

grow

Wisconsin's Magazine for the Life Sciences • Spring 2012

food & agriculture • environment • energy • health

New *to the* FIELD

**Beginning farmers from all backgrounds
help meet a growing need for food**



College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON

WISCONSIN'S VANISHING WATERS • TECH TRANSFER SUCCESS STORIES • REDUCING FOOD WASTE



Buffing some jewels: The newly renovated Biochemistry Building includes a restoration of John Steuart Curry's mural, "The Social Benefits of Biochemical Research" (above), which he painted in the 1940s as the university's first artist-in-residence, based at CALS. The mural is located in the stairwell foyer.

Joan Gorman (right), a senior paintings conservator with the Midwest Art Conservation Center, restored that piece as well as Curry murals lining the building's Seminar room.





grow

Wisconsin's Magazine for the Life Sciences

12 Growing Future Farmers

A growing population means more mouths to feed—and more farmers needed to feed them. A number of CALS programs help bring new growers into the field.

By Erik Ness

20 Vanishing Waters?

Numerous lakes and streams are drying in the Central Sands, but there's little agreement on what's causing it. A CALS-led initiative brings all stakeholders together to help shed light on the problem.

By Nicole Miller MS'06

28 Tech Transfer Showcase

The discovery-to-marketplace trail blazed by Harry Steenbock remains strong today. Here are some CALS-based businesses you should know about.

By Nicole Sandler and David Tenenbaum

Departments

4 In Vivo

Interim Dean William F. Tracy

5 On Henry Mall

Grazing goats help restore Wisconsin landscapes

Solving the mystery of a deadly bat disease

Program helps farmers with disabilities

ClassAct: Ronald Crandall

KnowHow: How to dye eggs naturally

10 Living Science

Jed Colquhoun teams with farmers, processors and pantries to get food where it's needed most

34 Working Life

The Grow Dozen: Alumni making a difference in life sciences communication

Catch Up With ... Beth Zupec-Kania BS'81

38 Back List

Five things everyone should know about hops

39 Final Exam

On the cover: Beginning farmer Rebecca Claypool in her fields in Avoca, Wisconsin

Photo by Lukas Keapproth/Red Wave Pictures

PHOTOS BY JEFF MILLER/UNIVERSITY COMMUNICATIONS



Interim Dean William F. Tracy

Funding Our Future



As I complete my time as interim dean, my thoughts turn toward the future. While I look forward to returning full-time to my duties as chair of the agronomy department, teacher and researcher—the sweet corn is calling!—this period of service has provided insights and food for thought that will stay with me as I continue working with all of you in support of CALS.

I move on with the knowledge that CALS is on course. We receive more research awards than any other land-grant college in the nation and rank among the world's top agricultural colleges in scientific impact. Recent achievements include discovering a key gene linked to obesity and diabetes, pioneering a sustainable way to grow potatoes that serves as a model for other crops and leading cutting-edge research on biofuels. Important discoveries at CALS continue apace; for more examples, see our feature on tech transfer success stories beginning on page 28.

While our current excellence is clear, our ability to sustain it is less so. State funding is declining and tuition hikes will not make up the losses, yet these two elements comprise the base budget

In an environment of limited resources, it is more important than ever to make our priorities clear

that supports teaching and research. In coming years we will turn more to philanthropy to fill the gap.

In an environment of limited resources, it is more important than ever to make our priorities clear. Our new dean, Kate VandenBosch, will work with faculty, staff, students and the UW Foundation to define those priorities when she arrives in March. But a few areas are so central to our mission that they are certain to stay at the top:

- **Need-based financial aid**, which is offered at CALS through the Wisconsin Rural Youth Scholarship fund (see page 37 for more info). Forty percent of CALS students demonstrate significant financial need, and that percentage is likely to rise. We simply have to help our undergrads.
- **Creating more endowed professorships**, which enables us to hire more faculty. The college has lost 120 faculty positions since 1980. Since faculty members do almost all of CALS' research and teaching, more positions mean more courses for students, more research dollars flowing into Wisconsin and more support for Wisconsin's industries.
- **Annual giving**, which allows the college to put funding in areas of the most acute need. More annual gifts are needed in the current economic climate to help fill the gap between the cost of educating students and the dollars available.

Funding our future will be a challenge—but it's a challenge we must meet together. Here at CALS, we look forward to supporting Dean VandenBosch's leadership over the coming year and beyond.

grow

Volume 5, Issue 2
Spring 2012**Editor**

Joan Fischer

WritersNicole Miller MS'06
Bob Mitchell BS'76**Intern**

Kristen Klimo

Editorial AssistantsRebecca Bock, Taylor Fritsch,
Flannery Geoghegan, Radene King**Design**

Diane Doering

Video/Podcast Production

Sevie Kenyon BS'80 MS'06

CALS ADMINISTRATION

William F. Tracy, Interim Dean
Birl Lowery, Senior Associate Dean
Rick Lindroth, Associate Dean for Research
John Shutske, Associate Dean for Extension and Outreach
Heidi Zoerb, Assistant Dean for External Relations and Advancement
Sarah Pfatteicher, Interim Associate Dean for Instruction

INTERACTING WITH CALS Alumni:

Office of External Relations,
 1450 Linden Drive, Madison,
 WI 53706
 Phone: (608) 262-1251
 Email: alumni@cals.wisc.edu
www.cals.wisc.edu/alumni/

Prospective students:

CALS Undergraduate Programs and Services, 1450 Linden Drive, Madison, WI 53706
 Phone: (608) 262-3003
 Email: undergrads@cals.wisc.edu
www.cals.wisc.edu/students/

