

grow

Wisconsin's Magazine for the Life Sciences • Summer 2012

food & agriculture • environment • energy • health

Creamy, Dreamy, Ours

What makes Babcock ice cream so good?



College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON

AG AND THE ARTS • STOPPING SALMONELLA • SCIENCE FOR EVERYONE

Andrena vicina



Andrena violae



Andrena virginiana



Andrena wilkella



Anthophora terminalis



Augochlorella aurata



Augochlora pura



Augochlorella striata



Bombus bimaculatus



Bombus borealis



Bombus fernaldae



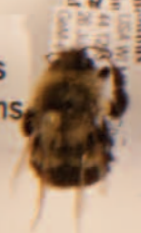
Bombus fervidus



Bombus griseocollis



Bombus impatiens



Bombus ternarius



Bombus terricola



Bombus vagans



Calliopsis andreniformis



grow

Wisconsin's Magazine for the Life Sciences

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Babcock ice cream not only tastes great—producing it also provides a valuable service to science, industry and our state.

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Take the CALS history challenge!

On the cover: Ah, sweet Babcock. There’s a lot of science behind that flavor.

Photo by Wolfgang Hoffmann BS’75 MS’79

BUGS WITH BENEFITS: (Left) Entomology professor Claudio Gratton and researcher Hannah Gaines found some 175 species of native bees in Wisconsin cranberry bogs—an important resource for pollination services, given colony collapse disorder among domesticated European honeybees. (Right) When Gratton and Gaines studied ground beetles living in and around potato fields, they found that as the diversity of beetles goes up, so does the rate of weed seed predation.

PHOTO BY SEVIE KENYON BS’80 MS’06

Dean Kate VandenBosch

The Road Ahead



By the time you read this issue of *Grow*, I will have had the honor of serving CALS as dean and director for nearly four months.

I want to thank all of you in the CALS community—students, faculty, staff, alumni and our partners and stakeholders around the state—for giving me such a warm welcome. And even more, thank you for sharing so many valuable insights, concerns and hopes for agriculture and the life sciences in Wisconsin.

We have a need for such discussions now as we address an immediate task at hand, namely, to establish our college's priorities. What are CALS' greatest strengths and opportunities—and how can we make the most of them now and in years to come?

Such thinking falls under the heading of strategic planning, a term that often, unfortunately, sounds more onerous than exciting. We picture reams of paperwork and an end product growing dusty on the shelf. That's not my goal. What I want is something

we will reach for on a daily basis to help us make critical decisions. A strategic plan provides a framework that weaves together what we're doing in key areas: resource allocation, educational design, faculty hires, facilities planning, and development objectives—so that they are all part of the same cloth.

Being purposeful and establishing priorities that have a rationale are critically important at a time like this.

As for why we need one now—as we all know, we are living in an extremely challenging fiscal environment. Being purposeful and establishing priorities that have a rationale are critically important in a time like this. We have to focus on establishing our priorities and how best to further them.

We have made a good start to a process that will require input and engagement from a wide range of CALS community members in the coming months. We'll be seeking your input through various channels, including via an e-mail account set up for that purpose (your ideas welcome at stratplan@cals.wisc.edu).

In the meantime, I invite you to consider the following questions:

1. What are CALS' critical advantages—what things do we do exceptionally well? Of these, what are our signature strengths—things we do well that are unique or tied to this state or region?

2. What are the grand intellectual challenges in our areas of inquiry? Looking toward the future, what are the big issues in the life sciences, agriculture, health, energy and the environment?

3. Most exciting, where do the answers to those questions overlap? What are the big issues that we at CALS are best positioned to address? Where can we have the greatest impact?

These questions are inspiring to think about. The work we do at CALS improves people's lives and the world in so many ways. Putting more of a strategy behind our work will, I believe, allow us to do it better.

grow

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On Henry Mall

News from around the college

CALS for the Ages

Retired professors band together to teach and preserve CALS history

Shouldn't someone be writing this down?

That's the goal of a new course imparting historic discoveries at CALS—and how those findings connect to research today.

The effort was born of a concern by some faculty elders that a great deal of CALS history was known only to people who were retiring.

"Younger faculty and staff, and especially our undergraduate and graduate students, knew next to nothing about genuinely important discoveries and contributions from CALS," says biochemistry professor Dave Nelson, who is close to retirement himself. "We feared that this history might be lost completely as we left the scene."

Emeritus animal sciences professor Robert Kauffman convened more than two dozen of his peers, including Nelson, from a broad range of disciplines to create a course in which they would teach CALS history—and at the same time build an archive of videos (all classes are taped), PowerPoints and other material to preserve it.

"Inter Ag 375—Groundbreaking Discoveries from CALS: Past and Present" debuted this spring as an offering not only for students but also for alumni, history buffs, and senior learning groups such as PLATO (all auditors welcome). The class is scheduled at a public- and parking-friendly 4:45 p.m.

The course is designed in a modular fashion, with a credit assigned to each component. Each week pairs a lecture on a historic CALS discovery with one on current research taught by younger faculty. Students going for three credits also participate in a hands-on workshop based on those presentations.

Fun is allowed—as anyone who cranked a Babcock milk fat tester with Dave Nelson or made kimchee with emeritus plant pathology professor



PHOTO BY GERHARD FISCHER

Paul Williams (following a lecture on cabbage disease) can attest.

And yes, the kids are learning. "I'm really surprised at the amount of basic biology research that has come out of CALS," says biology major Jacob Litman. "Discoveries such as the concept of micro-nutrients—vitamins, minerals—and the creation of

an effective strain of *Penicillium* are not typically what you think of in a 'College of Agriculture,' and CALS was originally 'just' the College of Agriculture."

The course will be offered again next spring. And since each year will present different areas of CALS discovery, the course may be taken three times for credit.

Think you already know CALS history? Try our special Final Exam on page 39.

—JOAN FISCHER

Students Chao Weng and Jacob Litman perform the milk fat test created by Stephen Babcock (photo below)



Cranes in the Crosshairs

Rising numbers of sandhill cranes may make them a tempting target, but hunting could hurt the species' genetic diversity



PHOTO BY MANJITH KAINICKARA

Cranes dancing in courtship

Sandhill cranes are majestic, iconic birds—a species carefully saved from the brink of extinction through concerted conservation efforts. But with the state population up to more than 20,000, some Wisconsinites are calling for a regulated hunt, citing damage the birds do to the state's corn crop. State Representative Joel Kleefisch (R-Oconomowoc) and others also tout the quality of their meat, calling sandhills “the ribeye of the sky.”

But a federally funded study led by CALS animal sciences professor Mark Berres suggests that policymakers should look at more than the number of birds. A recent analysis of the crane's Eastern population—birds that spend their summers from the Midwest to the East Coast—indicates we should also consider the distribution of the bird's genetic diversity.

“The genetic structure of the entire population is anything but uniform,” says Berres, who used DNA fingerprinting to assess the genetic makeup of cranes across the Eastern population's range. While Berres found a surprisingly good amount of genetic diversity throughout the population and quite a bit of genetic mixing, there also were a significant number of iso-

lated subpopulations, including some in Wisconsin.

These isolated groups of birds possess unique genes that could prove vital to the species' longterm resilience, perhaps giving the birds the ability to survive new diseases or adapt to changing environmental conditions, Berres explains. But because these subpopulations are relatively small, they are more vulnerable to hunting pressure.

“If people start harvesting them, I'm not sure how stable these local populations will be,” says Berres. “It's possible that if hunters are allowed to take 20 percent of the overall population, they could inadvertently take 99 percent of a particular subpopulation.”

From a low of just 25 mating pairs in the late 1930s, as estimated by famed naturalist Aldo Leopold, Wisconsin's sandhill crane population has rebounded thanks to a number of factors, including habitat conservation, increased farm acreage and protected status.

“We have a pretty good understanding of why the birds are doing so well, but we're really just starting to figure out the population's breeding structure,” says Berres. “To me it screams ‘Don't touch them.’”

—NICOLE MILLER MS'06

Quenching with Less

The grass gurus at CALS are coming up with water-saving practices for lawn care

Doug Soldat thinks there are better things to do with Wisconsin's drinking water than use it to grow grass.

Nationwide, landscape irrigation sucks up about seven billion gallons of potable water on an average day—and probably two-thirds of that get sprinkled on home lawns, the CALS/UW-Extension soil scientist and turfgrass specialist estimates. Adding to the problem: We tend to all do it at the same time, particularly during hot, dry spells.

"The issue is reducing peak demand in municipal areas," Soldat says. "As we put in more lawns and irrigation systems, we're seeing higher peak demand, which means we have to build more wells and water towers."

Soldat is looking at several strategies to address the issue. He's got downspouts at the O.J. Noer Facility for Turfgrass Research flowing into the mother of all rain barrels, a 4,000-gallon underground reservoir that can see the center's large lawn through a lengthy dry spell. He's also developing guidelines for irrigating lawns with treated wastewater. That's common in arid regions, and he suspects it will work even better in Wisconsin, where there's ample rainfall to flush the soil of any salts the wastewater carries.

But one of the simplest solutions is to plant grass varieties that need less irrigation than, for example, Kentucky bluegrass, the most commonly planted grass in Wisconsin. One of the most promising, he says, is tall fescue.



PHOTOS BY SEVIE KENYON BS'80 MS'06

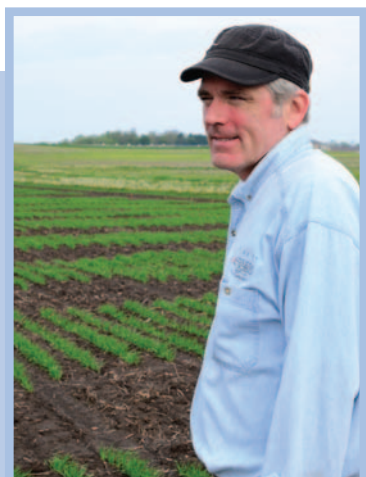
"It has about the same water needs as Kentucky bluegrass, but its deeper roots give it access to more water in the soil," Soldat explains. "It has double or triple the root mass of Kentucky bluegrass, so you could potentially double or triple the amount of time before you need to irrigate."

Just how the two will match up during a dry spell is something Soldat is testing this summer. He's growing several cultivars of each, along with a couple of other species, under severe drought conditions. That's not easy in Wisconsin, where droughts are short and unpredictable. So he's inducing drought with a rainout shelter—a 2,500-square-foot vinyl canopy on tracks. It sits off to the side when the sun is shining, but at the first hint of rain, it rolls into place to keep plots dry.

The drought tolerance work is part of a larger effort by the UW turf management team to provide information on reduced-impact lawn care strategies that work in Wisconsin. They offer suggestions in a new publication, "Organic and Reduced-Risk Lawn Care," available at UW-Extension county offices or online at learningstore.uwex.edu.

—BOB MITCHELL BS'76

Doug Soldat and the rainout shelter: Testing how grasses weather dry spells will help people choose lawns that need less water.



Heart Healthier

If you read labels in the cereal aisle, you know that oats are among the heart-healthiest of foods. And they may soon be even more so. CALS oat breeder John Mochon has developed a variety with significantly higher levels of beta glucan, the soluble fiber that nutritionists liken to a sponge that traps cholesterol-rich acids in the bloodstream. He hopes to have it available for the 2014 growing season.

classAct

Kendra Allen BS'12

Finding community

PHOTO BY JOAN FISCHER



Kendra Allen (center) with high school students from Milwaukee at Engineering Day on Campus.

Kendra Allen's curiosity about science was sparked by an episode about oceanography on the children's TV show, *Arthur*. She pursued that interest throughout an upbringing that involved attending about five different elementary schools on Chicago's South Side.

"Did you ever see *Waiting for Superman?*" she asks, referring to the documentary about getting into a charter school per lottery. "That's how

my parents were, trying to get me into whichever school was better and closest to where we lived."

Allen's father had a high school diploma and her mother, an associate of arts degree in accounting. They were thrilled when Allen was selected for Posse, a program that sends promising students from urban high schools to top colleges in small groups. Posse Scholars receive full scholarships, and the group acts as a support system to ensure that each member graduates.

Allen found other communities on campus. She learned about biological systems engineering from CALS assistant dean Tom Browne and tried some classes. "I just fell in love with the atmosphere, the students and, most important, the teachers," she says.

And she served as president of Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS) and the National Society of Black Engineers (NSBE), for whom she raised a record-breaking \$95,000 for a regional conference. Allen also volunteered with after-school science clubs and other youth groups, hoping to encourage minority kids, especially girls, to enter science professions.

