. On September 17th he and his wife had their first baby—Colton Richard Siefken.

## 1990s

**Greg Glunz** (1996, B.S., AGEN; 1998, M.S., AGEN) is a Professional Engineer with URS Corporation in Denver, Colorado. He is currently a team leader and project manager specializing in the evaluation, design, and construction of dams and hydraulic structures.

Let us know what's new. Update your profile at: [bse.unl.edu](http://bse.unl.edu)  
Select Alumni Update under the Department heading. Inclusion in the newsletter is optional.

## In Memoriam

Colonel Wayne Earl Thurman, of McPherson, Kansas, died on July 25, 2008. He was born in Nebraska on the family farm in Lower Lodi community, Custer County, on October 10, 1910. After graduating from Callaway High School in Nebraska, Wayne operated a crawler-type tractor for 2 years in construction and maintenance of public roads and highways. He entered the College of Engineering, University of Nebraska, in 1930, and graduated with a B.S. degree in Agricultural Engineering in 1936. Wayne was employed as an Assistant Agricultural Engineer with Nebraska Extension for two years before leaving to train as a pilot. He received his wings and the rank of Lt. in October, 1938, at Kelley Field, Texas. He flew over 50 missions during WW II in Europe and Africa and was promoted to the rank of full Colonel. He worked in various government agencies as a pilot and trainer, and while working for the Pentagon, had the honor of flying General and Mrs. Eisenhower on a good will tour to South America and Mexico. Highly decorated for his service, Colonel Thurman flew 38 types of military aircraft, was a command pilot of 22 years, and logged more than 6,000 hours of pilot time, which included 1,000 hours of subsonic and supersonic fighter aircraft. He retired from the Air Force on April 1, 1968.

# Comings and Goings



We welcome **Dr. Shadi Othman** as a new faculty member. Shadi's background is in MRI and mechanical engineering. He will establish the Translational and Regenerative Medicine Imaging Lab (TREM Imaging Lab) for combining imaging technology development with good biological control. Applications of high-field magnetic resonance elastography can be used to monitor tissue-engineered constructs and test cancer animal models. The lab will use the MRI facility at UNMC in Omaha,

until a high-field, wide-bore vertical MRI scanner can be purchased. Shadi will teach biomedical imaging and biomechanics related courses. He holds a B.E. from Jordan University of Science and Technology in Mechanical Engineering, an M.S. from Illinois Institute of Technology in Mechanical and Aerospace Engineering, and a Ph.D. in Bioengineering from the University of Illinois at Chicago.



**Dr. Lameck Odhiambo** joined the department as a Post-Doctoral Research Associate and is working with Dr. Suat Irmak to conduct applied field research on crop response to irrigation and fertigation under subsurface drip, center pivot, and gravity irrigation systems under a variety of tillage and management practices. He will oversee measurement of evapotranspiration and other energy balance components using the Bowen ratio energy system, eddy covariance system, and water balance approach. He will also assist in

related field measurements. Dr. Odhiambo received a B.Sc. (Agriculture) from the University of Nairobi - Kenya, M.S. (Soil and Water Engineering) from Seoul National University - South Korea, and D. Tech. Sc. (Irrigation Engineering and Management) from the Asian Institute of Technology (AIT), Thailand. His previous research work includes water balance studies in lowland paddy irrigation, measurement and evaluation of evapotranspiration methods, modeling of evapotranspiration using artificial intelligence, and near subsurface investigation and mapping using GPR. Lameck previously worked as a senior lecturer at the Jomo Kenyatta University of Agriculture and Technology, Kenya.; post-doctoral research associate at the Biosystems Engineering Department, University of Tennessee, Knoxville; and Director of research and program development (volunteer position) and Board Member for the Bailey Institute, Hagerstown, MD. Lameck is married and has a college-freshman daughter and a teenage son. His hobby is videography and he spends his spare time on building and editing all types of videos, but mainly educational and technical videos.

Farewell to **Teshome Regassa**, Project Specialist. He finished his project with our department and returned to the Department of Agronomy and Horticulture.