Business contacts:

Office of Corporate Relations,
 455 Science Drive, Suite 230,
 Madison, WI 53711
 Phone: (608) 263-2840
 Email: inquiries@ocr.wisc.edu
www.ocr.wisc.edu

To make a gift to CALS:

Brian Hettiger, UW Foundation,
 P.O. Box 8860, Madison, WI 53708
 Phone: (608) 265-5893
 Email: Brian.Hettiger@supportuw.org
www.supportuw.org

To contact the magazine:

Grow Editor, 136 Agricultural Hall,
 1450 Linden Drive, Madison, WI 53706
 Email: grow@cals.wisc.edu
www.cals.wisc.edu/grow/



UWMadisonCALS

College of Agricultural
and Life Sciences

UNIVERSITY OF WISCONSIN-MADISON

fsc logo here-FPO
 FSC_B_L_Green
 don't print keyline

On Henry Mall

News from around the college

Kids at Work

Can grazing goats help restore Wisconsin's landscapes?

The slopes in the Yellowstone Wildlife Area are an impenetrable tangle of brambles, prickly ash, dogwood and honeysuckle. They need a thorough de-brushing. But the craggy hillsides are too steep to mow, and they're a nasty place to wield a chainsaw.

But it's terrific terrain for goats. That's why a land management firm was hired last summer to bring 85 Boer goats to this 4,000-acre DNR-managed property in Lafayette County. The goal is to restore the woodlands to oak savanna. This open mix of trees, sedges, wildflowers and grass dominated southern Wisconsin until settlers began controlling the wildfires that kept savannas free of brush.

"Oak savannas are of prime interest to both state and federal wildlife managers. That includes endangered species that require savanna habitat—red-headed woodpecker, vesper sparrow, brown thrasher—as well as game birds such as turkey and grouse," says CALS landscape architecture professor John Harrington. Harrington leads a team that is evaluating the goats' impact with support from a state program funding grazing research.

Goats love to browse on woody plants. They are used widely out West to get rid of such noxious weeds as leafy spurge and to clear brush from fire-prone hillsides.

But the idea doesn't sit well with some conservationists. Free-ranging livestock have done major damage to wild areas through overgrazing, spreading weed seed and causing soil compaction leading to erosion. Harrington hopes the project at Yellowstone, in which the goats are carefully managed by landscape restoration experts, will change some minds.

"Environmentalists have been really gun-shy—or goat-shy," says Harrington. "This study aims to see if we can use goats as a management tool without the problems grazing has caused in the past." Harrington hopes to conduct further research this summer.



PHOTO BY JULIA ELA

Graduate students Julia Ela and Katie Baumann, who monitored the animals, report that so far the damage has been negligible. There's no evidence of soil compaction—and if there's any problem with plant damage, it's that there hasn't been enough of it.

"The goats defoliate the shrubs, and they break and bend a lot of branches, but they don't necessarily kill them," Ela says. "It's clear that repeated grazing cycles will be necessary."

But just getting rid of the foliage opens up new management options, including reintroducing fire. "By opening up the cover, if we can get more grassy savanna plants growing back in, we can start applying both fire and grazing and achieve greater biodiversity," Harrington says.

Getting goats to eat more has a benefit beyond brush clearance. The firms that provide the goats supplement their management fees by selling mature animals for slaughter, taking advantage of a Midwest market for goat meat that has been rising along with the presence of ethnic groups that prefer it. The plumper the animals are when they come out of the woods, the more they'll fetch at market—and the more affordable this management practice can be.

—BOB MITCHELL BS'76

Workers you can eat:
Goats do a great job
clearing weeds and
brush from hillsides.

Mystery Solved

A fungus causes the disease that has killed more than a million bats

PHOTO COURTESY USGS/NANCY HEASLIP



Most of these little brown bats, shown here in a hibernation cave, exhibit the fungal growth of white-nose syndrome on their muzzles.

White-nose syndrome, a fast-spreading disease that over the past six years has been decimating bats in North America, is caused by the fungus *Geomyces destructans*, scientists at the USGS National Wildlife Health Center in Madison have proven. Their work provides the first direct evidence that *G. destructans* is responsible for the disease.

Researchers from the U.S. Geological Survey, CALS and other institutions showed that all little brown bats exposed to *G. destructans* in their study developed white-nose syndrome while hibernating in captivity.

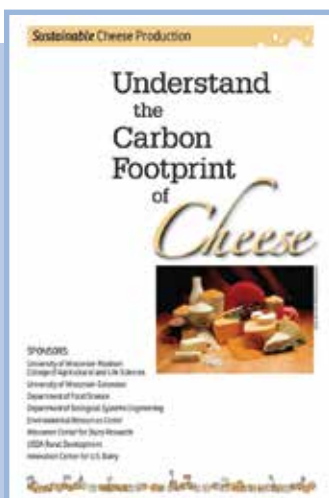
“Identifying *G. destructans* as causing the disease will help direct future research toward elucidating what makes the fungus pathogenic, what makes North American bats susceptible—and what

environmental factors are important for disease progression and transmission to take place,” says Jeffrey Lorch, who was part of the research team as a forest and wildlife ecology graduate student in the UW–Madison Molecular and Environmental Toxicology Center.

Bat populations in the eastern U.S. have been declining at an alarming rate since 2006, when white-nose syndrome first appeared in New York state—a development of particular concern to the U.S. agricultural industry, which saves billions of dollars in pest control costs each year courtesy of insect-eating bats. Bat declines in the Northeast already have exceeded 80 percent.