For nearly two years Allen worked as a research assistant and a McNair Scholar in the lab of chemical engineering professor Daniel Klingenberg on biofuel applications for corn stover. She earned her bachelor's degree in May and is setting her sights on a PhD, most likely in bioengineering.

She speaks enthusiastically about advancements in creating artificial organs and other devices that can be implanted in the body to improve and save lives. "That's really where my passion lies," she says.

And wherever she goes, Allen plans to continue building supportive communities for students coming in behind her.

ELECTED to the National Academy of Sciences, **Ching Kung**, Vilas Professor of Genetics and Molecular Biology, in recognition of his "distinguished and continuing achievements in original research." Kung studies the way microbes process sensory information through ion channels, gateways through cell membranes that allow electrically charged atoms to pass in and out of the cell to spark or suppress cell activity.

NAMED 2012 Laboratory of the Year, the **Wisconsin Institutes for Discovery**, in an international competition sponsored by *R&D Magazine*. The public-private facility, open for little more than a year, was deemed best in a competition that honors the highest standards in architecture, laboratory design and "push-the-envelope" concepts in science buildings.

WON first prize (and \$100,000) in the Chicago Clean Energy Challenge, Hyrax Energy, a new company co-founded by CALS biochemistry professor **Ron Raines**. Hyrax is developing a process to make sugar from cellulose, the tough carbohydrate that gives structure to plants. That sugar could be a raw material for the biofuels, chemical and plastics industries.

CELEBRATING centennials, **UW Cooperative Extension** and **Marshfield Agricultural Research Station**.

Cooperative Extension is marking the occasion with events throughout the year and has been honored with Centennial Resolutions from numerous county boards. Marshfield will

hold a centennial event on August 16.



UW-Extension Dean Richard Klemme poses at a centennial event with a cutout of Cooperative Extension's first agent, E.L. Luther, who made farm visits using a two-cylinder motorbike.

Number Crunching 40 YEARS OF WALSAA. The Wisconsin Agricultural and Life Sciences

Alumni Association is marking its 40th anniversary with "40 in 40 Impact Awards" in recognition of the extraordinary achievements by CALS alumni in farms, classrooms, laboratories, businesses and other organizations throughout the state. The 40 recipients will be honored at WALSAA's beloved Football Fire-Up on September 15, which will double as a birthday celebration. And we'll feature profiles of some honorees in the fall issue of *Grow* magazine. More information about WALSAA's 40th at www.walsaa.org.

how to attract **beneficial creatures** to your garden

These critters not only do your garden good—they also are beautiful or at least interesting to look at. But to get them in your garden, you have to roll out the welcome mat. Ed Lyon, director of Allen Centennial Gardens, offers a selection of plants they find alluring.



Toads

Toads are very beneficial as they prey on insects, slugs and snails—a single toad will eat up to 10,000 of them in a single summer. They need a moist, shady place to live. Native plants that enjoy moisture and have large leaves to provide shade include prairie dock, Canadian ginger and mayapple. Appealing ornamentals include hostas, Rodger's flower and hellebores.



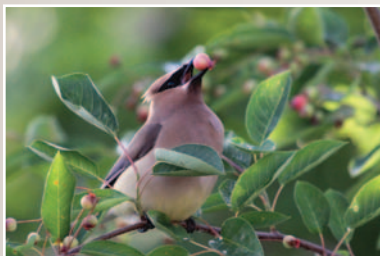
Native Bees

To attract native bees it's important to have a diversity of plants—ideally at least three different species—with a range of flower colors and shapes blooming at the same time. That way you provide a diversity of food for the generalists and will likely include some flowers preferred by specialist bees. Appealing native plants include wild indigo, goldenrod, fire weed, blazing star, purple coneflower and sunflower. Other attractive plants include lavender, cosmos, and such herbs as basil, rosemary, oregano, Russian sage and borage.



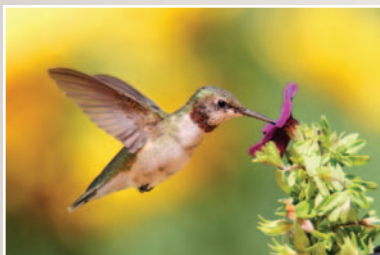
Hummingbird Clearwing Moth

These engaging creatures have long tongues that they carry rolled under their chins and use to reach the nectar of long-necked flowers—food that is inaccessible to many other pollinators. Caterpillars do well with a range of plants: honeysuckle vine cultivars, snowberry, hawthorn, cherry and plum trees and the European cranberry bush. Adults enjoy nectar from a wide variety of flowers including beebalm, lilac, phlox and many flowering annuals.



Cedar Waxwing

Even though this bird eats berries and sugary fruit year-round, noxious insects are an important part of their diet in the breeding season. Native plants producing edible fruit include hackberry, hawthorn, winterberry and dogwood. Ornamentals include cotoneaster, serviceberry and flowering crabapples.



Hummingbirds

These birds serve as mobile links between plant populations in different landscapes, facilitating pollen and gene flow over often considerable distances. Native attractions include cardinal flower, spotted jewelweed, Canada lily, red columbine and Indian pink. Ornamentals include beebalm, bottlebrush buckeye, trumpet honeysuckle and trumpet creeper.

Five things everyone should know about . . .

Quinoa

By Irwin Goldman



1 | This “supergrain” is not a grain. Quinoa (KEEN-wah) is not even in the grass family, unlike such grains as wheat, rye, oat and corn. As a member of the family Chenopodiaceae, the Andean plant’s closest relatives include beets and spinach. When prepared for eating, however, its seeds pass as a grain substitute to such an extent that quinoa is known as a pseudocereal. Quinoa may have been domesticated before the grasses and likely is one of humankind’s first seed domesticates in the Americas.

2 | It is super-nutritious. Quinoa has 10 essential amino acids, is very high in protein (up to 18 percent, compared with 10-12 percent for most grains) and is loaded with minerals including iron and magnesium. It is gluten-free and so nutritious that NASA researchers deem it an ideal food for long-term space missions. Quinoa seeds naturally contain saponins, which must be removed after harvest and prior to consumption. Saponins have an anti-nutritional effect on humans but provide bird-resistance to the plant, which allows it to be cultivated widely throughout the Andes. Most commercial quinoa available in North America has had its saponins removed prior to sale, rendering the seeds palatable and healthy.

3 | It was sacred to the ancient Incas. They called quinoa the “mother grain,” and each year the emperor would sow the first seeds using a golden ceremonial spade, historians say. The Incas cultivated quinoa at very high altitudes in the Andes, and some of the best quality quinoa today still comes from those high elevations. The Spanish called this crop *arroz pequeño* (little rice), but they favored other crops such as barley and oats above quinoa. Spanish colonists later dismissed quinoa as “food for Indians” and, because it was held sacred in non-Christian ceremony, for a time even banned it and forced the Incas to instead grow such European crops as wheat.

4 | Popularity brings problems. The new demand has been a boon for growers in Peru and Bolivia, who have seen prices for quinoa nearly triple over the past five years—but now fewer native consumers can afford it.

5 | Quinoa’s big moment is fast approaching. The United Nations recognizes 2013 as the International Year of Quinoa, an observance intended to promote its benefits and potential use. The crop is very tolerant to stress and can be grown in marginal environments, providing hope that quinoa can be used in the developing world to improve human nutrition and economic conditions.

Irwin Goldman is a professor and chair of the CALS’ Department of Horticulture. He is the nation’s only publicly supported beet breeder.

INDIA



Helping women help themselves

A little assistance can go a long way. That's the lesson learned from multiple trips by CALS dairy experts to the state of Uttar Pradesh in northern India, one of the poorest parts of the world.

Many farmers there keep only a few cows or very small herds that, for the most part, produce enough milk for a family's own use. Caring for livestock is work that falls almost exclusively to women.

By teaching the women better dairy practices—such as proper hygiene in milking and milk storage, providing adequate water, shelter and vaccinations for livestock, the basics of improvements in breeding—CALS experts and their partners in India are helping women dramatically increase their cows' milk yields. Not only does that improve their families' nutrition, it allows women to sell excess milk, adding to the family income.

Dairy science instructor Jerry Guenther has been to India three times over the past three years. "Most of the women are unable to read and write. But they are very attentive and very hungry for information," says Guenther, who interacts with the women through an interpreter. "With every point you talk about, they are making notes and thinking about it. And they come up with very interesting questions."

Since CALS teams began going over in 2009—besides Guenther, instructors have included Bob Kaiser and Ken Bolton—they have trained some 1,400 women.

But the team's reach goes much wider. The women come from all over Uttar Pradesh—and when they return to their villages, they teach other women what they've learned. USAID, the program's main funder, a few years ago reported that by adopting the new dairy practices, 32,000 women dairy farmers had seen a 25 percent increase in milk production, earning on average \$11 more every month. The CALS team reports that since then the number of farmers helped has surpassed 50,000.

The initiative began as part of the Khorana Program run by agricultural economics professor

Ken Shapiro and biochemistry professor Aseem Ansari, who was born and raised in India. It is conducted in partnership with the Babcock Institute for International Dairy Research and Development and the India-based Rajiv Gandhi Charitable Trust.

The dairy know-how provided by CALS fits into a bigger program of establishing women's self-help groups throughout Uttar Pradesh. Guenther attended training sessions where women were taught how to pool their money to make loans to support each other's growing dairy businesses or even cover each other's emergency family health care needs.

Such a comprehensive approach is needed, says Ansari. "Women in this part of India are traditionally forbidden from making even the simplest decisions. While dairy work is assigned to women, for them to be truly empowered they need to be educated in the basics of how to interface with the world that lies beyond their front door—let alone the marketplace, banks and other financial institutions," he says.

Women come from villages all over the region to receive cowside instruction from Jerry Guenther.



Women are seizing the opportunity to take part in that bigger world, Ansari says.

"Most of the rural, semi-literate women I met turned out to be incredibly bright and entrepreneurial," says Ansari. "Once they figured out the system, they nimbly melded dairy management with the traditional constraints and then slowly pushed the constraints to gain new freedoms and develop long-term plans for their children and families."

—JOAN FISCHER

Stopping Salmonella

Treat chickens, not humans. That's the approach **Amin Fadl** is taking in developing a vaccine that could halt the deadly foodborne pathogen at its source.

Let's start with salmonella. What is it and how does it get in our food supply?

Salmonella is one of the major foodborne pathogens. It's a zoonotic pathogen, which means it can be passed between humans and animals. Humans mostly get infected by eating contaminated meat from infected animals. Unfortunately, a significant number of chickens in our nation's poultry operations are carriers of this pathogen. They have it in their intestines but don't show any symptoms or signs

of sickness. So during meat processing, salmonella from the intestines can sometimes contaminate the carcass, the meat. As for eggs, salmonella either can be on the outside, on the eggshell, or inside, in the yolk. A significant proportion of eggs are contaminated, so that's why people always recommend that eggs be cooked properly before eating.

How big of a problem is this?

It's big. According to the Centers for Disease Control and Prevention, there are about two million cases of salmonella infection in humans every year, but many people just have minor abdominal cramps so they don't go to the hospital. About 43,000 people actually go to the hospital and provide samples that confirm salmonella infection.

And it can be a big problem for poultry producers, too. Consider last summer's salmonella outbreak that was linked back to an Iowa egg-producing farm. Many millions of eggs had to be recalled, so that was a huge economic loss. And not only that, but production on this farm was basically stopped for a significant period of time—months—until regulators made sure that they had cleaned everything, sanitized everything and figured out the source of the contamination.

Overall, salmonella is believed to have a total economic cost of more than \$1 billion dollars per year.

How would an animal vaccine help?

The whole issue here is how we are going to reduce salmonella outbreaks in humans. Our approach is to stop the infection at the source. Before chickens are harvested, we want to make sure that they are free of salmonella. One way to do this is by administering a vaccine that inhibits the colonization of salmonella in the intestinal tract. This breaks the chain of infection at the source.

How does your vaccine work?

Our vaccine is a weakened form of the pathogen. It's called a live attenuated vaccine. To make it, we deleted a gene from the salmonella genome known as *gidA*, which controls the production of a suite of disease factors and co-factors. You can immunize mice with our mutant strain, and then challenge the animals later with a lethal dose of regular salmonella and nothing happens. They stay healthy.

Now we need to test it in chickens to make sure that this vaccine is indeed capable of blocking or reducing the colonization of salmonella in the intestinal tract of these animals. If it does, we can look to take it to the next level.