# Alumna Profile

by Dr. Kathryn Farrell-Poe

As the first female to graduate with an undergraduate degree in Agricultural Engineering from the University of Nebraska-Lincoln, I'm here to tell you it was an interesting ride and one well worth taking. When I first arrived in Nebraska from a suburb of Cleveland, Ohio, I was enrolled as an "undeclared" engineering major. After taking the Introduction to Engineering course and looking at the course requirements, I decided to join the Agricultural Engineering program. As surprised as I was to find out that I was the only woman in my classes, the faculty and students in the 1970s were more so. I literally changed how business was conducted. Most of the students didn't know how to deal with me, but the faculty never once told me that I shouldn't be there. In fact, they helped me every step of the way. Although I didn't have an agricultural background (I actually used "furrow" and "farrow" interchangeably for a while!), the faculty were there to help me learn and succeed.



Kathryn (Kitt) Farrell-Poe

It was great to go on the annual spring tours to the big manufacturers. It never occurred to me that being the only woman would be an issue, and the chaperoning faculty never allowed it to be one. I really enjoyed the hands-on curriculum; I even took a course in metal lathe work. Although we didn't have to declare a focus or emphasis in agricultural engineering, like our fellow mid-west college students did, I focused on soil and water conservation which has formed the basis of my career.

I am now an Extension Specialist for Water Quality and full Professor with the Agricultural And Biosystems Engineering Department at the University of Arizona with a three-way split in my role statement (teaching, research, and extension). While my actual office is off-campus at an experiment station in Yuma, I provide services to the whole state as the Arizona Cooperative Extension Water Quality Coordinator. My professional interest is in onsite wastewater treatment systems (sometimes known as septic systems), but I also have done work in drinking water, non-point source pollution, stream monitoring, groundwater protection, and household hazardous waste.

I also serve as the United States Department of Agriculture - Cooperative States Research, Education, and Extension Service (USDA-CSREES) Region 9 Water Quality Coordinator. This large regional program encompasses the Land Grant Institutions in the EPA Region 9 (Arizona, Nevada, California, Hawaii, and six Pacific Islands) and is one of ten regional programs that support the National Water Program. The National Water Program is a partnership of the USDA-CSREES and the Land Grant Institutions of this country. The principal goal of the Region 9 program is to coordinate integrated efforts to protect and/or improve the quality and quantity of our surface waters and groundwater. I have found the biological aspects of my engineering training to be invaluable, and I believe it has helped me to be a better engineer and a leader in water quality issues facing our nation.

## Museum Hand-picked for HELP

Mid-America Arts Alliance selected the Lester F. Larsen Tractor Test and Power Museum of the University of Nebraska-Lincoln as one of 20 museums to participate in the Hands-On Experiential Learning Project (HELP).

In Nebraska, HELP is implemented in partnership with the Nebraska Arts Council and made possible through the generosity of the Nebraska Arts Council, the Cooper Foundation, Sue Renken, the Institute of Museum and Library Services, and Sen. Ben Nelson. HELP provides museums with on-site, affordable learning opportunities that further skills in areas critical to successful museums today. Jeremy Steele, Educational Communications Associate of the Tractor Test Museum said, "The timing could not have been any better for us. For the next 12 months, we will be recipients of training needed to address challenges associated with small museums."

Your donations to the Tractor Test Museum are welcome in helping with this project. To learn more about the museum, its exhibits, and programs, visit: <http://tractormuseum.unl.edu/>

## Urban Water Quality



Dr. Tom Franti, surface water management specialist, applies water to the home roof on the homeowner rain garden model at Husker Harvest Days in Grand Island as he explains the urban water quality benefits of a landscape rain garden. Photo by Brett Hampton. Used with permission.

Biological Systems Engineering  
Department Newsletter

Archives

Past issues can be found on the Web at  
[bse.unl.edu/news.shtml](http://bse.unl.edu/news.shtml)

# Student News

## Summer Graduates

Congratulations to the August graduates. We wish them all the best as they enter the next phase of their lives.