As Lorch points out, understanding what causes the disease is a crucial first step in controlling it.

—DAVID TENENBAUM



Cheese and Climate Change

“The cheese stands alone.” Or does it? While we understand that humans create a carbon footprint, we are less likely to attribute one to our food.

A new booklet illuminates how making and distributing cheese—from the methane-producing cows that provide milk to shipping cheese to stores—creates a carbon footprint, along with information about how cheesemakers, consumers and other stakeholders might reduce it. Included is a “cheese carbon footprint calculator” that details greenhouse gas emissions along the way. “We knew there would be very savvy cheese plant owners who wanted to see the next step,” says co-author Franco Milani, a professor of food science. “There is growing pressure from large retailers to provide this information and reduction plans.”

To purchase or to view the booklet as a cost-free pdf, visit learningstore.uwex.edu.

Keep on Farming

A CALS partnership helps growers do their work even after serious injury

PHOTO BY KRISTEN KLIMO

Sometimes there's a moment in life when everything changes. For Arlington farmer Alan Kaltenberg, that moment happened twice.

The first was when he lost his arm four inches below the shoulder in a childhood accident involving farm machinery. "I've been without my left arm for 46 years," says Kaltenberg, now 50.

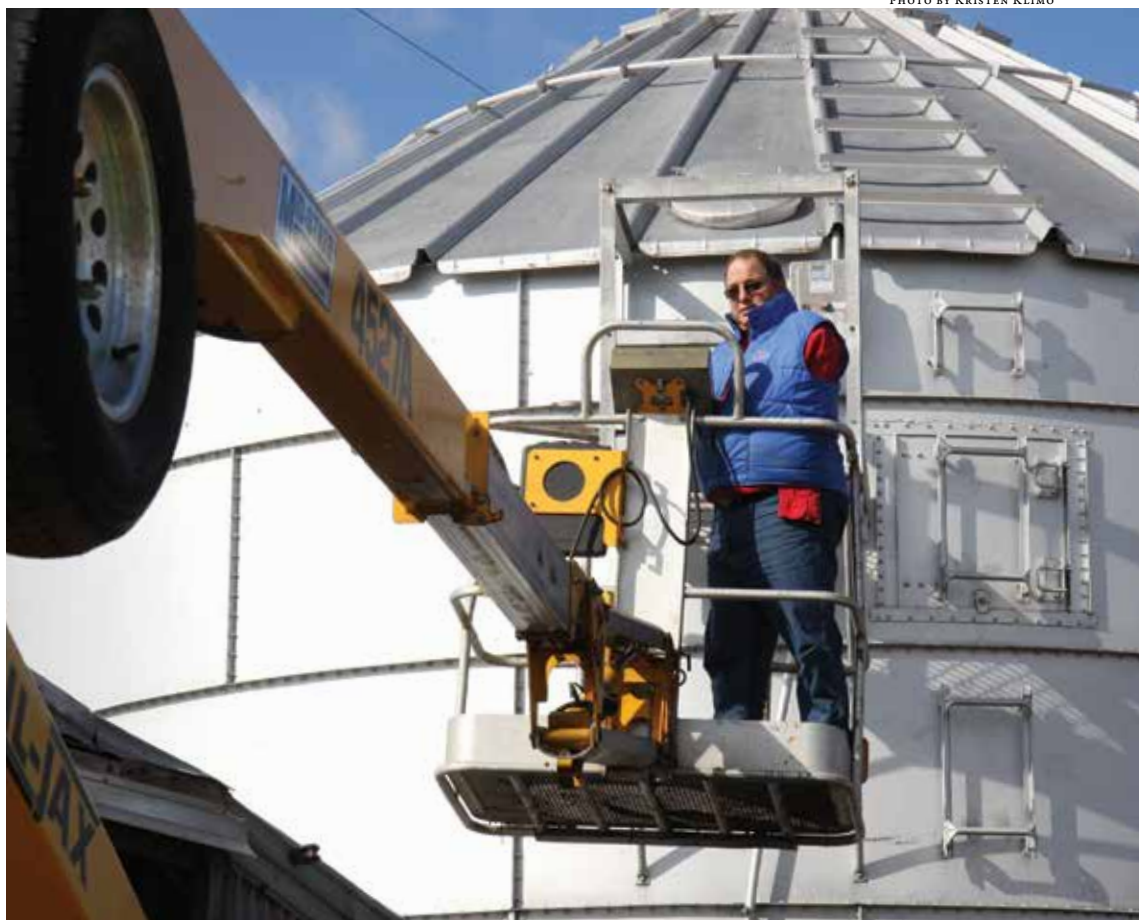
The second came two years ago when Kaltenberg fell 30 feet off a grain bin, shattering both legs, including his ankles. "I landed standing straight up and down on my feet so the bones going up my leg just splintered," he says. The accident left him with limited mobility.

Kaltenberg continues to farm about 300 acres of soybeans, wheat and corn, raise beef cattle and board his niece's horse—a prodigious amount of work made possible with the help of AgrAbility, a federal program that for 20 years has had an active branch in Wisconsin housed at CALS.

AgrAbility has a simple mission: to help people keep working in production agriculture, even in the wake of an accident or basic wear and tear on the body. The program is run as a partnership between the CALS Department of Biological Systems Engineering (BSE), UW Extension and Easter Seals of Wisconsin. Another key partner is the state Department of Workforce Development's Division of Vocational Rehabilitation, which provides farmers with assistive technology—the nuts-and-bolts devices that allow farmers to keep working.