When will your vaccine become commercially available?

It's a long process. There are several steps that any potential vaccine must go through before it can be licensed to be used in animals or humans. There's the lab work, clinical trials, safety testing, quality testing. And after that comes the process of commercial manufacturing. If everything goes well, it'll take five to 10 years.

Are there salmonella vaccines already on the market?

I only know of one vaccine that's on the market right now, although some others are currently being developed. So far, vaccinating chickens in the United States against salmonella isn't routine, as it is in Europe. In Europe there is a different form of salmonella that is really nasty. It produces a very high mortality rate in chickens. With the help of the vaccination they were able to reduce the number of outbreaks and mortality in the European poultry industry. They have been vaccinating for the past decade or more.

AS A VETERINARIAN IN SUDAN, his home country, Amin Fadl worked with large poultry producers in the Khartoum area to optimize the health and growth of their flocks. In 1993, he moved to the United States to attend the University of Connecticut, where he earned his master's and doctoral degrees in microbiology. Now an assistant professor of animal sciences at CALS, Fadl brings his various experiences to bear in the classroom, where he teaches "Animal Science 320: Animal Health and Disease Management," and in the lab, where he is developing a poultry vaccine against salmonella.



Amin Fadl's next step is to make sure his vaccine is capable of blocking or reducing the colonization of salmonella in the intestinal tract of chickens.

PHOTO BY SEVIE KENTON BS'80 MS'06

“Overall, salmonella is believed to have a total economic cost of more than \$1 billion dollars per year.”

Fortunately, we don't see that form of salmonella much in the United States, so there isn't a huge market here for a vaccine right now. But we don't know what will happen later on. The USDA and the FDA could decide that animals must be vaccinated.

🔗 How is your vaccine different or better than the other vaccines out there?

There are three important things for a salmonella vaccine: It's protective, it reduces salmonella colonization in the gut and it produces mucosal antibodies. Our vaccine could be better on one or more of these fronts, but you never know. The data is going to tell us that.

There are actually two types of vaccines—live attenuated vaccines like ours and killed vaccines—each with pros and cons. Killed vaccines are considered safe because the pathogen is killed, but they only induce a weak form of immunity because they don't interact with the host immune system in the same way as a live bacterium. Live attenuated vaccines, on the other hand, actually multiply in the host system, interacting with it in the same way that disease-causing pathogens do, so they trigger a stronger immune response and provide better protection. However, people are always concerned that there's a possibility

that the weakened pathogen will revert back to its original pathogenic form.

To address this, we've also developed a salmonella mutant that has *gidA* and another gene knocked out. This double mutant has the same quality, the same protection, the same everything as the single *gidA* mutant strain. But the good thing about it is that two genes have been deleted, so it's much safer because it's much less likely to randomly revert back to the pathogenic form. This is where our vaccine has a real advantage. And we are continuously looking for other factors that we can delete that will make our live vaccine safer, while at the same time maintaining its ability to induce a strong immune response.

🔗 What could encourage American poultry farmers to start using salmonella vaccines?

Paying for vaccines is like buying insurance. For example, if you look at the Iowa farm that had the contaminated eggs, maybe the owners will think twice about vaccination because of what they went through. Maybe they will tell you that they would have rather taken the loss in their flock's weight and productivity for a day or two that comes with vaccination than deal with the whole recall process. And it only costs a few cents per bird to vaccinate. 🔗

Mission: *Delicious*

By Maggie Ginsberg-Schutz





WHAT MAKES
BABCOCK ICE CREAM
SO GOOD TO EAT—
AND SO GOOD
FOR SCIENCE, STUDENTS
AND INDUSTRY ?



The Babcock Hall Dairy Store on Linden Drive is packed at noon with campus regulars and visitors alike. While offerings include tasty sandwiches and celebrated cheese, there's no doubt about the main attraction for dessert. For Babcock ice cream devotees this is mecca, the mother lode, and they are here to get their fill.

Student servers offer bountiful scoops in crispy cones and cups—creamy hillocks of such trademark flavors as Union Utopia, a rich vanilla shot with peanut butter, caramel and fudge; Berry Alvarez, swirls of blueberry, raspberry and strawberry on a tender pink field; and Badger Blast, a dense chocolate studded with dark chocolate flakes and whorls of fudge.

It is love at first lick, bliss at first bite. Enthusiasts might not know why Babcock ice cream tastes so good; they only know it does, and that it stands apart from all the others.

Pull back the camera from the Dairy Store set, and the hustle and bustle of a backstage is revealed. This is the Babcock Hall Dairy Plant, and it's actually the main show: a fluorescent, thrumming, brick red-and-pistachio-tiled production facility with a Willy Wonka maze of piping and vats. Here a team of staff experts and student assistants churn out milk, cheese and the famous Babcock ice cream.

**Fresh from the nozzle:
A tempting swirl of strawberry**



Often they have an audience—food science students training for their careers, industry professionals who’ve paid to learn from the best, alumni or special university guests eager to see an icon in the making. The steady stream of participants doesn’t bother staffers at all. They know that Babcock Hall is “51 percent instruction, 49 percent production,” according to plant manager Bill Klein, and their main purpose is to serve those who want to learn.

And if visitors are lucky, head ice cream maker Tim Haas might give them a treat. Every morning Haas assumes his position at a freezer hose dispensing what is, at this moment, the freshest ice cream on earth. He deftly swivels the giant nozzle, filling three-gallon tubs in about 40 seconds and tiny cartons even

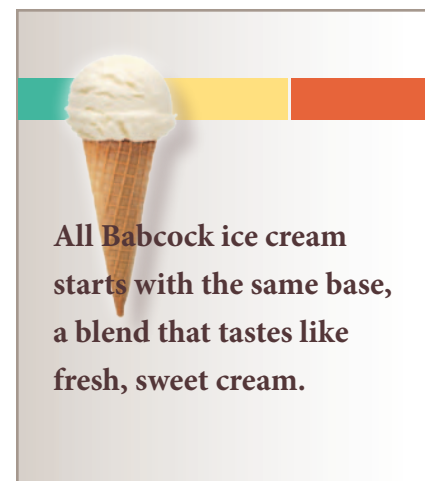
faster. This ice cream is destined for the blast freezer—except for the few folks on hand who get to try some right away.

That spoonful earns a moment of silence. It is smooth, rich, enveloping—warmer than ice cream typically is served, with a creamy goodness that demands complete attention. We are transported.

Small wonder that Haas will eat ice cream no other way—and that he keeps some spoons and paper cups handy for coworkers who share that sentiment. Part of what makes it so good, he explains, is that the original ice crystals inside it have never melted and refrozen, which is exactly what happens in your home freezer.

That bit of science, and much more learned during a Babcock tour, illumi-

nates the value of both the great Babcock flavor—and of having a dairy plant on campus. The Dairy Plant and Dairy Store combined are a \$2 million annual operation, and Babcock ice cream is a modest scoop of that—75,000 to 100,000 gallons are made each year, bringing in some \$700,000. (To offer perspective: many ice cream producers kick out 100,000 gallons in a single day.) Babcock produces only enough ice cream to offer at 18 or so on-campus sites plus a tiny handful of off-campus retailers.



The dairy plant brings in enough revenue to be self-supporting, but profit is not its purpose. Rather, Babcock has a higher goal—to make the best products it possibly can, for the benefit of the university and the state, and to research, business and industry around the world.

How it pursues that mission makes for a delicious story.

There might be a thousand ways to make ice cream, but Babcock introduced its preferred formula when the plant and store opened in 1951—and, although new flavors are constantly being created, it hasn’t wavered from that basic recipe.

“As far as we’re concerned, there’s a

Big scoops and a smile: Babcock offers students a chance to learn food science behind the scenes—and get over-the-counter retail experience as well.

huge value in keeping it the same,” says Bill Klein. “People love to come back after 30 years—and I guarantee they spent four years eating Babcock ice cream—and have it again. They love knowing it’s the same product.”

But nostalgia isn’t the only draw. Science is foremost at play here. As CALS/UW-Extension professor and food science department chair Scott Rankin puts it, “It’s wonderful for a reason.”

It all starts with fresh, high-quality cream from a hyperlocal source—the university herd one block away. These cows produce about 3,000 pounds of milk a day. Babcock needs between 10,000 and 15,000, so additional milk is brought in from a handful of local farms. Standard Babcock ice cream starts with a base mix of 12 percent milk fat and 10.7 percent “milk solids not fat,” components of milk including protein, carbohydrates, water-soluble vitamins and minerals.

With other ingredients, too, quality comes first. Babcock uses real cane sugar rather than corn syrup; corn syrup, although cheaper, affects flavor and texture. Babcock also uses gelatin stabilizer, a rarity in the industry because it is an animal byproduct, twice as expensive and not as shelf stable—but with Babcock’s relatively small batch and quick turnaround, that’s not a problem, and Klein believes it produces a cleaner taste.

All Babcock ice cream starts with the same base, a blend that tastes like fresh, sweet cream. It gets vat-warmed to about 110 degrees, run quickly through the pasteurizer at 185 degrees and then on to a cold storage vessel for aging, always moving so that it stays cooled at around 34 degrees. Babcock lets the base age overnight, much longer than the industry standard of four hours, to allow all ingredients to fully hydrate and the milk fat to crystallize, which results in

a richer, more viscous mix. Meanwhile, samples are run through a rigorous flight of tests in the onsite quality control lab.

The next day the fun begins as the base is customized into dozens of flavors. Haas and his colleagues lean over giant vats like chemists over cauldrons, pouring high-grade vanilla, caramel, chocolate syrup and other liquid flavors from enormous beakers, stirring them into the base mix with an oar-like spatula. Liquid flavors are added before the mix enters the freezer. Solid ingredients, known as inclusions—hunks of cookie dough and buttery yellow cake, slivers of bittersweet chocolate, creamy chunks of peanut butter—are added at the end of the freezing process with a grinder attachment, just before the ice cream is packaged.

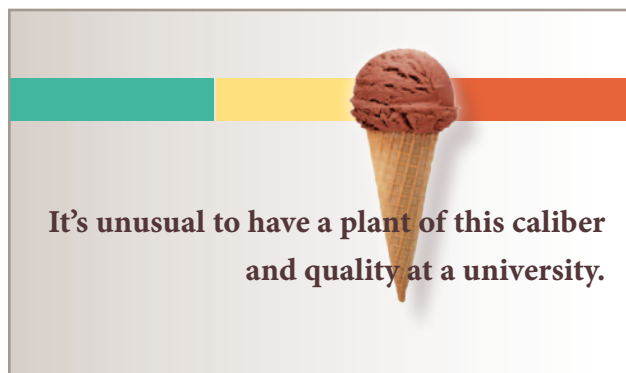
Once the liquid flavors have been added, it’s time to freeze. The mix is pumped into a barrel surrounded by

Freon, cooling it to 21 degrees as it spins. Inside the freezer, air is introduced, known as “overrun.” (Because air, a needed ingredient, also is free, it can be a cheap way to increase volume. An average discount supermarket brand has 100 percent overrun; standard Babcock has 80 percent.)

As the mix spins, ice crystals, air cells, fat globules and proteins are all bonded together in a delicate balance. The spinning—20 razor sharp steel blades scraping at 200 rpm—exemplifies one of the most crucial developments in ice cream making to date, helped in part by decades of research by food science professor Rich Hartel, an expert on ice crystal formation.

If the ice crystals get too big during spinning, the ice cream will taste crunchy. If you want creamy, smooth-tasting ice cream, you need the smallest ice crystals possible. The trick is keeping





those original ice crystals intact and tiny. The rapidly spinning steel blades make for the tiniest ice crystals because they scrape ice from the barrel rather than ice from ice. The end result is a product surprisingly low in fat yet still creamy and rich, with a heartier shelf life.

"I call home freezers 'torture chambers,'" jokes Bob Bradley, a food science professor emeritus—because home consumption of ice cream generally involves so much removal and refreezing (not to mention a lot of door-opening in general), each time causing ice crystals to melt and reform bigger.

Bradley is one of Babcock's chief flavor experts, but the enterprise does not rest on his palate alone. The plant uses both trained and random consumer taste panels to blind-test flavors under development (see sidebar for past hits and misses). Trained testers are asked pointed questions about such qualities as mouth feel, balance of ingredient blends and background flavor. For the random consumer tasters, the goal is essentially a thumbs up or thumbs down because when a formula is spot-on, not many words are needed. When the consumer tasters are left speechless, Bradley says, "That's what you want."