### B.S. in Mechanized Systems Management

Jessica Geis, York  
Shane Wohlgemuth, Holdrege

### B.S. in Biological Systems Engineering

Dipika Singh, Lucknow, India

### Ph.D. in Engineering

Siew-Yoong Lee, Kuala Lumpur, Malaysia  
Dissertation title: Preparing, characterizing, on-line digital image processing of residence time distribution and modeling of mechanical properties of nanocomposite foams



Siew is flanked by her daughters, left to right, Xinci and Xinrou, and her husband, Chai after receiving her diploma.

## Distinguished Fellowship Awards

A luncheon to recognize graduate students receiving Distinguished Fellowship awards was held in the East Union in September. Hosted by the Agricultural Research Division, the College of Agricultural Sciences and Natural Resources, and the Institute of Agriculture and Natural Resources, this program included four of the Department's Ph.D. students/candidates.

**Ramesh Singh**, Widaman Trust  
Distinguished Graduate Assistant Award

**Heartwin Pushpadass**, John and Louise Skala Fellowship

**Govindarajan Suresh Babu**, John and Louise Skala Fellowship

**Ajay Kumar**, John and Louise Skala Fellowship



## Partners in Pollution Prevention Interns

Preparing to make a difference, the summer interns in the P3 program gather before fanning out across the state. These student interns work with businesses to maximize sustainable practices to lessen environmental impact.

Shown left to right above are: Bonita Delhay (Project Assistant), Chris New (Engineering Intern Manager), Nathan Vanis, Stacey Hawkey (Program Coordinator), Kristin Bruffett, Tisha Roth, Kayleigh Peters (*front*), Blair Debban (*back*), Shannon Killion, Chad Abernathy (*front*), Jonathon Homes (*back*), Valdeen Nelsen (Staff Assistant), David Mabie, Kate Johnson, Ben Stewart, Ashley Baltes, Brent Hanson, Dr. Bruce Dvorak (Program Director). Not pictured: Seth Reddy.



## Quarter-scale Tractor Competition

The Quarter-scale tractor team attended the annual ASABE competition at the beginning of June. The team finished 6th, and the X-team finished 4th. The team also won a MillerMatic 120 welder. The following team members, accompanied by Dr. Roger Hoy, attended: Alexander Austin, Will Corman, Aaron Fuelberth, Ryan Hillen, Nate Kelly, Jared Koch, Dane Mosel, Jared Speichinger, Mark Tieszen, Dwight Easterly, Heather Wettstein, Tim Mattson, Travis Kleensang, Branden Baade, Jade Bender, Grant Janousek, Chris Howard, and Brent McKenny.

Don't miss the **BIG RED ROAD SHOW**  
UNIVERSITY OF NEBRASKA-LINCOLN

Visit our Department representatives at the Big Red Roadshow on Sunday, February 8, 2009, from 1:00 - 4:00 at the Qwest Center in Omaha.

# Scholarships and Ice Cream

With perfect weather for the second consecutive year, students and faculty met at the Nebraska Arboretum for the BSE Department annual ice cream social and scholarship recognition. New flavors of ice cream tempted many to second helpings. Many thanks to the Social Committee for presenting the wonderful treats and congratulations to all of our student scholarship recipients.



Scholarship recipients. Back row, left to right: Patrick Trout, Brent McKinney, Nate Kelly, Mike Rennau, Pat Moser, Suzanne Higgins, Diane Norris  
Middle and front, left to right: Becky Dornbierer, Ben Fitzwater, Dan Leiser, Adam Moss, Cody Lang, Catherine Amenta, Evan Curtis, Kayla Anderson, Lee Steffel