AgrAbility's team of rehabilitation specialists and extension agents serve around 400 farming families each year, helping with problems ranging from arthritis and respiratory conditions to hearing and visual impairments, chronic back pain and amputations.

"We cover a broad umbrella of people with limiting conditions working in every area of agricul-



ture—you name it," says Vicki Janisch, AgrAbility's outreach coordinator. "We help everybody who wants to continue farming."

A farmer's disabilities may change over a lifetime, and AgrAbility adjusts services accordingly. Kaltenberg's second accident, for example, made climbing ladders impossible.

"They set up a skid loader that's operated all one-handed, a stairway in our shop, a boom lift, and a feed mill I can use to unload from the tractor," says Kaltenberg. "AgrAbility also helped look at ways to eliminate the repetition of doing things with one arm, to save wear and tear."

Although loss of a limb and impaired mobility were big blows, the most important thing to Kaltenberg is that he can keep doing what he loves.

"It's a life that's tough but rewarding. It's hard to explain how rewarding it really is," says Kaltenberg. "It's in your blood."

—KRISTEN KLIMO

Alan Kaltenberg demonstrates his boom lift, which helps him reach the top of a grain bin he fell from two years ago.

classAct

Ronald Crandall

Thinking big

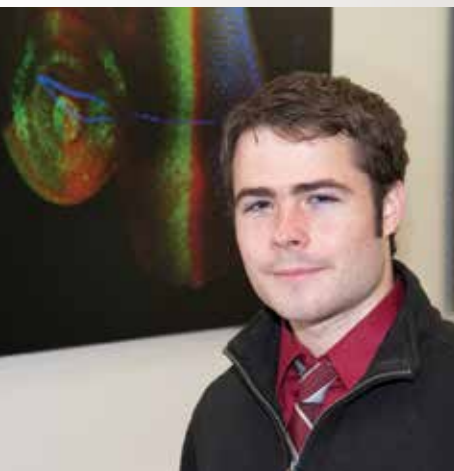


PHOTO BY SEVIE KENTON BS'80 MS'06

For Ron Crandall, the study of genetics is personal. He wants to learn more about what causes cancer, a disease that has plagued many members of his family.

"In high school I started looking for treatments and to help get them into clinical trials," says Crandall. "And from there I started to take some genetics classes and found I really liked it."

Crandall is committed to that investigation for the long haul and wants to earn a dual MD/PhD degree in medical genetics at the University of Wisconsin

School of Medicine and Public Health. "I hope it will prepare me to go out into the community and make a difference, not just in treating people who have cancer but other genetics-related diseases," says Crandall, whose academic honors include a WALSAA Outstanding Sophomore Award and the Wallace Award for Genetics.

Crandall's desire to serve takes him out of the lab and into the worlds of communication and campus leadership. In elementary school he began teaching himself computer programming and web design, drawn mostly by the challenge, he says, of finding easy-to-understand ways to convey complex information. He now heads his own web development and design business, SSII Designs, and also works as the website administrator for the Department of Genetics.

When he's not studying or working, Crandall engages in student activities. He is a CALS Ambassador, charged with offering prospective students a peer's view of CALS. He's also president of the CALS student council and last semester was elected to the student services finance committee of the Associated Students of Madison (UW-Madison student government). There he plans to focus on a "metacouncil" initiative to create a much-needed representative body for all the student councils on campus, he says. Another project: to create a software enhancement to make DARS, the Degree Audit Reporting System students use to track requirements, easier to understand and implement.

One can't accuse Crandall of not thinking big. The mystery is how he finds time for it. "A lot of sleepless nights," he laughs. "I have this interesting schedule of doing 20-hour days. I'll stay up until 4 a.m. or so, get a few hours' sleep and then continue. And then on weekends I have huge naps."

SELECTED, Kathryn VandenBosch, as the new dean of the College of Agricultural and Life Sciences. VandenBosch, a professor of plant biology at the University of Minnesota in St. Paul, assumes her new role March 1.

APPOINTED to President Obama's Committee on the National Medal of Science, biochemistry professor **Judith Kimble**. Kimble will help choose the next winners of the nation's most prestigious science award.

NAMED a Fellow of the American Association for the Advancement of Science, biochemistry professor **Richard Amasino**, for contributions to our understanding of the genetic and biochemical mechanisms behind seasonal flowering and for leadership in science education.

HONORED with the National Institutes of Health Director's New Innovator Award, **Douglas Weibel**, a professor of biochemistry and biomedical engineering. Weibel studies how bacteria make the cell wall that separates them from the environment and how we might manipulate that process to kill harmful bacteria.

NAMED directors: **Michael Bell**, a professor of community and environmental sociology, is now head of the Center for Integrated Agricultural Systems, while agricultural economist **Bruce Jones** takes over as head of the Renk Agribusiness Institute.

EMMY AWARD (regional) given to "Tater Tales," an episode of the children's television series *Into the Outdoors*, produced by Discovery Mediaworks and featuring in-the-field interviews with CALS professors **Jed Colquhoun** and **Russell Groves** and alumnus **Andy Diercks BS'93**.