They all flock to Babcock: Food science professor and department chair Scott Rankin (in black visor cap and lab coat) trains industry professionals from around the country in the finer points of their trade.

All of the factors that go into Babcock—fresh, high quality ingredients, state-of-the-art processing, pains-taking attention to flavor—work together to create the best ice cream possible, which Bradley says is the entire point.

"We are called upon by industry to assist them," says Bradley. "We have to show people how it's done—and we do it right."

The experts at Babcock are indeed called upon by industry, and they rise to that call on a regular basis. "Every couple of weeks we have a company coming in," says Bill Klein. "We never advertise and the phone just rings."

Babcock essentially operates as a glass house, offering its substantial knowledge and equipment to established industry professionals and start-up entrepreneurs alike. For a fee, companies can visit Babcock and take advantage of a customized curriculum. There are also a number of

UW-Extension short courses. They include one targeted to large scale manufacturers—the Ice Cream Makers Short Course—and another, the Batch Freezer Short Course, intended for small batch artisans, or "Ben and Jerry wannabes," according to Scott Rankin.

"People come from literally all over the planet because we're not trying to sell anything other than the best science-based education possible," says Rankin. "Campus is uniquely positioned to do what nobody else can. We're not in it for the money. We're not a political entity. We're not trying to push an agenda. It's a unique, valuable experience."

That experience is prized by industry professionals.

"The short course is really about, 'How does the science meet practicality?'" says Bill Meagher, owner of Lakeside Creamery in Deep Creek Lake, Maryland. Meagher started his ice cream business in 1995, and not long after that he met Rankin, who was then at the University of Maryland. Together they developed the beginnings of the Batch Freezer Short Course that Rankin brought to Madison in 2001.

"A lot of equipment companies put on seminars about how to make ice cream using their equipment," says Meagher. "I heard they were all good,



PHOTO COURTESY DEPT. OF FOOD SCIENCE



put it together and boy, you may have something good.”

Throughout the years the Galloway Company has called on Babcock Hall countless times to help develop products. When there’s a specific goal—better understanding the subtleties between sweetened condensed milk formulas, or the intricacies of the different processes between various dairy dessert mixes, or the interactions in milk proteins—such experts as Scott Rankin, Bob Bradley, or, in past years, Joe von Elbe, will develop and present the appropriate

curriculum. Sometimes they’ll present their work at Babcock, but often they’ll bring it to company headquarters.

“It’s extremely valuable not only to better understand—but also to be able to ask questions as we’re going through the process that you wouldn’t normally want to ask if you were in a room with a bunch of competitors,” says Galloway.

Beyond access to state-of-the-art instruction, another value Babcock offers is the opportunity to experiment with and run small batches, which would be very expensive for producers to do in their own plants.

The benefits run both ways, Rankin notes. Babcock gleans knowledge from the specific, real-world questions industry brings—and the entire state benefits from the research and development provided by Babcock. It all adds up to a substantial body of knowledge and a creative, dynamic atmosphere.

“It’s unusual to have a plant of this caliber and quality at a university,” says

Rankin, noting that only about 10 U.S. universities even have ice cream plants on site. “It provides a perspective and a background that is just invaluable. It’s like learning about a car by driving versus only in a classroom.”

That could be why food science enrollment has nearly tripled in the last 10 years. Many of the basic classes are standing room only, and “we literally can’t fit everybody in Babcock Hall anymore,” says Rankin.

Food science students, who routinely win national product development competitions, are eminently marketable in an industry that respects Babcock Hall so much.

“Our graduates are highly, highly recruited. Employers know they’ve gone through an exceptional science-based, scholarship exercise that is complemented with applied, hands-on opportunities,” says Rankin. “We start getting calls in January from companies looking to hire. The biggest problem that our seniors have is, which of these three jobs am I going to take?”

Of all the students to utilize Babcock Hall each year—ranging from undergrads taking a sanitation or pasteurization course to Ph.D. students conducting advanced research—15 or so are employed as staff each year. They work alongside Tim Haas as the ice cream is frozen and packaged, generally putting in two to three hours a day. The one who gleans the most experience is the summer intern, most recently a junior food science student named Trent Kearns, who spent a two-to-three-week rotation in each area of the plant.

Kearns had read in food engineering about the behavior of Newtonian versus non-Newtonian fluids moving through piping, but he didn’t fully understand it until he had a close-up view of the pasteurizing process at Babcock. That’s just one example of what proved to be a rich educational experience. “I learned so

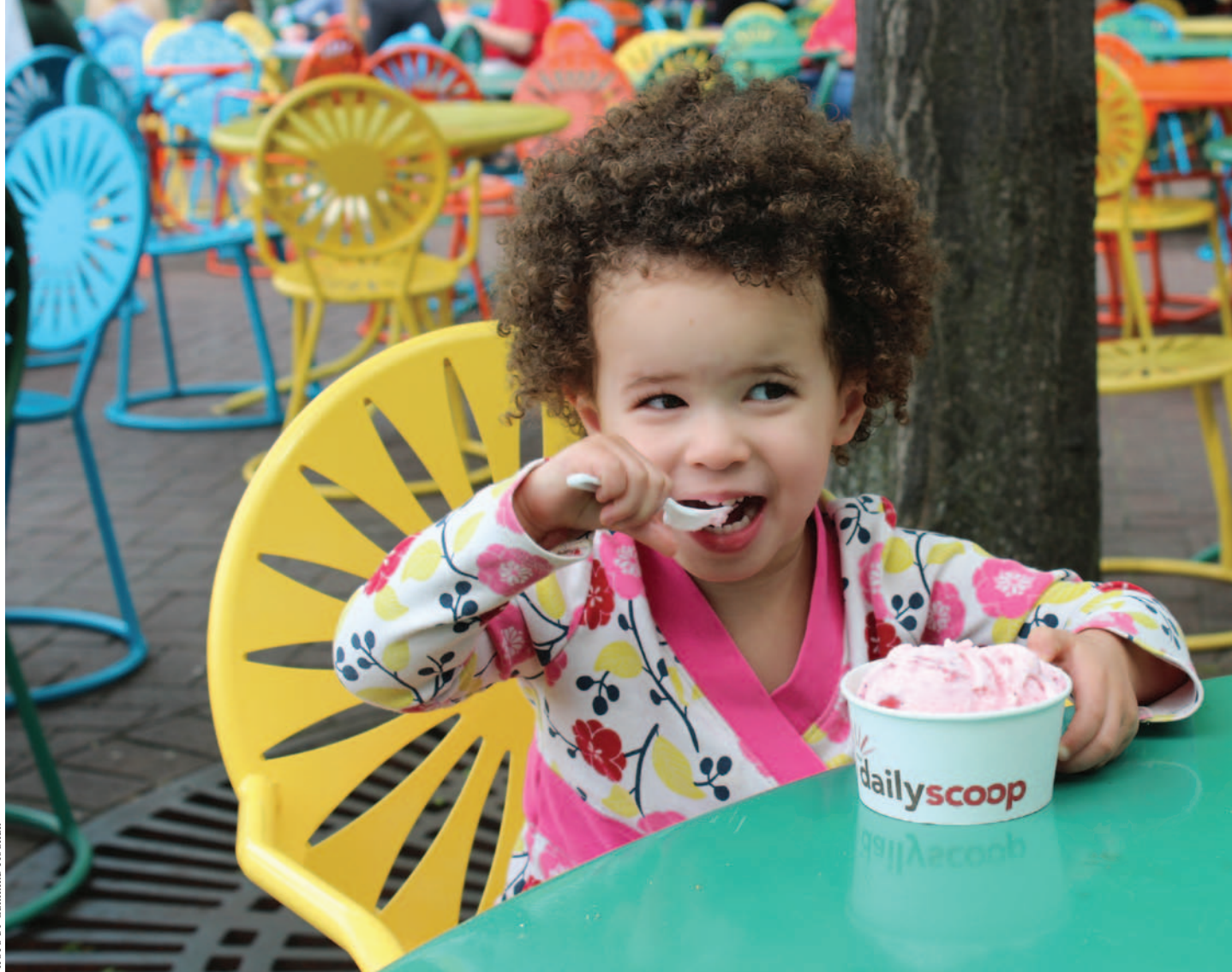
but they’re there to sell you something. What I said is, ‘Let’s sell how to make great ice cream.’ Scott was so enthusiastic about it—yes, let’s do that, let’s teach for the good of teaching.”

Today Meagher visits Babcock Hall once or twice a year to work with Rankin and Bradley on developing new flavors and mixes based on the latest technology, something that gives his ice cream a competitive edge back home.

“I’m always searching, always trying to make it better,” says Meagher. “Trying to make it taste better, creamier, last longer.”

Babcock Hall experts will also customize a workshop at a company’s request, as they have for the Neenah-based Galloway Company, Wisconsin’s largest manufacturer of frozen dessert mixes for three generations.

“There are things we’re going to find out from the practical end of the field, and things they know from the academic,” says CEO Ted Galloway. “You



much about standard operating procedures, quality control and legal guidelines, sanitation requirements, and the overall protocol,” he says. “The material you learn in the classroom doesn’t carry the same weight.”

The demand placed on Babcock by students, researchers and industry alike points to a looming question: after 60 years of heavy use, the plant is showing its age. A capital campaign is underway for a serious upgrade to the facility, which also serves as home to the Center for Dairy Research, a program that has been crucial to the advancement of Wisconsin cheese.

“Babcock Dairy is in dire need of renovation. Nearly every foundation and utility is 60-plus years old,” says Rankin. “We’d like to keep the manufacturing and educational heritage of Babcock Dairy alive and well for the next 60 years.”


Making Babcock ice cream

might not be mostly about the money—but it’s invaluable to the university nevertheless. If UW–Madison is the gateway to the Dairy State, Babcock ice cream is its tasty ambassador. Few would dispute that as a University of Wisconsin icon, Babcock ice cream ranks right up there with the Memorial Union Terrace and Badger sports.

“Babcock ice cream strikes an immediate nostalgic chord for alums and opens the gate to a treasure trove of UW memories,” says Deb Nelson, senior director of U.S. chapters and volunteer training for the Wisconsin Alumni Association (WAA). “I hardly ever attend an alumni event where someone doesn’t mention Babcock ice cream. The ice cream in and of itself is awesome, but when it also reminds people of a time and place that had an incredible impact on their lives, that just makes it all the better.”

The alumni association doesn’t shy from luring potential supporters with ice cream. For example, when an alumnus from Arizona was thinking about starting a new chapter, WAA was able to send Babcock’s special flavor, “Mad Grad Medley,” out to Sedona to help seal the deal—and it did, Nelson says.

Babcock created Mad Grad Medley—Door County cherries and chocolate flakes in a bed of creamy vanilla—to help celebrate WAA’s 150th anniversary in 2011. It was served with fanfare and received with blissful appreciation at alumni chapter events throughout the year.

Because nothing says UW like Babcock. “Part of why people love it is the same reason they love the Badgers,” says Bill Klein. “It’s their team, it’s their operation, it’s what they support. This is their college town—and Babcock ice cream is made here and no place else.” 



It makes us happy:
The best way to eat
Babcock is on the Terrace.



FUN FACTS *about* Babcock Hall Ice Cream

1 Top three flavors: Vanilla, Chocolate Chip Cookie Dough, Cookies and Cream

2 Quickly discarded: Root Beer, Peanut Butter and Jelly, Honey Graham Cracker and “Christmas Special” (which contained mincemeat)

3 Seasonal faves: Caramel Apple, Irish Cream, Bo’s Express (vanilla with chocolate flakes and raspberry swirl), Peppermint Stick

4 All standard Babcock ice cream starts out with the same base, a mixture that tastes like fresh, sweet cream

5 Babcock occasionally solicits flavor and name suggestions from the public in honor of special people or events. Some bestsellers: Berry Alvarez (for athletic director Barry Alvarez), Bo’s Express (for basketball coach Bo Ryan) and Crazylegs (for 1940s Badger football legend Elroy “Crazylegs” Hirsch). Berry and Bo are still available. Crazylegs—vanilla with marshmallow swirl and caramel-filled chocolate footballs—may be revived some day.

6 Compare calories for a half-cup of vanilla: Häagen-Dazs: 270, Ben & Jerry’s: 200, Babcock Hall: 150. Lesson: More calories do not mean better taste!

7 You can order or send Babcock ice cream anywhere in the continental U.S. Try www.wisconsinmade.com or www.icecreamsources.com, search for Babcock Hall.