## **BSE Departmental Scholarship**

Evan Curtis  
Stacey Johnson

## **Warren P. Person Memorial**

Brady Folck

## **George Milo Petersen**

Cody Lange

## **Paul E. and Mary Beth Fischbach and Family**

Benjamin Carlson  
Robert Brauer

## **Mr. and Mrs. W.F. Hoppe Sr.**

Kyle Schmit

## **John Sulek Memorial**

Patrick Moser

## **Fred R. Nohavec**

Andrew Landgraf  
Aaron Fuelbarth

## **Edgar Rogers Memorial**

Patrick Trout  
Alan Wiese

## **Central Plains Irrigation Association**

Joseph Holoubek

## **Elenore Gakemeier Swarts**

Stacey Joy  
Stephanie Baird  
Shannon Killion

## **Lloyd W. and Margaret V. Hurlbut Memorial**

Andrew Volkmer  
Leo Steffel

## **AGP Biological Systems Engineering Student**

Nathan Kelly  
Michael Rennau

## **Glen D. Chambers**

Kim Grieb  
Michael Schaal

## **John Deere Mentor**

Adam Maas  
David Jobman  
Michael Hauger  
Zachary Carlson  
Grant Melotz

## **Leroy W. and Jean E. Thom**

Joseph Holubek  
Rebecca Dornbierer  
Daniel Leiser  
Benjamin Robison  
Justin Vonasek  
Justin O'Brien

## **Ivan D. Wood Memorial**

Brent McKinney  
Corey Smith  
Jessie Winter

## **Ken Von Barga Student Support**

Benjamin Fitzwater

## **Dr. and Mrs. William E. Splinter**

Diane Norris  
Sergio Valadez

## **Tom Thompson Memorial**

Stephanie Berger

## **Leonard G. Schoenleber**

Kristine Seier

## **Wayne E. and Virginia R. Thurman**

Ryan Hulme  
Tyler Scherr  
Jason Johnston

## **Leslie and Harriet Jochens**

Cathryn Amenta

## **Glenn J. and Maria L. Hoffman**

Kayla Anderson

## **CASNR Recruiting Scholarship Fund**

Zachary Tietz

## BSE faculty develop Odor Footprint Tool *By Crystal Powers*

As livestock and poultry production has moved to larger facilities, communities and neighbors surrounding these facilities have become increasingly concerned about the potential for offensive odors. The BSE Air Quality group developed the Odor Footprint Tool (OFT), an objective, easily-visualized tool to help livestock and poultry producers, community planners and officials, and rural residents make well-informed decisions regarding odor impact, siting of facilities, and odor control.

The OFT estimates the frequency of annoying odors around an existing or proposed livestock facility and then determines minimum separation distances for different odor tolerance levels. These distances reflect the size and type of facilities, weather patterns for the region, and local terrain. This science-based information about the prevalence of odors can help determine the suitability of a site and lessen the potential for negative air quality impacts on neighbors. Proven odor control technologies can also be compared.

The Odor Footprint Tool underwent four basic phases in development. Studies were conducted of odor emissions, especially from facilities that are distinctive for Nebraska; computer modeling of odor dispersion was developed and calibrated; the modeling was field tested; and finally the OFT was developed as a public resource and workshops were conducted to teach its use.

Drs. Dennis Schulte, Dave Billesbach, Rick Koelsch, and Shashi Verma, assisted by BSE graduate students, began the process about ten years ago with a project that modeled dispersion of odor from plastic swimming pools filled with solutions of known chemical compounds (Mike Rinkol,

M.S., 2000; Sensen Lin, M.S., 2002). Lakshmi Koppolu (Ph.D., 2002) then developed the base modeling approach and the initial set of regional odor footprints that became the basis of the Odor Footprint Tool. Ryan Duysen (M.S., 2003) measured emissions from beef feedlots and Jason Byler (M.S., 2004) did the same for swine lagoons to obtain baseline information from feedlots and lagoons prevalent in Nebraska, but not common in northern and eastern areas of the Midwest. Manish Modi (M.S., 2006), Naem Ebrahim (M.S., 2007), and Extension Engineer Chris Henry conducted further research to calibrate the dispersion modeling using field olfactometry.