Number Crunching



4884 THE COW AFFECTIONATELY

KNOWN BY THIS NUMBER has a remarkable record of service. At age 11 and a half (most research cows live only five years), she is the veteran of what herd manager Mike Peters believes to be the most experiments of any cow ever. Besides participating in 12 nutrition and physiology trials, #4884—who seven years ago was fitted with a cannula or "window" to allow rumen access—has provided a living learning lab to hundreds of graduate, undergraduate and high school students as well as many 4-H and FFA groups. And, far from slowing down, #4884 gave birth to her 10th calf in January.

how to dye eggs naturally

E

EGG DYEING IS A TRADITION that has been passed down through the ages from all corners of the world. The tradition continues today with one major difference: the widespread use of synthetic rather than natural dyes. But synthetic dyes may be harmful to health and the environment, making eggshells unsuitable for composting (to name one disadvantage). As horticulture professor Irwin Goldman points out, natural ingredients from plant sources can be excellent alternatives and make use of vegetables and other products you may already have in your kitchen.



PREPARE THE EGGS:

START with hard-boiled eggs washed with warm soapy water to remove any residue. Let the eggs cool.



BLUE: Mix 1 cup red cabbage leaves, torn and loosely packed, 1 teaspoon vinegar, and 3 cups water. Boil mixture for ½ hour, cool to room temperature, and strain out the cabbage leaves. Add cooled eggs and soak them in the dye for ½ hour.



PURPLE: Mix 1 cup purple grape juice, ½ teaspoon vinegar, and 3 cups water. Soak cooled eggs in the dye for ½ hour.



YELLOW: Mix 1 teaspoon turmeric, 1 teaspoon vinegar, and 3 cups water. Boil mixture for ½ hour, cool to room temperature, and strain out stray turmeric grains. Add cooled eggs and soak them in the dye for ½ hour.

BOILED DYES



ORANGE: Mix 1 cup yellow onion skin, 1 teaspoon vinegar, and 3 cups water. Boil mixture for ½ hour, cool to room temperature, and strain out the onion skins. Then add cooled eggs and soak them in the dye for ½ hour.

COLD DYES



PINK: Mix 1 cup strained juice from canned beets, ½ teaspoon vinegar, and 3 cups water. Soak cooled eggs in the dye for ½ hour.

From Field to Food Bank

Jed Colquhoun found eager partners when figuring out how to get food waste from farms to people in need. Now they've created a system that serves as a national model.



Jed Colquhoun (right)
with Second Harvest's
Jim Scheuerman

PHOTO BY SEVIE KENTON BS'80 MS'06

TWO YEARS AGO Jed Colquhoun told *Grow* about a vegetable grower who had to leave 40 acres of carrots in the field because his local processing plant was over capacity. Wasting food bothers Colquhoun, and it bothers people in the state's vegetable industry just as much. Now they're doing something about it together. Wisconsin is a leader in processed vegetables—No. 2 nationwide in acreage and production and No. 3 in the value of goods produced—and now the state's growers and processors are leaders in a new approach to hunger relief. We asked Colquhoun, a professor of horticulture and director of the Wisconsin Institute for Sustainable Agriculture, to describe how the industry and such food relief groups as Second Harvest of Southern Wisconsin are partnering to get vegetables from farms to food banks.

When we think of donating to food pantries, we think of collection barrels filled with cans, jars, boxes and cellophane bags. It's hard to imagine how you'd fit truckloads of fresh carrots into that mix.

We now know that that model isn't terribly realistic when you're talking about hundreds of thousands of pounds of carrots. We've been working on determining the logistics from the field all the way to the food bank—and beyond, because food banks distribute through mobile food pantries or local food pantries around the state. That last piece, what they call the last mile of food delivery, needs to be considered.

That's why we don't focus more on fresh products. It's about perishability and handling food safely. If we can get food in a can we no longer have the need for freezing and refrigeration. We have to consider where it's being delivered, and having the capacity to hold this food for quite some time. Especially when you talk large volumes.

So now you have a different model?

What we've narrowed it down to, as one of our processors put it, is to make "field to food bank" an invisible component of the traditional food distribution system. In other words, capture the produce from Wisconsin farms as far down the handling stages as possible, and then instead of going to a supermarket, that food goes to the food bank or food pantry. That's where we've seen some of the success in being able to do this and develop this system further.

So basically you've turned this over to the experts.

Exactly. We have a very successful vegetable industry in Wisconsin. These people have decades of experience and have learned how to do it right. So let's get it through their systems as far as we possibly can, and then divert it at the end.

📍 These people are in business. They don't earn a living by giving food away. Has it taken a lot of convincing to get them on board?

Wisconsin producers and processors have always been very generous, and they're very engaged in making this work. The most amazing part has been watching the industry take ownership. I remember sitting in a coffee shop in central Wisconsin, watching the logistic chain develop to get snap beans and sweet corn to Second Harvest without my involvement at all. Somebody in the room lined up trucking and asked when they could get somebody else's harvester over there. The processor asked when they could can that produce and how they could get it down to Second Harvest. So are they generous? Are

produce in the food bank system over the next few years. Last August they held a summit that focused entirely on how to move produce using the kind of farm-to-food-bank system that we're developing in Wisconsin. We're testing a model that Feeding America might be able to use at the national level.

📍 That tells you a lot about the need for hunger relief.

Food insecurity is a growing problem. We haven't come close to scratching the surface. Nearly 20 percent of children in Wisconsin are in what the USDA calls food-insecure households, meaning there's doubt about where the next meal will come from. That's alarming. Eligibility for free and reduced

“The most amazing part has been watching the industry take ownership”

they engaged? Very much so. And they're asking how they can do more. They're in business, yes. But they're in the business of providing food.

📍 How is it going so far?

We moved snap beans, sweet corn, potatoes and carrots through this system this summer. One grower donated a very large amount of carrots, which were processed by one of our Wisconsin processors and trucked by another Wisconsin-based company. The can manufacturer was very generous in getting the cans to the processing plant. And now we're moving hundreds of thousands of pounds of carrots into the food bank system.