8 Q. Why “Babcock” Hall? A. Among his many achievements, CALS agricultural chemist Stephen Babcock in 1890 unveiled a simple milk fat content test to enable an accurate assessment of composition—no more watering down! The test paved the way for setting quality standards and fair pricing for the dairy industry.

9 The average size of an ice crystal in freshly made Babcock ice cream is 30 to 35 microns. (There are 25,400 microns in an inch.)


10 Industry professionals have come for ice cream education at Babcock from as far away as Hawaii, England and China



Science for Everyone

Wisconsin residents of all ages and backgrounds are tracking wolves, monitoring streams, banding birds, counting invasive plants and more—all in the name of “citizen science”

By Denise Thornton



A citizen scientist collects a water sample from Pheasant Branch Creek in Middleton to see if it contains road salt. He is one of hundreds of volunteers monitoring Wisconsin's waters on behalf of UW Cooperative Extension and the Department of Natural Resources.

At dusk Dave Wilttrout steps out of his house and climbs into a Ford F150 to follow the lonely roads of the Chequamegon National Forest till well after midnight. At an isolated spot, he stops, steps out of the truck, and moves silently down the dark road. Then he fills his lungs and howls.

He's hoping to learn from answering calls whether the wolf packs he identified while snow tracking the previous winter have added new members. A retired veterinarian who earned his howling chops while treating sled dog teams, Wilttrout sometimes finds that his howls are a bit too effective. "When they answer you back, it's pretty spectacular. But when a wolf responds to your call from 50 yards away, and it's pitch black out, and you are the only person for miles—that will make the hair go up on the back of your neck," he says.

Despite his solitary treks, Wilttrout is no lone wolf. He is a citizen scientist, one of many volunteers who work with biologists, wildlife technicians and tribal conservation departments to monitor the wolf population of Wisconsin.

And the contribution of citizen scientists doesn't end there. They are playing an increasingly crucial role in many areas of research at CALS and other institutions. Projects that incorporate citizen scientists benefit from an enthusiastic (and usually unpaid) workforce that allows researchers to conduct projects that otherwise would not be possible. And in return, citizen scientists increase their knowledge and contribute to issues that matter to them.

Data collected by citizen scientists directly benefits Adrian Treves, a professor with the UW-Madison Nelson Institute for Environmental Studies, where he explores coexistence and conflicts between people and wildlife. "The accuracy of the wolf count in Wisconsin is important to both research and state policy," he says. "Citizen scientists working with DNR biologists make it possible to locate every wolf pack and attempt to enumerate every single wolf in the state."

"The volunteers more than double the miles we can cover," says Adrian Wydeven, a mammalian ecologist and conservation

biologist with the Wisconsin Department of Natural Resources (DNR). "We try to cover as much of the landscape as possible to detect every wolf out there. Volunteers provide many more eyes and ears looking for wolves and searching for signs, and that gives us a better picture of the distribution of wolves in the state."

The volunteer tracker program has been in place since 1995 and coordinates up to 150 trackers each year. Wydeven puts out a news release each fall requesting volunteers. "We get Internet inquiries, and I send them to our Wisconsin's Volunteer Carnivore Tracking Program website." (This URL and others provided below.)

To become a tracker, volunteers spend a weekend studying wolf ecology, survey methods, conservation and the social and political aspects of wolf management. Then they get outside to look for wolf signs and do howl surveys. A second class is a day-long animal tracking class in early winter to identify wolf tracks, conduct a survey within a certain area and fill out the survey forms.

PHOTO COURTESY JIM BEECHER

PHOTO COURTESY LOUIS BAUCH



A citizen scientist at Biocore Prairie on the UW–Madison campus applies a uniquely numbered band to the leg of a song sparrow. Data collected is sent to the USGS Bird Banding Laboratory, in operation for some 100 years.

The wolf count culminates every April when scientists and trackers convene at the Wausau Days Inn and pull out a big map of the state. That map gets covered in Post-its marked by numbers up to 11, which is the biggest wolf pack in the state. Volunteer data is included on that map. Wydeven says experienced volunteers are as good at reading tracks as agency biologists. Volunteers also jump into the discussion to interpret

the data, giving them an opportunity to participate and gain a better understanding of how scientific information is formulated.

“When they see how carefully their data is assessed and how it is being used, that seems to encourage people to stay involved,” says Wydeven. “As an agency we get a lot of scrutiny of populations we report on, but I don’t recall ever having criticism from anybody involved

“We are dealing with an environment where public buy-in and public participation in science may be critical.”

in the track survey. By being involved in these surveys, volunteers understand our survey methods, and this puts people out there in the community who are aware of how we get our numbers.”

Treves feels the role citizen scientists play in carrying what they learn back into their communities is as important as gathering data in the first place. Wilttrout, who attends and contributes at the annual meeting, agrees. He sees his role as reporting the facts as accurately as he can both to the DNR and to his neighbors.

“I live in a small community, and we get to know each other pretty well,” says Wilttrout. “The people in the neighborhood rely on me for information about wolf ecology. I wind up being kind of a resource person for that.”

In a world where public support and funding for science is becoming more uncertain, the connection between citizens and science can be key. “We are dealing with an environment where public buy-in and public participation in science may be critical,” says Dietram Scheufele, a professor of life sciences communication at CALS.

The National Science Foundation is changing its narrative and criteria, notes Scheufele, and there are efforts underway to make broader public impact a more important element of grant proposals.

“Being able to point to a citizen science component makes a grant more competitive,” he says. “One of the beauties of CALS is that we have taken advantage of many opportuni-

ties to incorporate citizen science, and that brings more research money into Wisconsin. Volunteers build more excitement around science and ultimately make us more competitive for federal funding.”

A citizen science project, Scheufele says, can increase not only people’s scientific knowledge but also their understanding of how that knowledge might inform public policy. That’s increasingly important in a world where so many science-based issues—climate change, stem cell research and genetically modified foods, to name but a few—have become so politically charged.

An important trigger to a deeper understanding of complex policy decisions is the act of talking things over with other people, Scheufele notes.

“Imagine you are sitting in a 400-student lecture course, twice a week, and the professor tells you facts about soil science or genetically modified foods—but you need to get together with your fellow students in a study group and talk it through to make sense of it,” Scheufele says. “Citizen science plays the role of a study group for participants. People who go out and interact with others about science have a more integrated understanding.”

In essence, citizen science provides a forum not only for learning but also for informed discussion. “The more infrastructure we have for understanding science, the more likely we are to interact with others on this topic,” Scheufele says. “There is positive feedback. If you know something, you are more likely to engage—and the younger we are when we begin this process, the better.”

Indeed, engagement is the key. Kris Stepenuck, of UW Cooperative Extension and the Department of Natural Resources, coordinates 300 adults and 1,500 students who wade into streams all around the state collecting data for UW-Extension and the DNR as part of the Water Action



PHOTO COURTESY MARA McDONALD

A volunteer at Biocore Prairie gently blows on the front of a female common yellowthroat to assess the condition of her brood patch.

Volunteers (WAV), a group that makes water monitoring possible at a level that simply could not happen without them.

Last year WAV volunteers were asked to help expand an urban road salt monitoring project that, because of the cost of continuous monitoring equipment, had stalled at 22 sites.

“Each continuous monitoring site costs \$15,000 to run,” says Stepenuck. “But with volunteers grabbing samples every other week, plus whenever it snowed, they were able to monitor 34 sites for under \$10,000. So it’s much more economical, and we can get a broader picture with the help of this network of local volunteers.”

To keep her volunteer force growing, Stepenuck pays close attention to what motivates them. “They want to see lakes and streams protected for the future,” Stepenuck says. “And the more they learn, the more likely they are to take action to help protect these natural

resources they care so much about.”

As evidence Stepenuck points to a newsletter she uses to keep her volunteers connected with each other and with the research to which they contribute. A recent edition shows the results of a survey tallying volunteers’ community connections and activities related to natural resources. Every person surveyed said he or she has written a letter to the editor of their local paper about water or other resource issues, attended a public meeting, talked with neighbors, engaged in personal reading or research, or sought experts for additional information on water issues. Before becoming a stream monitor, almost half stated they had rarely or never participated in water issue activities in their local communities.

Ted Ludwig is an example of someone who found his engagement deepening. First he joined the Tainter



Lake Association, and then he attended a water monitoring course through Water Action Volunteers. Soon he was monitoring multiple sites. “I’ve taken on coordinating 20 people who are monitoring 15 different streams,” says Ludwig. “Now that I understand the value of water monitoring I keep looking for ways to do more.”

After retiring from 21 years in the Marine Corps and 20 years with the U.S. Postal Service, Ludwig now spends more than 30 hours a week as a Water Action Volunteer and organizing a nonprofit dedicated to monitoring area streams and lakes. When he is not in the water, Ludwig is writing letters to newspapers and going to hearings on environmental issues. He also serves on a citizen committee to help develop lakeshore rules at the county level.

In addition to enjoying being outdoors, says Ludwig, “The thing I like the best is working with young kids. It’s always fun to see the kids when they try to identify the creatures they have found in the water. The people you work with are really nice, and it makes for an enjoyable retirement.”

When the solution depends on observation over large areas, citizen scientists can play a pivotal role. The Great Lakes Early Detection Network, launched this spring and spearheaded by CALS/UW-Extension agronomy professor Mark Renz, will depend heavily on citizen monitoring to identify invasive plant species.

“We started this project to better understand where invasive plants are located and how they are moving within the Great Lakes Area,” says Renz. “Wisconsin has more than 70 species of invasive plants. When you add in Minnesota, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and New York, it’s a huge task to find out where these plants are. We quickly realized that as scientists and researchers, we could not tackle this by ourselves. We are asking people to do a service for their community by reporting invasive plants.”

Renz has designed a website where information can flow back and forth between volunteers and researchers to keep the volunteers engaged. He hopes to attract and build a relationship with volunteers who become knowledgeable about plant identification and stay involved in the program. “We are a network,” says Renz. “The citizen scientists are equal members. We know that if they are not happy, the project will falter.”

Citizen science shows its true power in providing information not only over large areas but also about big phenomena. One example is climate change. Benjamin Zuckerberg recently joined CALS’ Department of Forest and Wildlife Ecology after spending three years at the Cornell University Lab of Ornithology, a national leader in citizen science. As a research associate in citizen science, he analyzed data from Project FeederWatch, which compiles the observations of volunteer bird watchers who have been regularly logging what they see at their feeders every winter since 1990.

One of Zuckerberg’s students, Gavin Jones, is using Project FeederWatch data to study the early arrival of wintering birds in Wisconsin. Jones has found that over the past 20 years, robins have been coming back from their wintering grounds earlier and earlier.

“We have been seeing these kinds of shifts,” Zuckerberg says. “What’s interesting is that they are so dramatic at this point. We will be looking at more species throughout the Midwest to see what species are more or less likely to track changes in climate.”

Zuckerberg plans to draw upon information from Cornell’s eBird Program, which is based on sightings that volunteers from all around the world submit from their smartphones. “At this point eBird is getting anywhere from 2 to 3 million entries a month,” he says.

Zuckerberg is looking forward to bringing more citizen science to bear upon climate change studies in Wisconsin.

“I collaborate pretty closely with several Cornell scientists, and I am now working with climatologists on campus here,” says Zuckerberg. “The Wisconsin Initiative on Climate Change Impacts was a huge incentive for me to come here. The University of Wisconsin system is a model for looking collaboratively at the effect of climate change on natural resources, as well as having a long tradition of citizen science. We plan to set up more volunteer groups here focused on monitoring the effects of climate change.”

**A volunteer tracker spots
prints from the Brush Creek
Wolf Pack in Ashland County.**

*Citizen science
shows its true power in
providing information
not only over large
areas but also about
big phenomena*

For citizen science projects to work, both volunteers and the scientists working with them need to be happy. Some researchers have been hesitant to take advantage of citizen scientists because they are concerned about the quality and accuracy of volunteer-collected data.

As projects like eBird demonstrate, advancements in the smartphone are beginning to ease those concerns. Scientists are developing apps that can answer volunteers' questions in the field and document their observations. A good example is WeBIRD, a smartphone app that identifies birds by their call, thus letting citizen scientists know which bird they are listening to. Its creator, CALS animal science professor Mark Berres, is applying for funding to use the new tool to monitor birds at the UW Arboretum.

"WeBIRD takes the guesswork out of species identification," Berres says. "The user records the call from the bird they want to identify, which verifies the siting, and then WeBIRD identifies the bird. It gives the volunteer immediate feedback. It's like having an expert in the woods with you." Similar techniques are being used to photograph and identify many kinds of plants and animals, and more are being developed.