“Sniffers” (state-of-the-art odor evaluators) were recruited and trained to evaluate odors. They used a special mask developed by Chris Henry and made measurements around livestock facilities at locations in Iowa and Nebraska. In the past four years the project has been made available to the public through the leadership of Dr. Rick Stowell and Crystal Powers, Extension Engineer. Additional field studies were conducted in a rural Nebraska area to ensure that the modeled frequency of annoying odor matched what people observed (Melissa Halverson, M.S., 2006; Kara Niemeir, M.S., 2007; and Crystal Powers, B.S., 2005).

Recently, Tim Plander of Olsson Associates, an engineering consulting firm in Lincoln, enhanced the OFT’s capability to use additional sources of weather data (beyond National Weather Service stations) in the model. This facilitated developing more localized odor footprints. Crystal Powers subsequently performed modeling for 6 regional locations and an additional 18 locations in Nebraska. UNL also performed the modeling used to develop South Dakota’s version of the Odor Footprint Tool (SDOFT). A current project is using the OFT to do a cost-benefit analysis of different odor control technologies.

Education and outreach have been involved at all stages, with presentations at research meetings and Extension workshops for livestock producers, service industry representatives, and county officials.

The Air Quality group has received grants from the Nebraska Department of Agriculture, Nebraska Pork Producers Association, Nebraska Environmental Trust, National Science Foundation, USDA, and others for modeling and computer programming, developing the Odor Footprint Tool, conducting the validation study, and facilitating educational events. Other individuals having key supporting roles in this effort include Dr. Dan Miller, USDA ARDS, and numerous UNL student employees. Information is available online at: <http://water.unl.edu/cnmpairqual>. Dr. Rick Stowell and Crystal Powers coordinate educational efforts and may be contacted for additional information.



On the left is an example output from the odor modeling. This output is then converted into the OFT setback distances (on the right) by taking the longest distance in each sector to give an easy-to-visualize footprint for the odor drift from a livestock operation. The blue lines represent the minimum separation distance for a specific odor tolerance level.

## Ethanol Co-product Storage and Utilization Conference *By John Hay*

Experts in livestock feeding and educators from 10 states met in May to learn about and discuss storage of wet corn co-products. Held at UNL’s Agricultural Research and Development Center (ARDC) near Mead,



One storage method demonstrated was straight modified wet distillers grain in a bunker covered with plastic. One month later, an outer crust had formed, yet product below the crust was still good quality.

Nebraska, this program provided professional development for extension educators and feed industry professionals with full-scale demonstrations at the feedlot at the Center. This program, supported by a Professional Development Program (PDP) grant from the North Central Region SARE, had the goal of teaching educators how wet ethanol co-products can be used in small-scale cattle operations. Experts from Nebraska, Iowa, Kansas, South Dakota, Missouri, and Colorado presented their research, experience, and observations on storage of co-products.

Once delivered to the feedlot or ranch, these wet co-products have a short shelf life. For the demonstration, wet distillers grains put into storage in March were opened in late May for conference participants to observe the percentage of spoilage and feed quality.

Packets of written and digital materials were provided to educators for use in educational programs in their home areas. In post-conference reviews, 55% of participants said they planned to start new educational programs, or expand and modify existing programs, using what they learned at the conference.

During the second year of this project more demonstrations will be included as well as a conference, scheduled for June of 2009, focusing on new and emerging feeding issues surrounding distillers grains and small-scale cattle operations.



# Biological Systems Engineering Department Hall of Fame



Don Eret

Agricultural Engineering graduates Don Eret and Ned Meier were inducted into the Biological Systems Engineering Hall of Fame during the annual spring banquet on Friday, April 25, 2008. Although these two Nebraskans had separate careers, it was their common interest in the Nebraska Tractor Test Laboratory (NTTL) that brought them together as the co-founders of the Supporters of the Nebraska Tractor Test Laboratory. Their sustained efforts have enabled the NTTL to thrive and ensured that it remains the internationally respected Lab that it is today.