📍 How can this help eliminate food waste?

If food gets wasted, it's usually because a crop yields well over average. Growers and processors make planting decisions based on what the processing plant can handle, assuming an average yield. If they get an above-average yield, the key to capturing the over-abundance is to connect different operations instead of relying on a single operation all the way through from harvest to trucking to processing to delivery. This means that the person who grows a crop may not be the one who harvests it, and the person who harvests it may not provide the truck, and someone else may store it and ship it down to Second Harvest.

📍 Is this idea going to be bigger than Wisconsin?

Feeding America, the national oversight group for many of the nation's food banks, wants to increase

lunch is rising every year. Over 40 percent of the children in Wisconsin are eligible for free and reduced lunch. It's 82.6 percent in Milwaukee public schools. And we're not only trying to feed hungry people, but also to provide nutritious, locally produced vegetables.

📍 The newest development from all this, we hear, is a plan to actually grow food specifically for food banks.

The producers are talking about ways that they can plant crops intentionally that will move into the food bank system. In other words, they may grow 100 acres of snap beans and allocate a half-acre to food banks. Those beans would move through the food handling route with the rest of the crop, but at the end of the line, instead of going to the grocery store, they would be delivered to the food bank.

📍 Hunger is such a huge and growing problem, but you seem pretty optimistic. Where does that come from?

I think of one grower who donated a few tons of snap beans and sweet corn this summer. In his overall portfolio of production that wasn't enormous, but it's still a very generous donation, and from the food bank perspective that's huge. The grower called me that night and said, “I feel great about what we just did. Tell me what I need to do to be involved next year.” So they feel that reward, and that's what we're building from. Phone calls like that tell me that I want to be a part of this. 📍



Agroecology studies at CALS—
and a Farm Service Agency loan
for women farmers—helped
Rebecca Claypool get her start.

PHOTO BY LUKAS KEAPPROTH/ RED WAVE PICTURES

A BOOMING POPULATION MEANS
MORE MOUTHS TO FEED—AND MORE FARMERS NEEDED
TO FEED THEM. A NUMBER OF CALS PROGRAMS FOCUS
ON BRINGING NEW FARMERS INTO THE FIELD.

growing FUTURE FARMERS



BY ERIK NESS

REBECA CLAYPOOL MS'09 is not color-blind. She knows her house is orange and that the steel shed is blue. Her hands planted the fulsome rows of lettuce and kale and chard—now lush, late-season waves in eight shades of green. She marvels at the funky purple berries in her hedgerow.

But that red barn? “I always wanted a yellow barn,” she explains. But painting is low on the chore list at the Yellow Barn Farm, established in 2010. Claypool’s just finished her second growing season and her mind is already on next year—how much to plant, procuring more compost, relocating a greenhouse. “Some day I will paint it yellow,” she vows.



PHOTO BY GERHARD FISCHER

CALS' Dick Cates (far right) discusses the finer points of managed grazing with prospective farmers out at the Cates Family Farm near Spring Green, where he produces grass-fed beef and raises dairy heifers.

and older. At some point we're not going to have enough people to take over that working land."

Farm kids are still important players in the future of agriculture, but there's also a new breed of grower heading for the land. The USDA reports that about one-fifth of all U.S. farms are operated by a beginning farmer, defined as someone who's been in the business less than 10 years. Demographically speaking, these new farmers—when compared to established agriculturalists—are more likely to be female, non-white or Hispanic. And while they generally are younger, in 2007 nearly a third were 55 or older.

What can be done to support and encourage those who see the opportunity and accept the myriad challenges of farming? People and programs across CALS are trying to answer the call.

Born and raised East Coast and urban—in West Philly, to be precise—Claypool is two generations removed from farming. The daughter of a school nurse and an architect, she attended Quaker school and a small liberal arts college in Maine. But on a high school exchange program she caught the farming bug. "I harvested my first potatoes, milked my first cows, gathered my first eggs," she remembers. "I was looking for something, and it just clicked."

After college Claypool learned cheesemaking and worked on established organic vegetable farms in Pennsylvania and Minnesota. She remembers driving through the Midwestern farmscape for the first time and the revelation of that rich, dark soil unfolding to the horizon. Eventually she wound up studying agroecology at CALS, where she still works as a researcher on the Veggie Compass, a tool that helps farmers determine production costs. A year after finishing her master's degree she took on 10 acres in Avoca, west of Spring Green.

Claypool's young operation is pocket change in Wisconsin's \$60 billion ag economy, but it poses a pressing ques-

tion: Who are our future farmers? Only about 2 percent of Americans now live on farms, and only half of them actually farm. Rural populations continue to age and decline. Farm kids used to be the logical next generation, but that's now a very small pool of potential applicants to cultivate the farm belt. And agriculture has become so capital intensive that if a farm kid wants to farm, generational transfer is tricky.

Politicians always tout the hiring of more police officers or teachers, but during Farm Bill hearings in 2010, U.S. Secretary of Agriculture Tom Vilsack abandoned his prepared remarks to extemporize on how the country needs 100,000 new farmers. "I think it's important that we focus an aggressive effort on helping beginning farmers begin," he argued.