A continuing attraction of citizen science is the learning process. For many volunteers, apps will not replace in-person training by professionals and seasoned volunteers like Mara McDonald, an assistant administrator in the CALS department of genetics and a trained ornithologist. McDonald helps run a bird-banding program on Biocore Prairie near Picnic Point, where she coordinates the efforts of other citizen scientists.

Through weekly bird netting and banding over the past dozen years, McDonald and her fellow citizen scientists have demonstrated that bird diversity increases in restored prairie,

even if that land is less than two acres in size. "We were able to show within four years that there was a positive effect on bird diversity in the prairie. It's been an exciting little piece of work," McDonald says.


McDonald also has seen exciting growth in her banding project, which she started in 2001 after being a teaching assistant in the UW-Madison Biocore program. She wanted Biocore students to experience animals as well as plants they studied for class. She also wanted to provide opportunities for the campus and Madison communities to work with animals. It has evolved into the Biocore Prairie Bird Observatory, and McDonald hosts regular open houses to recruit citizen scientists to the project.

Looking for a family activity, John Bauch, along with his wife, Michelle Louis, and two sons, Alex and Evan, attended one of McDonald's open houses about seven years ago. They've been banding Saturdays from spring to fall ever since.

"While we're there, we see other biology groups doing all kinds of experiments on insects and prairie plants," says Bauch. "We see people who are studying dragonflies. They are really good at catching them, and we look at dragonflies while we are banding birds. It's been a tremendous influence on the whole family, especially the kids. The people we work with are so genuine and interested in what they are doing and willing to share information."

The experience made his kids keener observers of nature, Bauch notes. "From our work in the prairie, I'm convinced my sons learned to see things differently than many young people," Bauch says. "They notice things that other kids run right by."

Alex Bauch is now a biology major at St. Olaf College. "I remember the first time I went to the prairie," he says. "It was one of those open house days, I must have been 11. At that point, I wasn't really interested in birds. That was the first time I got to hold a bird, and that sparked something in me. It was a great way to spend my time. I definitely felt like I was contributing to the scientific effort."

After reflecting for a moment, Alex offers this advice to other potential citizen scientists. "If there is anything you are even a little interested in, try it out. It may become something that's really important to you." 

Get in touch with some citizen science programs

- Biocore Prairie Bird Observatory:
<http://waa.uwalumni.com/lakeshorepre-serve/birdbanding.html>
- Cornell University Lab of Ornithology:
<http://www.birds.cornell.edu/citsci/projects>
- Great Lakes Early Detection Network:
www.gledn.org
- UW Arboretum:
Brad Herrick, bmherrick@uwarb.wisc.edu,
(608) 263-7344
- Water Action Volunteers (WAV):
<http://watermonitoring.uwex.edu/wav/>
- Wisconsin Bat Monitoring Program:
<http://wiatri.net/inventory/bats/>
- Wisconsin Volunteer Carnivore Tracking:
<http://dnr.wi.gov/org/land/er/mammals/volunteer/>

And for an array of statewide opportunities:

- Who's Who in Citizen-Based Monitoring:
<http://wiatri.net/cbm/WhosWho/>

The Culture of Ag



A family stops to appreciate the sculpture *Boots*, by Christopher Lutter-Gardella, on display as part of the Reedsburg Fermentation Fest last fall. The Fest, to be held again in October, included a self-guided tour of farm-based art installations along a 50-mile loop of rural roads.

CALS HAS A UNIQUE LEGACY
OF CELEBRATING THE ARTS AND
HUMANITIES IN AGRICULTURE.
AN EXPLORATION THAT FORMALLY
STARTED DURING THE DEPRESSION
IS ENJOYING RENEWED VIGOR IN
RURAL ARTS CELEBRATION TODAY.

BY JENNIFER A. SMITH



PHOTO BY PAM HEANY

THE LAST THING YOU'D EXPECT to see inside a university's newly renovated, state-of-the-art biochemistry center is a 1940s Regionalist masterpiece celebrating rural life. Ditto for a rotating exhibition of paintings by contemporary rural artists ringing the grand vestibule of Agricultural Hall, seat of the University of Wisconsin–Madison College of Agricultural and Life Sciences.

CALS' reputation as a scientific innovator is well established. Less heralded, and unique among agricultural colleges, is that CALS throughout its history has been a cultural innovator as well, taking pains to illuminate the ways in which the sciences and the arts intersect—and why each way of knowing the world is so important to the other.

John Steuart Curry's 1942 mural in the Biochemistry Building offers a prime example. *The Social Benefits of Biochemical Research* powerfully illustrates the benefits made possible by vitamin discoveries and applications. On the left side of the main panel, the artist depicts a sickly hog and wan children, including a boy whose bowed legs are a sign of rickets. At the center and right, we see hale and hearty kids, adults and livestock. Men pictured at the back of the mural are some of CALS' legendary figures in vitamin research, including Harry Steenbock, who eradicated rickets by discovering how to increase vitamin D content in foods.



PHOTO BY ROBIN DAVIES

Far from being accidental or casual, Curry's decade-long association with the College of Agriculture was part of a deliberate aim to meld culture with agriculture. From 1936 until his death in 1946, Curry was artist-in-residence at UW in the first such arrangement at any American university—and his residency was in the College of Agriculture.

While artist-in-residence programs are now common at schools and universities across the country (and even in some businesses, such as Milwaukee's Pfister Hotel), they were a novel concept in Depression-era America.

Yet Curry's residency is just one facet of CALS' longstanding interconnections with arts and culture, both historically and today. Such connections highlight the importance of agriculture for students and the general public. They also provide important pathways for rural people to express themselves and celebrate their livelihoods and communities.

Spotlighting the cultural side of agriculture is a deep part of Wisconsin's heritage. And that tradition still burns brightly through new initiatives of which many CALS faculty, alumni and students are a part.

CHRIS L. CHRISTENSEN, DEAN of the College of Agriculture, deserves the lion's share of the credit for the Curry residency. Under his tenure, Curry—part of a famed trio of American Regionalist painters alongside Grant Wood and Thomas Hart Benton—arrived at UW in fall 1936.

Born on a Nebraska farm, Christensen had studied not only at the University of Nebraska but also at the University of Copenhagen and the Royal Agricultural College in Denmark. His Scandinavian experience left an indelible mark. Christensen was deeply influenced by Danish “folk schools,” where people from all walks of life took free courses that fostered their self-expression.

Author Jerry Apps BS'55 MS'57 PhD'67—who is himself a product of CALS and one of the state's most highly regarded experts on Wisconsin rural culture—offers some insight.

“Though it sounds a bit corny, Christensen supposedly said that one of his goals upon becoming dean was to put some culture back in agriculture,” says Apps. “He embraced the Danes' philosophy that rural people should have the opportunity to study art and poetry as well as learn how to improve their cattle and field crops.”

During his campus residency, Curry didn't just squirrel away in his studio (now gone, but once located on Lorch Street). Instead, he taught painting to Farm and Industry Short Course students and traveled the Badger state with UW Extension agents and rural sociologist John Rector Barton, author of the seminal *Rural Artists of Wisconsin* (1948).

In fact, today's Wisconsin Regional Art Program (WRAP), now headquartered at the Division of Continuing Studies, was born in the College of Agriculture as the Wisconsin Rural Art Program, with the mission of fostering

the development of nonprofessional artists. The first Rural Art Exhibit was held at the Memorial Union during Farm and Home Week in 1940.

That inaugural show featured 30 artists. As an artist of national stature, Curry strolled around offering critiques and ate lunch with the participating artists. “It was so wonderful they decided to do it again the next year,” says Leslee Nelson, who has been WRAP director since 1982 and wrote her master's thesis on Curry. The 1941 exhibition attracted the attention of *Life* magazine, and the program continued to blossom rapidly, with 100 exhibiting artists in 1947.

Nowadays more than 20 regional shows take place, with the top third of artwork selected for exhibition in Madison at the UW's Pyle Center. Visitors to Ag Hall today are welcomed by a sampling of art on loan from WRAP, from colorful landscapes to Asian-style scroll paintings.

Nelson is proud to carry on the tradition established by Curry and deepened by his successor as artist-in-residence, the still life and trompe l'oeil master Aaron Bohrod, as well as by earlier WRAP directors James Schwalbach

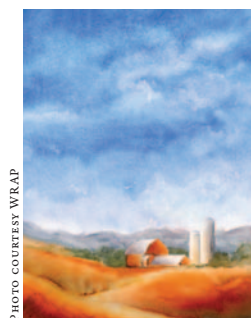


PHOTO COURTESY WRAP

This landscape by Cheryl Hilliard Breunig is a recent selection from the Wisconsin Regional Art Program.

Detail from *The Social Benefits of Biochemical Research*, a mural by John Stuart Curry painted during his time as CALS' artist-in-residence. The painting was recently restored as part of the remodeling of CALS' biochemistry center.

(Below) Encouraging homegrown written expression: UW–Extension professor Robert Gard out talking to the people, ca. 1950. His Office of Community Arts Development was housed in Ag Hall. On the door of his truck are the words “Wisconsin Idea Theatre.”

and Ken Kuemmerlein. (Schwalbach is also known as the creator of *Let's Draw*, a wildly popular WHA radio program that brought art instruction to thousands of rural children. By 1952, it served 4,320 classes with a combined 95,040 students. Another popular arts program of that era was *Journeys in Musicland*.)

“I believe everybody's creative,” Nelson says. “It's an essential part of a healthy life. Whether it's painting, knitting, cooking or fixing cars, it's about problem solving and figuring things out.”

Small Community in the late '60s. Gard, who passed away in 1992, is remembered for his deep sense of place and his belief that all people deserved avenues for creative expression.

That conviction was shared by UW President Glenn Frank, who in a preface to one of Gard's works in support of a “people's theater in Wisconsin” wrote: “There is poetry as well as production on a farm. Art can help us to preserve the poetry of farming while we are battling with the economics of farming.”

Jerry Apps regards Gard as an important mentor. “He really pushed me

CALS Distinguished Service Award for his lifelong body of work.

“Gard saw storytelling not only as entertainment, but as helping people understand place, how they as human beings relate to place, and how it has an influence on them—and how rural people shouldn't apologize for that but be proud of it,” says Apps. “That's what I'm trying to do in my own work.”

Flourishing organizations that were started or co-founded by Gard—such as the Wisconsin Regional Writers Association and the Council for Wisconsin Writers—encouraged, and still encourage, homegrown written expression. “What Gard managed to do was bring rural poets out of the closet,” says Apps. “Because if you were a farmer in Oneida County in 1950, you didn't want anyone to know you were writing poetry. Gard made it okay.”

Gard also founded the School of the Arts at Rhinelander in 1964. Nearly a half-century later, it is still a vibrant learning center for nonprofessional artists of all disciplines. Today's students immerse themselves in everything from folk art and music to digital media.

EACH YEAR SEES HUNDREDS OF of culturally infused ag festivals around the state honoring all manner of livestock and foods, along with county fairs, barn dances and farm technology displays—and CALS and Extension faculty, agents and alumni have a hand in many of them.

A new high-profile celebration with significant CALS involvement is the Fermentation Fest, a 10-day celebration that drew approximately 4,000 attendees to Reedsburg last fall—a ringing success that ensured a repeat this fall from Oct. 12 to 21. It's spearheaded by the nonprofit Wormfarm Institute in collaboration with a wide range of community partners.

Wormfarm Institute was founded by

But CALS' engagement with rural arts and culture has by no means been limited to the visual arts. Robert Gard, a professor with UW Extension, was charged with fostering rural theater and writing programs through his Office of Community Arts Development, housed in Ag Hall. As part of that work, Gard authored such classics as 1955's *Grassroots Theater: A Search for Regional Arts in America* and *The Arts in the*

beyond writing the straight stuff I was doing for the 4-H office,” says Apps, a CALS professor emeritus of continuing and vocation education who once served as a county Extension agent and 4-H specialist. Apps went on to write dozens of books and novels relating to all manner of Wisconsin history, culture and rural life. Popular titles include *Barns of Wisconsin*, *Ringlingville* and *Horse-Drawn Days*. Recently Apps received a



PHOTO COURTESY UW–MADISON ARCHIVES



Literally, a landscape:
Farmed Frame by David Wells, another work featured on the Fermentation Fest's Farm/Art D-tour.

a pair of artists, Donna Neuwirth and Jay Salinas, who left Chicago in 1995 to start a CSA farm in Reedsburg. Five years later, they expanded that farm into a nonprofit that not only reconnects consumers with the source of their food but also forges creative links between urban and rural, people and land, culture and agriculture.