Oh the places you'll go with a degree from UNL! Don Eret grew up in Dorchester and earned his UNL degree in Agricultural Engineering in 1953. While undertaking his studies, Don also completed the advanced ROTC program and served in the Army for three-and-a-half years. He remained in Alabama after his service and worked for an engineering service that was affiliated with the Army Ballistic Missile Agency, which later became NASA. The next 14 years were spent working with the Wernher von Braun rocket team. The team developed the prototype for the main booster rocket for the Apollo-Saturn moon missions. In 1970, Don returned to Nebraska, and began farming near Dorchester in 1972.

Keenly aware of life around him, Don served as a Nebraska State Senator from 1983 to 1987. While in the Unicameral, he served on the Agricultural, Education, and Business and Labor Committees. He also ran in the primary for governor (1990), for Congress (1998), and in the general election for Secretary of State (2006).

Don and Ned met at a public hearing about the NTTL. They discovered their common interests and concerns relative to bills being introduced that would negatively impact the NTTL. They formed the support group in response to those bills. Don is the (volunteer) registered lobbyist for the group, handles correspondence, and monitors bills in the legislature that affect the NTTL. The support group has about 100 members. Don also writes letters of

support for the NTTL to news outlets, and organizes groups to lobby senators in support of the Lab. Don has been particularly effective in working with Nebraska's farm organizations.

The arrival of an unexpected letter, bearing the University return address, was how Ned Meier found out he had been chosen to become a member of the Department Hall of Fame. As a student, he worked in the NTTL, and received two degrees in Agricultural Engineering: a B.S. in 1967 and an M.S. in 1970. The procedure he developed to measure noise in the tractor operator's cab for his master's research was adopted as an international standard (OECD Code 5).



Ned Meier

Ned worked for Caterpillar (Peoria, IL) after graduation from UNL and earned his master's in business, from Bradley University, at the same time. After four years, he returned to farm in the Grand Island area near Chapman. Still tinkering, Ned is almost finished developing Precision Trac®, a prototype tractor/tool carrier. He believes this design will result in improved mechanical weed control and more precise fertilizer placement. His concept creates a more stable relationship between the tractor and the implement, and he has applied for a patent.

An active supporter of professions in agriculture and engineering, Ned has served on the Advisory Council for the Biological Systems Engineering Department. He is very involved in the Nebraska section of ASABE, and has progressed through all the state leadership offices, and has advocated on state water issues, including testifying at public hearings on numerous occasions. As co-founder of the Supporters of the Nebraska Tractor Test Laboratory, he has testified before the Agricultural Committee in the State Legislature. In addition to a petition drive he and Don organized, Ned also launched a letter campaign to every tractor dealer of record in Nebraska stating his support for, and outlining why they should also support, the NTTL.

## International Symposium

**Rick Stowell** co-chaired (with Eileen Wheeler of Penn State) the Symposium Proceedings for the 8th International Livestock Environment Symposium (ILES) at Iguaçu Falls, in southwest Brazil near the borders with Paraguay and Argentina. Rick was the program chair for the previous two ILES meetings in Beijing, China, in 2005, and in Louisville, Kentucky, in 2001. During this large conference, 170 papers were presented over four days.

This was the first time ILES was held in the southern hemisphere, and spotlighted Brazil as a growing powerhouse in animal agriculture. The ILES is a specialty conference within ASABE. This symposium piggybacked on the location and meeting time for CIGR, the International Commission of Agricultural Engineering, a global association for agricultural society associations. CIGR presented meetings in soil and water, and precision agriculture. About 900 people attended CIGR, and about 175 attended ILES.

Meeting tours included farms, diversified agriculture, and a hydroelectric dam. The main focus was the world-wide concern about air quality issues surrounding animal environments. Whether a facility is open or closed, greenhouse gases have an impact on nearby established residential areas. One study, from Canada, dealt with how people in livestock areas are affected by animal production, and the opposition these facilities face from



Tami Brown-Brandl (4th from left) and Rick Stowell (taking photo) represented Nebraska at the 8th International Livestock Environment Symposium held in Brazil. Here they visit the symposium location's namesake, Iguaçu Falls, with colleagues from Africa, Europe and nearby Midwestern states.

communities that will be affected by the odor and sound associated with animal agriculture. Over all, Rick reports, the technology is pretty clear. Certain gases can be controlled, but controlling odor is very challenging. Everyone, world-wide, seems to be heading toward multi-level treatment systems, and there is much work to be done.