On the state level, Paul Dietmann concurs. "We need people to work the land," says Dietmann, until recently the director of the Wisconsin Farm Center at the Department of Agriculture, Trade and Consumer Protection (DATCP). "The average age of a farmer in Wisconsin is 55 and keeps getting older



IN JANUARY OF 1886,

20 young men gathered on the wintry Madison campus for an innovative 12-week indoctrination in agricultural arts at CALS. They sat through 60 lectures on everything from road building to manure; more than a third of them focused on veterinary concerns. One hundred and twenty-six years and several agricultural revolutions later, the Farm and Industry Short Course is now the longest-running agricultural curriculum in the state.

Its intensive certificate program remains a crash course in essential farm skills, with more than 50 courses ranging from dairy cattle reproduction and business management to pest control and welding. Coursework runs for 15 weeks outside the growing season and helps beginning farmers launch into a challenging, changing business environment.

But that's not the only farmer training on campus. In 1989 CALS opened the Center for Integrated Agricultural Systems (CIAS) as a research center for sustainable agriculture. It offers an array of workshops, most of them two or three days, for beginning dairy and market farmers.

Since the farm crisis of the 1980s—when a perfect storm of falling prices and rising debt destroyed or disabled many growers—farmers have faced consolidation, increasing environmental pressures, rising input prices and intense market volatility. Many farm kids watch their family operations struggle and may hesitate to shoulder the yoke.

But people are coming. Short course enrollment has been at or near maximum for the last few years. Most short course students are rural and have worked on their family operation or for a neighbor. They are heading into production agriculture—either back to the family operation or to a salaried job with a larger concern. “The business has changed so much, and the economies have changed so much. It’s a complicated business, and post-secondary education is critical,” says Ted Halbach, director of the Farm and Industry Short Course program.

The expertise needed to produce food at historic rates of production—today’s farmer produces food and fiber for 155 people, compared to one farmer producing for 19 people in 1940—underlies a point that should be obvious but somehow often isn’t. “Farming is a profession, and a profession we should be proud of. This is something you do because you’ve

chosen it,” says Halbach, who notes a marked spirit of entrepreneurship among participants.

At the same time, more women and second-career students are enrolling in short courses than ever before, and a growing number have no farm background. CALS’ Dick Cates Ph.D. ’83 is adamant that it doesn’t matter. He’s just happy to see new blood. “We need to imagine a different way,” he says. “We simply don’t have the human capital coming from farms to fully support a next generation on the land.”

His own story illustrates the changing landscape. “When I started farming, I thought you had to be from a farm to farm. That’s the story we tell ourselves,” says Cates, who was introduced to farming as a teenager when his father, a noted trial attorney raised on a farm in Maine, purchased an underperforming hill farm south of Spring Green to teach his five kids about hard work. His dad “instilled in me a love of the land, a land ethic—but he was a lousy farmer, as he liked to say himself, and he certainly was not my farming mentor,” recalls Cates with a laugh. Cates became fixed on farming, anyway. Friends and classmates thought he was nuts.

After graduate school and a three-year stint setting up a dairy farm in Saudi Arabia that would become the largest in the world, Cates returned to the family farm. He needed to reimagine the business and found the critical spark in managed grazing, building up a substantial operation producing grass-fed beef and raising dairy heifers.

Defining, finding—even inventing—a niche is precisely the challenge for the new generation of bright would-be farmers he’s training. Since 1995 Cates has run the Wisconsin School for Beginning Dairy and Livestock Farmers, a hands-on seminar series conducted as a joint program of the Farm and Industry Short Course and CIAS. By focusing on business planning and pasture-based management, the school provides an accessible and sound financial approach for the beginning farmer.

One key for new farmers, says Cates, is managed grazing. In a typical confinement feed operation you have to plant, cultivate, harvest, dry and store the feed. Then you have to take it out of storage, feed the cows, and remove and distribute the manure. It takes a lot of labor, equipment and fuel.

Grazing advocates like to joke they hire the cows to do all that. By providing a lower capital approach, grazing allows for a farm that can reasonably be owned by a family just starting out. “Your business is turning sunshine into grass into milk or meat,” says Cates. “You can make it as complicated as you want, but those are the essentials.”

Farm and Industry Short Course students learn from dairy scientist Jerry Guenther at the Arlington Agricultural Research Station.



PHOTO BY WOLFGANG HOFFMANN BS'75 MS'79



PHOTO BY SEVIE KENYON BS'80 MS'06

Their dream came true: Trucker Bob Van De Boom and his wife Beth found a second career in raising grass-fed beef. Here they move cattle to a fresh paddock using portable fencing.

nonprofit promoter of managed grazing. Dick Cates and the School for Beginning Dairy and Livestock Farmers have worked closely with GrassWorks—a number of current and former board members and advisors are graduates of CALS' degree or short course programs.

In fact, Cates' curriculum is part of a formal apprenticeship—the first of its kind in the nation—being developed by Tomandl to train beginning farmers in managed grazing. With support from the USDA's National Institute for Food and Agriculture—specifically, their beginning farmer and rancher development

program—four students are now testing a two-year program that features on-farm learning, classroom instruction and compensation. A fifth pilot student, Nate Weisenfeld, a short course alum, already is managing his own herd and building a grass-based dairy near Merrill.

The challenge, Tomandl says, is to transfer the complex knowledge of a working farm. It can't be taught with classrooms and books alone. "There is a bit of an art to it," Tomandl says. "It's a biodynamic, moving, living system. You need to experience it to do a good job at it."

The apprenticeship fills an important educational need and could play an even larger role in finding younger farmers. "A whole generation is looking to transfer, and they probably don't have a son or daughter to transfer to," says Tomandl. Many would like to see their farms remain as intact working farms, but often their only option is to sell to a larger farmer. "Not only do we lose the land," frets Tomandl. "The bigger tragedy is we lose 30 years of grazing knowledge."