The Fermentation Fest is in the vanguard of a burgeoning national trend known as “creative placemaking.” Wormfarm Institute last year received \$50,000 from the National Endowment for the Arts (NEA) under its new, highly competitive “Our Town” grant program, which is designed to strengthen the arts and support the social, physical and economic characters of selected communities. Wormfarm also received \$100,000 from ArtPlace, a consortium of other leading foundations and federal agencies—including the U.S. Department of Agriculture—devoted to community revitalization through creative placemaking.

Fermentation was chosen as the festival theme because of the live and active cultures it evokes, in all senses of that phrase. Billed as “a live culture convergence,” the Fest featured such hands-on presentations as Hot Compost, Sourdough Bread Baking and The Secret Life of Chocolate (most people don’t know it’s fermented). A festival highlight was an accompanying

“Farm/Art D-tour,” a self-guided tour of farm-based art installations created for the event along a 50-mile loop of rural roads. And the route was studded with “Roadside Culture Stands,” artist-designed mobile farm stands.

The theme of fermentation hooked right into CALS. Jenny Erickson BS’98 MS’02 has spent a decade working for UW-Extension in Sauk County as a community natural resource and economic development agent. She also administers the county’s publicly funded arts and culture grant program (Sauk is the only rural county in Wisconsin that has one). All those hats enable her to serve as a critical link between the needs of her local community and the resources of the university.

Erickson facilitates the steering committee that plans and oversees Fermentation Fest. For her, much of the Fest’s appeal is that its focus is on not importing arts and culture from elsewhere.

“There’s a lot of culture in a rural community and sometimes people forget that or don’t see it,” says Erickson, who grew up in a small community (Wild Rose, Wisconsin, same as Jerry Apps). “The great thing about Fermentation Fest is that it’s bringing out that culture that’s part of a rural community. You don’t need to travel to a metropolitan area to experience ‘culture’ or see art. It’s showcasing what’s already here.”

CALS faculty contributed their talents. Jim Steele, a CALS UW-Extension professor of food science, led a workshop called “Inner Life,” in which he introduced a diverse audience ranging from teens to octogenarians to the science behind fermented foods and probiotics.

Steele, who is working to help establish CALS as a national leader in fermentation science (see “Rising to the Top,” *Grow*, summer 2011), is fascinated by both the cultural and scientific aspects of fermented food and drink.

“For thousands of years, we’ve made hundreds of different fermented foods and beverages without understanding the science behind their production. But through culture and oral history we’ve passed down what works and what doesn’t, and the end result has been some extraordinary products,” Steele says. “Now we have a much greater understanding of the science of many of these products, which has allowed us to produce them with far greater consistency and at a much larger scale. These scientific advances combined with human creativity have fueled the enormous growth in craft beers and specialty cheeses.”

Michael Bell, a professor of community and environmental sociology and director of CALS’ Center for Integrated Agricultural Systems, participated in the Fermentation Fest as a musician and composer. He took part in several outdoor “pasture performances” with his ensemble, Graminy, a name that derives from the botanical name for the grass family, Gramineae. Bell calls Graminy’s style “class-grass,” a combination of classical and grassroots traditions.

For Bell, merging cultural and agri-

Chop, chop, chop: Cooking classes at Fermentation Fest focused on the science of fermentation in sauerkraut, chocolate, bread, beer and wine.



cultural themes offers an opportunity to look at agriculture in a bigger context. “Agriculture provides us with food and that’s extremely important, but it also provides us with so much more: wildlife habitat, clean water, and also aesthetic and cultural values. One of the important roles of the humanities, and in thinking about the ‘culture of agriculture,’ is to remind us of the wholeness that is agriculture,” says Bell.

Bell will participate in Fermentation Fest again this year as part of a program element called “Decomposition.” Graminy will write a composition in the key of D—“A ‘D’-composition, if you’ll excuse the pun,” Bell says—and perform it for composers from around the state, who, in turn, will react to it by creating something new out of its themes. Thus artistic processes will echo natural processes. “Decomposition is actually about life and growing new things out of the old, using the old as that which fertilizes the new,” Bell says.

Sarah Lloyd, a CALS graduate student in community and environmental sociology, considers what the arts and culture mean in rural life both personally, as part of a dairy farm family and a Wormfarm board member, and in her research. Her dissertation uses Richland County as a case study to examine changes in rural life—economic, ecological and social—since World War II. Cultural expression is not only about individual creativity or a sense of place, she says. It also can be a vehicle for economic development and communication.

“Many rural communities—in my experience from living in and studying them—have lost vibrancy, especially if you look at the empty storefronts in the downtowns of some of our villages and small cities,” Lloyd says. “Having the chance to highlight what’s special about a place also hopefully has the impact of creating economic activity around it.” Her words echo research done for the

national Mayors’ Institute on City Design, funded by the NEA. In their report “Creative Placemaking,” researchers Ann Markusen and Anne Gadwa note that “creative locales foster entrepreneurs and cultural industries that generate jobs and income, spin off new products and services, and attract and retain unrelated businesses and skilled workers.”

And when some rural places have become bedroom communities for nearby cities or sites for vacation homes, arts and culture also can serve as a way for newcomers to learn about an area’s agricultural heritage, Lloyd notes.

Helping people understand the working landscape is an important part of Fermentation Fest and the Farm/Art D-tour. Encountering a sculpture like Christopher Lutter-Gardella’s monumental *Boots* along County Highway F jolts viewers with the unexpected. While the sculpture is playful, the brown work boots acknowledge the labor of those who farm the lands of Sauk County.

MEANWHILE, BACK ON CAMPUS, CALS faculty, staff and students continue to draw unusual ties to the arts. Genetics professor Ahna Skop creates her own art—often inspired by her lab work with *C. elegans* nematode worms—and helped organize a permanent display of art created from microscopic images in the foyer of the Genetics/Biotechnology building. And CALS faculty, staff and students delivered three out of 12 winning or honorable mention entries in a campus-wide Cool Science Image Contest (one of them appears on the back cover of this issue).


Other CALS/UW-Extension faculty find unlikely uses for art in teaching. Horticulture professors Irwin Goldman, Jim Nienhuis and Rebecca Harbut

regularly take their classes to the UW’s Chazen Museum of Art to get students thinking not only about how fruit looked in centuries past or what diseases affected plants, but also the social aspects of our food system.

Students in “Horticulture 345: Fruit Crop Production,” for example, tour the Chazen to look at specific depictions of produce in art. “When students finish my course, I want them to have an appreciation for not just the production of fruit, but the impact on the greater society, both negative and positive,” says Harbut. “I encourage them to explore how our relationship with food changes over time, how our expectations change over time, and to look at that in a critical way.”

A self-described “fruit fanatic,” Harbut notes that many students today grow up with little notion of what it takes to produce food. But, she says, “You can really see it when you look back in art, you see depictions of agriculture and food production. There is respect for the art of cultivating that fruit.”

Aside from pushing students to think about everything from pests that damage fruit crops to timely issues like “food deserts” in poor, urban areas, Harbut also wants CALS learners to be open to cultural experiences and all that the university has to offer.

“I can say to them, ‘Hey, go to the Chazen and have a look!’” says Harbut. “The greatest injustice we can do is keep them trapped in our discipline and not encourage them to explore other things.” 

in the field



Graham Adsit



Paul Boor



Andy Diercks



Brian and Jill Huenink

Graham Adsit BS'04 Biological Systems Engineering • Graham Adsit moved from engineering into medicine, earning his M.D. at the Columbia University College of Physicians and Surgeons. He now focuses his attention on using the most recent medical tools and therapies available to treat his patients. As a Fellow in cardiovascular medicine at UW Hospital and Clinics and a graduate student in cell and regenerative biology, Adsit says he has found a career that allows him to positively influence people's lives with unparalleled intimacy. "I am driven by the desire to heal and to help patients feel well, and am rewarded when there are successful medical interventions," he says. But his impact on the world around him doesn't stop at the hospital. Utilizing his background in agriculture—he is a partner in his family's grain operation, Long Winter Farm—he founded World Farmer, a grassroots movement that allows farmers to donate grain commodities directly to food relief programs. In addition, Adsit is an officer in the Air National Guard, serving as a flight surgeon.

Paul Boor BS'85, MS'88 Agricultural Engineering • Paul Boor is the Vice President for Engineering Services and Product Development at Lester Building Systems, a firm that designs and manufactures custom agricultural and commercial structures. In that role, he provides oversight for the design and product development process at Lester, from the design engineer's desk to final plans. "All of our products are unique, built-to-order structures," he explains. "We always try to understand how new

products will fit into the big picture as they are developed." He says his CALS education helped him to think more broadly about a lot of topics. "Coming from a dairy farm in rural Wisconsin and moving to Madison was an eye-opening experience," he says. "My education opened doors that otherwise would have been closed."

Andy Diercks BS'93 Agricultural Engineering • Andy Diercks has a passion for potatoes. A fourth-generation potato grower, Diercks operates Coloma Farms, Inc. with his father Steve. Together they grow 2,700 acres of potatoes and grain. On the farm, he uses his engineering acumen to manage the farm's mechanical and technological challenges. "My passion is problem solving that attempts to make everybody else's job easier or more efficient," he says. Diercks also is active in industry leadership. He serves as a director on the United States Potato Board and is a past president of the Wisconsin Potato and Vegetable Growers Association. As a member of that organization he is working with CALS faculty and other partners on the Central Sands Water Initiative, a project that seeks to shed light on causes and solutions for water shortages in that area. He also chairs the citizen board for the Wisconsin Department of Agriculture, Trade and Consumer Protection.

Brian and Jill Huenink BS'00, MS'03 Agricultural Engineering | BS'03 Agricultural Engineering • Brian and Jill Huenink have built their engineering careers at John Deere, where Brian is a senior engineer charged with meeting

new EPA emissions requirements for Deere's 7R tractor. Jill's resume includes work on drivetrain and chassis components of John Deere's popular 7000 and 8000 series tractors. As a couple they recently received the 2012 Young Engineer Award from the American Society of Agricultural and Biological Engineers in recognition of their outstanding contributions to their profession. Currently Jill is taking a long-term leave from John Deere to raise their children, but she's still working outside the home; she and Brian are partners in Brian's family dairy and certified seed operation near Cedar Grove. "CALS laid the foundation for my career as an engineer by giving me the tools, contacts and experience necessary to step right in and make a difference," Brian says. "I can't say enough about the positive effect the faculty had on my lifelong commitment to agriculture."

Alan Koepke BS'63 Agricultural Engineering • Alan Koepke has never been a practicing engineer, but that hasn't prevented him from utilizing the engineering skills he developed at CALS. In fact, as a partner in Koepke Farms, Inc. near Oconomowoc, Koepke says that using his engineering skills to design buildings, repair farm machinery and implement soil drainage systems has been his favorite part of farming. The 320-cow dairy also boasts an impressive record of conservation, winning the Wisconsin Leopold Conservation Award last year in part for their efforts to reduce soil erosion through no-tillage cropping systems. "Conservation has always been used on our farm," Koepke says. "I took a soils class taught by pro-

Alumni who are making a difference in Biological Systems Engineering



Alan Koepke



Karen Mandl



Scott Mueller



Greg Williams

fessor Art Peterson that really inspired me in soil conservation." Along the way, Koepke also has made an impact on the dairy industry. He helped found the Professional Dairy Producers of Wisconsin and has served as a past president of the Wisconsin Holstein Association. Alan, along with his brothers, Jim and David, and a nephew, John, were named World Dairy Expo Dairymen of the Year in 2011.

Karen Mandl BS'03 Biological Systems Engineering, MS'05 Food Science •

Karen Mandl loves the idea of working on food products because they are such an integral part of our everyday lives. "When I say, 'I work on Cheerios,' that's something everyone can relate to," she says. As a product developer at global food giant General Mills, she is currently working to make popular breakfast cereals healthier by, for example, increasing fiber and whole grain content. "We always try to make the product taste the same as it did before those changes so that it will still be the product people love," she explains. Mandl joined General Mills' strategic research group in 2005 after four summers as an intern with the company. In her spare time, Mandl enjoys participating in competitive open-water swim races.