# Faculty & Staff News

The Darrell W. Nelson Excellence in Graduate Student Advising Award for 2008 was presented to **Milford Hanna** in recognition of exceptional graduate student mentoring. This award was presented by the College of Agricultural Sciences and Natural Resources and the Institute of Agriculture and Natural Resources.

**George Meyer** received the Best Paper Award in the Biological and Agricultural Engineering Division at the 2008 ASEE meeting in Pittsburgh for his paper entitled *Instrumentation and Controls for Agricultural and Biological Engineering Students*.

**Curt Weller** was recognized for Distinguished Service to the 2008 Mid-Central Conference of ASABE. He served as conference chair.

**Viacheslav Adamchuk** received the Pierre C. Robert Precision Agriculture Young Scientist Award during the annual International Conference on Precision Agriculture meeting in Denver, CO. He was recognized for significant research contributions in precision agriculture and technology.

**John E. Gilley**, an Agricultural Engineer with the USDA-Agricultural Research Service, was promoted in June 2008 to grade GS-15. In the university system, this is similar to moving in rank from an Associate to a Full Professor. Dr. Gilley also has an Adjunct Professor appointment in the Department of Biological Systems Engineering where his office has been located since September 1982. Although Dr. Gilley was born in Pueblo, Colorado, and he was raised on a farm and ranch in southeast Colorado, he considers himself a Nebraskan.

**Darrell Watts**, professor emeritus, received an award from Argentina's National Institute for Agriculture Technology. The award recognizes more than 25 years of service for helping Argentine researchers access irrigation, conservation tillage, and site specific crop management knowledge and technologies. His work has improved agricultural productivity and sustainability, and benefited farmer and national economics. The award was presented during a study abroad tour with CASNR students earlier this year.

**Diann Young** received the Outstanding Employee Award for Office/Service Staff in the Institute of Agriculture and Natural Resources for September, 2008. "Diann's work ethic and her personal and professional standards are of the highest quality," noted Ron Yoder.



*Dr. Yoder presents Diann Young with her OEA award.*

In 1991, the Agricultural Research Division (ARD) Advisory Council established a program to recognize the research accomplishments of junior faculty members. Typically, two junior faculty are recognized each year. Criteria used to evaluate nominees include scientific publication record, external grant funding, recognition by peers, and the potential for making outstanding contributions in the future. **Jeyam Subbiah** was a deserving recipient this year.

*Left to right, Ron Yoder, Gary Cunningham*



*(Dean, ARD), Jeyam Subbiah, and Rolando Flores (Department Head, Food Science & Technology).*

**Alan Boldt**, Research Engineer in the Department., and his wife, **Carla**, Ph.D. candidate, welcomed their second child, son Emmett, this fall.

**Roger Hoy**, Director of the Nebraska Tractor Test Lab received the Next Generation Award from the American National Standards Institute. This award honors individuals who have demonstrated vision, leadership, dedication, and significant contributions in his or her chosen field of activity.

## University Service Awards

More than 800 employees were honored for their years of service to the University prior to Chancellor Perlman's State of the University address on September 4. Among them were these Department members.

### 40 Years of Service

William Splinter

### 30 Years of Service

George Meyer  
Dennis Schulte

### 20 Years of Service

David Billesbach  
Scott Minchow

### 15 Years of Service

Thomas Franti  
Jan Hygnstrom

### 10 Years of Service

Christopher Henry

### 5 Years of Service

Gregory Bashford  
Stacey Hawkey  
Suat Irmak

DeLynn Hay, who retired last year, was also recognized for his years of service.

# ASABE Annual Meeting



From left to right: Drs. Martin, Howell, Yoder, Eisenhauer, Irmak, and Xin attended the ASABE Awards Luncheon.