Scott Mueller BS'87 Agricultural Engineering • Scott Mueller wanted to combine his passion for agriculture with his talent in math and science. When it came time to pick a career, he found agricultural engineering and never looked back. "Coming from a small family farm, I enjoy assisting in conservation engineering work being applied to the land in Wisconsin," he says. For a time he worked as an area engineer in southwest Wisconsin, helping landowners improve their conservation practices. Today he is the assistant state conservation engineer for the Natural Resources Conservation Service, a division of the U.S. Department of Agriculture, where he provides oversight and leadership for engineers across Wisconsin. "I know this conservation work makes a positive impact on the landscape of our state," he says. Mueller is a registered professional engineer (PE). As a 26-year member of the American Society of Agricultural and Biological Engineers (ASABE) he currently serves as a technical committee member, committee secretary and writer for the Agricultural Engineering professional engineer exam.

Greg Williams BS'91 Construction Administration, MS'93, PhD'99 Agricultural Engineering • Greg Williams' family

has a 100-year history of involvement in two industries: construction and agriculture. So becoming an agricultural engineer was a natural choice for Williams, the president and founder of Facility Engineering Services, PA. The Arkansas-based company focuses on designing industrial processing facilities for the food, biofuel and agricultural industries. A practicing engineer, Williams has designed many facilities including feed mills, grain elevators, malting plants, meat and poultry plants, and other food and agricultural processing facilities. He takes pride in having founded his own business. "Being a business owner is much like running a dairy farm," he says. "It's a seven-day-a-week job." He remains in close contact with the Biological Systems Engineering department and serves on American Society of Agricultural and Biological Engineers committees.

—BY TAYLOR FRITSCH

About In the Field

These alumni represent the depth and breadth of alumni accomplishments. Selections are made by Grow staff and are intended to reflect a sample of alumni stories. It is not a ranking or a comprehensive list. To read more about CALS alumni, go to www.cals.wisc.edu/alumni/

Know a CALS grad whose work should be highlighted in *Grow*? E-mail us at: grow@cals.wisc.edu

Next issue: A selection of recipients of WALSA's "40 in 40" Impact Awards.

Catch up with ...

Michael Boettcher BS'06 Horticulture

YOU GET YOUR FIRST INKLING of the care Michael Boettcher gives the grass in Miller Park right before he steps onto it: He pauses to knock the soil off of his shoes. In the big leagues, details matter. An errant bit of soil could divert a grounder, extend an inning and maybe change the game. As grounds manager for the Milwaukee Brewers, Boettcher can't let that happen.

And he wants the field to look as perfect as it plays. No other patch of turf in Wisconsin gets as many looks as these two acres, and Boettcher has exact standards for the landscapes under his care. That began when he was growing up on his family's Jackson County farm, where taking care of the grounds was one of his favorite chores. Even though he now has a crew of 40 to maintain the 250-acre Miller Park campus, he still climbs on

the mower when he gets a chance to cut those perfect crosshatched patterns. Mowing is soothing, he says, and he loves the smell of fresh-cut grass.

Boettcher got his start in pro sports through a summer internship with Gary VandenBerg, the Brewers' head groundskeeper. He loved it, and he made a good impression. Two years after graduation, the club invited him to join its landscape team and later promoted him to become VandenBerg's first assistant. When VandenBerg passed away last fall after a battle with cancer, Boettcher took over his responsibilities for the remainder of the season.



PHOTO BY WOLFGANG HOFFMANN BS'75 MS'79

● **When you watch a game in Miller Park, what do you see that the fans don't?**

When the ball rolls across the infield, fans watch the players to see how they'll field it. We're watching the ball, to see how it reacts as it's going from the grass surface onto the dirt on the infield to make sure there are no bumps, no irregular bounces. Players have the expectation that the ball's going to come to them as naturally as possible. That's what we try to do for them.

● **What was life like during the National League Championships?**

I slept a lot of nights on the couch in my office. There was no opportunity to go home. We were painting logos from midnight to 4 a.m. You're given a window to get stuff done, you get it done. But adrenaline keeps you going. That's what every groundskeeper dreams of—having postseason played on their field, to be on a worldwide stage. It's a great honor, a great thrill.

● **Did you come to CALS with this kind of career in mind?**

No, I started out in animal science. I took a class in horticulture my freshman year that gave me a chance to work in the Allen Centennial Gardens with garden director Bill Hoyt. It just opened my eyes. We were supposed to put in 25 hours of volunteer work, but for me it went way past that—I helped out at the garden whenever I could. It was awesome. I couldn't wait to get back to the gardens. The next fall I switched to horticulture.

● **Your internship with Gary VandenBerg was pivotal to you. Are you carrying on the tradition?**

Definitely. The program Gary established has become a nationally sought-after internship. This year we're bringing in interns from Kentucky, Michigan, California and Illinois as well as one from UW-River Falls and one from Madison. I love the teaching aspect of the job. That was something that Gary preached—teach the kids who are going to take care of our fields tomorrow.



PHOTO COURTESY UW FOUNDATION

Dairy Cattle Judging Team 2009 flanked by David Dickson on the far left and former team coach Ted Halbach, far right

JOIN CALS alumni and friends at **Farm Technology Days** in Outagamie County (host farms: Sugar Creek and Heideman Farms, New London), **July 17–19**. CALS will host daily receptions in “tent city”—look for the Wisconsin Alumni Tent. The Wisconsin Agricultural and Life Sciences Alumni Association (WALSAA) will hold a picnic on **Wednesday, July 18, 3 p.m. to 8 p.m.**, at Fox Valley Technical College in Appleton. Brats, burgers, salads, soda, beer, milk and dessert will be served. No reservations necessary, friends and family welcome. Tickets may be purchased upon entry. More info at outagamiefarmtech.com and walsaa.org.

CELEBRATE with CALS/UW–Madison at the **Wisconsin State Fair** on **Wednesday, August 8**. Activities include science demonstrations, musical performances (including the UW Marching Band) and athletic contests. Visit statefair.wisc.edu to learn more.

FIRE UP for the **WALSAA Football Fire-Up** tailgate party and silent

auction on **Saturday, September 15** at the University of Wisconsin Foundation in Madison prior to the game against Utah State at 7 p.m. This year’s Fire-Up will also recognize recipients of WALSAA’s “40 in 40” impact awards, an honor marking WALSAA’s 40th anniversary. Volunteers needed! More info at walsaa.org.

REUNITE and mingle with CALS alumni and friends at **World Dairy Expo, October 2–6**. A CALS reception will be held on **Wednesday, October 3, 4–6 p.m.** in the Monona Room, featuring appetizers, Spotted Cow and other refreshments. RSVP mmcginnis@cal.wisc.edu.

LEARN AND HAVE FUN with experts at **CALS’ Agricultural Research Stations** around the state. A wide array of events are planned all summer. Examples: “Batty about Bats,” Garden Day Open House with Master Gardeners, Beef Field Day. Marshfield celebrates a centennial on **August 16**. More info at go.wisc.edu/e599g.

Skills Beyond the Arena

A dozen years of cattle judging have taught Laura Elliott a lot.

“You get to see all of your work and determination pay off when you realize just how much you have learned, not only about cows but also about yourself,” says Elliott, a senior majoring in dairy science and life sciences communication.

Elliott is a member of the CALS Dairy Cattle Judging Team. Her group placed first in the Jersey category at this year’s Southwestern Exposition and Livestock Show in Fort Worth, Texas—the most recent in a regular stream of team honors over the years. Much of the team’s competitive strength rests on its ability to travel, which is made possible by the David Dickson Dairy Cattle Judging Team Fund.

“We travel to four regional contests and to the national contest every year,” says team member Danielle Brown, another dairy science/life sciences communication major. “Also, we spend about a month visiting the best farms around the state to practice. We don’t have to worry about getting to the best herds and being the best prepared team.”

The fund, named in honor of the late longtime coach and professor of dairy science David Dickson MS’63 PhD’67, serves as the primary funding for an activity that allows students to develop important professional skills needed in—and beyond—the dairy industry.

Ted Halbach, who served as the team coach for 12 years before stepping down last summer to focus on directing the Farm and Industry Short Course program, describes the team’s far-reaching benefits.

“According to employers, students who take part in this activity become better decision-makers and better problem-solvers than students who do not participate in dairy cattle judging,” says Halbach. They also become better communicators. “Our teams are recognized as some of the very best for their communications skills, often winning the Oral Reasons portion of the competition,” he says.

It was a joy to see students develop those skills, says Halbach. “Students start with the judging team their sophomore year, and just to see that growth and maturity develop through their senior year, really, it’s very rewarding,” he says. “That was my favorite part of the program.”

To help support the David Dickson Dairy Cattle Judging Team Fund, visit: <http://www.supportuw.org/giving?seq=14633>

The UW Foundation maintains more than 6,000 gift funds that provide critical resources for the educational and research activities of CALS.

For more information, go to: www.grow.cals.wisc.edu



Give to CALS—

Our Students Will Thank You

Your gift to the CALS Annual Fund helps our young people make the best of themselves.

And the skills and sense of stewardship learned at CALS help them make the best of our world.



■ **Jennifer Holle BS'12** received a scholarship reserved for undergraduates from rural communities. Holle belongs to the nearly 40 percent of CALS students who demonstrate significant financial need. Such support is helping Holle reach her goal: To become a veterinarian serving Wisconsin dairy farms like the one she was raised on.



■ As an undergraduate, **Michael Crossley BS'12** published a peer-reviewed paper with a professor, created a sustainable pest control method for a local farmer and won a national prize from the Entomological Society of America. Half of CALS undergraduates conduct research with faculty—a rate higher than anywhere else on campus.



■ Performing service work in Africa with CALS changed life for **Ellen Tangel BS'11**. “It reshaped my career goals, which now include doing nutritional work in developing countries,” she says. Many corporate leaders see international experience as a professional requirement. “It’s an indicator of someone having geographic mobility and a global perspective—attributes the future leaders of our industry will need,” says a Dow AgroSciences executive.

Your support makes these opportunities possible

Your gift of any amount to the CALS Annual Fund is needed in a time of changing funding sources for the university.

To make a gift, please visit supportuw.org/giveto/cals

or mail to UW Foundation, U. S. Bank Lockbox, Box 78807, Milwaukee, WI 53278-0807

You may also contact Barb McCarthy (608) 265-5891 or barb.mccarthy@supportuw.org to learn more.



Take the FINAL EXAM!

This Edition: THE CALS HISTORY CHALLENGE!

A special Final Exam in honor of a new course in CALS history, Inter Ag 375. More on page 5.

Fill out your answers online. Ace our quiz and we'll enter you in a drawing for a gift box of Babcock Hall cheese. Go to: www.cals.wisc.edu/grow/ for more details.

1. The first commercial cheese-making plant in Wisconsin started operation in

- a. 1840-1850
- b. 1860-1870
- c. 1900-1910
- d. 1920-1930

2. Warfarin, invented by K.P. Link and co-workers at the UW, is used as:

- a. a chemical weapon
- b. a weed-killer
- c. a blood thinner
- d. an insecticide

3. A major problem in producing pork from pigs was PSE, which was related to PSS and malignant hyperthermia. This problem was pioneered on the UW campus by former professors Bray, Briskey and Cassens (Department of Animal Sciences). What does the P in PSE represent?

- a. pork
- b. porcine
- c. pale
- d. phenylalanine
- e. protein

4. Nitrogen fixation in plants is a major factor in successfully producing agronomic products for production agriculture. Over the years this process was intensely studied in the College of Agriculture by many renowned scientists representing several departments. One of those scientists (no longer living) was a plant biochemist who became a scholar and an international authority on the subject, and was also a dynamic teacher and a dedicated chairman of the Department of Biochemistry. Who was this person?

- a. Fred
- b. Foster
- c. Steenbock
- d. Burris
- e. Link

5. The fermentation product made in largest quantities in Wisconsin today is:

- a. yogurt
- b. pickles
- c. sauerkraut
- d. silage
- e. beer

LAST ISSUE: Answers were 1: D, 2: B, 3: D, 4: C, 5: E. Congratulations to Rebecca Engel BS'06, who was randomly selected from the 30 people who correctly answered all questions. She wins a gift certificate to Babcock Hall.

SOCIAL SLIME is the title of this photo by CALS soil science researcher David Hunter Dyer, who received an honorable mention in a campus-wide Cool Science Image Contest. In this image, the slime mold *Dictyostelium discoideum*, usually translucent, has acquired a cherry hue from meals of the bacterium *Serratia marcescens*, which carries the red pigment prodigiosin. While the slime mold has digested its meal, it retains the red pigment, which has antibiotic, immunosuppressive and anti-cancer properties.

Photo taken in the lab of soil science professor Bill Hickey, O.N. Allen Laboratory for Soil Microbiology