During this year's annual ASABE meeting in Providence, Rhode Island, the following Faculty and alumni were recognized.

#### President-Elect

**Ron Yoder**, Department Head, Biological Systems Engineering

#### Incoming Board of Trustee Member

**Tami M. Brown-Brandl**

#### Educational Aids Awards

Publications, Short (less than 9 pages):

**Suat Irmak**: Drip Irrigation Design and Management Considerations for Windbreaks (Blue Ribbon)

#### Innovative Extension Methods or Impact Assessment

Impact Assessment of the Extension Program "Promoting Conservation Buffers in the Blue River Basin, 1996-2006." (Blue Ribbon) **Tom Franti**, Scott Josiah, Paul Hay, Randy Pryor, Gary Zoubek, Andy Christiansen, and Terry Hejny.

#### 2008 ASABE Fellows

**Hongwei Xin** (alum, M.S., 1985, Ph.D., 1989, AGEN) Professor, Agricultural and Biosystems Engineering, Iowa State University. Dr. Xin was honored for his work in structures and animal environment. He has been involved in updating ventilation design standards for ASABE, ASHRAE, and CIGR.

#### 2008 New Holland Young Researcher Award

Given annually in recognition of "dedicated use of scientific methodology to seek out facts or principles significant to the agricultural engineering profession." It is endowed by New Holland North America Inc., New Holland, PA.

**Suat Irmak**

#### PEI Professional Engineer of the Year Award

This annual award recognizes a licensed engineer who has made "outstanding contributions to the engineering profession, the public welfare, and/or humankind."

**Ron Yoder**

#### John Deere Award

This award was established by John Deere's descendants to recognize "Distinguished Achievement in the Application of Science and Art to the soil."

Adjunct Professor and ASABE Fellow, **Terry A. Howell**, USDA-ARS, Bushland, Texas

#### Heermann Sprinkler Irrigation Award

One of the newest awards in ASABE, this is the second year it has been awarded. The award, named for BSE Alumnus Dale Heermann recognizes those professionals in research, development, extension, education, or industry who have made significant contributions to the improvement of efficient and effective sprinkler irrigation.

Adjunct Professor and ASABE Fellow, **Terry A. Howell**, USDA-ARS, Bushland, Texas

#### Award for the Advancement of Surface Irrigation

This annual award recognizes an individual, a group, or a project that successfully demonstrates and publicizes the effective use of surface irrigation.

**Dean Eisenhauer**

#### Presidential Citation

Recognizes a member for extraordinary service and invaluable contributions to the Society.

**Allen R. Dedrick** (alum, B.S., 1962; M.S., 1963, AGEN; BSE Hall of Fame 2005)

#### Book Author Recognition

Design and Operation of Farm Irrigation Systems, 2nd Edition

**Glenn J. Hoffman**, Robert G. Evans, Marvin E. Jensen, **Derrel L. Martin**, Ronald L. Elliott

#### International Pre-professional Council

**Dane Mosel** (MSYM student) will serve as secretary during the 2008-2009 term. Last year, Dane served as Parliamentarian in the IPC and Garrett Pommeranz (alum, B.S., 2005, AGEN), served as 1st Vice President.

# Figuring out what makes something tick is what makes you do the same.

As a biological systems engineer you have a need to see how things work. And then the desire to help them be better.

And now you have a chance to help the students following in your footsteps be better, too.

The next generation of biological systems engineers could use your help. Please consider making a donation to the Biological Systems Engineering Excellence Fund to provide scholarships and programs for students who like to figure things out just like you. If you prefer, you can establish your own fund and name it for a family member, friend or mentor.

For more information, contact Ann Bruntz, University of Nebraska Foundation, 402-458-1176, or [abruntz@nufoundation.org](mailto:abruntz@nufoundation.org).



 University of Nebraska  
FOUNDATION

Meet our Department at the Big Red Roadshow on Sunday, February 8, 2009, from 1:00 - 4:00 at the Qwest Center in Omaha.

**BIG RED**  
**ROAD SHOW**  
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