AN EXAMPLE OF NEW blood brought into the fold through grazing is Bob Van De Boom, who spent 30 years driving trucks before "retiring" to open V D B Organic Farms in Delavan. There he produces organic grass-fed beef, running 50 head on 40 of his own acres and renting another 60.

Though his parents both grew up on farms, they left as fast as they could. His dad even threatened to disown him if he ever farmed. But two decades ago, Van De Boom and his wife Beth got interested in organics. And in the back of Van De Boom's mind an idea emerged. As retirement came closer, he put in four 10-hour days, and on the fifth day he worked with a pasture-based organic dairy farmer. It confirmed how much he loved working with livestock, but also that he didn't want the daily hassle of milking.

Eventually Van De Boom enrolled in short course and Cates' class, graduating in 1999. After a few more years of work-

ing with his mentor, gradually assuming more and more responsibility, he finally reached launch point. In 2003, V D B Farms was born.

The timing was perfect—interest in organic local meat was already high and grass-fed products are increasingly in demand. His production sells out every year. But Van De Boom's not planning to expand. "I like it as a one-person operation. I want to be able to keep it small enough and functional enough where I can handle it myself," he says. "To me it's relaxing to go out there and move the cattle."

Van De Boom was fortunate to find a mentor who helped him learn the trade and ease his way to farm ownership. "If you want to be a teacher or a doctor, there is a path you follow. A, B, C, D, you network, and there you are," explains Joe Tomandl, who milks about 320 cows on 550 acres near Medford in central Wisconsin. But in the absence of growing up on a farm, there's been no structured path for training.

Tomandl is working to change that as part of GrassWorks, a 20-year-old

(Photo below) Growing Power's Will Allen, far right, is working with soil science professor Stephen Ventura, far left, to identify and expand local innovations in urban food production. George Reistad and X'Zayvion McCoy (center), who came to UW-Madison through the PEOPLE program, are student assistants on the project. Here they learn about worm composting at Growing Power's headquarters in Milwaukee.

Generational transfer can be a challenge even when a farmer's kids are willing. Terry Quam BS'78, for example, took over his family's operation during the farm crisis. "I was able to survive, but we've paid the price for 30 years," says Quam, 56. Today's farm economy is more stable but also more closed, Quam notes. "Economics have told us we have to be bigger," says Quam. "We do not have as many farmers because scale is forcing us, you might say, to cannibalize each other. There is only so much land."

Now his children feel the squeeze. One son graduated from a short course in 2002 and his daughter is finishing a CALS degree in life sciences communication. They and their brother want to join Marda Angus, the 900-acre beef

and crop farm Quam runs with his wife and his mother. But it's been difficult to bring them home in a way that wouldn't jeopardize all parties. "There is not a shortage of young willing bodies," Quam says. "There is a shortage of opportunities."

Much day-to-day work of the Wisconsin Farm Center at DATCP focuses on assisting with generational transfer. And more people are contacting the Farm Center for help getting started, says Frank Friar, who runs its Beginning and Transitioning Farmer Program. But Friar has a hard time connecting landlords and beginning farmers. "We need more landlords to rent or sell property to beginning farmers," he says. "The transition process can be challenging, and the

key to being successful is to start early, evaluate each financial situation, and discuss the future goals of both generations."

THE RISE OF THE

ORGANIC and local food movements have made clear that there is enormous, sustained interest in finding new ways to grow food and feed people. Also rising is the determination to address food insecurity. The United States is the richest agricultural nation in the world, yet 48.8 million Americans—including 16.2 million children—live under threat of hunger.

First Lady Michelle Obama has spot-



PHOTO BY MICHAEL KIENITZ



PHOTO BY MICHAEL KIENITZ

Aquaponics in action: Water courses through tiers of watercress and other edible greens before landing in a long tank below in which fish are raised. Water from the fish tank is then pumped back up to the plants to flow back down again. It's a low-energy system in which water is filtered by the plants, and plants receive nutrients from fish waste.

lighted the problem of food deserts—the phenomenon whereby 8.4 percent of the U.S. population lives in low-income neighborhoods more than a mile from a supermarket, the main source of fresh produce for most Americans. Among her partners is one of the nation's leading pioneers in urban agriculture, Will Allen, a pro basketball player turned farmer turned MacArthur genius. As founder and CEO of the Milwaukee-based nonprofit Growing Power, Allen has captured the imagination of thou-

sands of new farmers who are turning vacant lots, rooftops and other unlikely spaces into gardens and farms—growers of all ages, backgrounds and colors uniting in what Allen calls “the good food revolution.”

CALS soil science professor Stephen Ventura is working with Allen and other collaborators to tackle these issues with a \$5 million grant from the USDA's Agriculture and Food Research Initiative. The challenge: to analyze urban food systems to identify local innovations in food production and distribution—and then expand local production. In its first year the program is looking at Chicago, Detroit and Milwaukee, and will grow to include Boston, Los Angeles, Cedar Rapids and Madison. Ventura is excited to apply university expertise to urban areas that have been underserved by the land grant system.

Putting on urban and regional lenses allows us to examine the food system from new angles, Ventura says. Traditional questions about agricultural techniques could well morph into questions about access to capital and the weaknesses of market-based food distribution systems. Among the technologies being developed are geographic information system (GIS) tools for assessing vacant land suitable for urban farming and crowdsourcing tools that can identify and help design food networks.

“What are the innovations, why are they working and can they be expanded and transferred?” Ventura asks. “If we can produce fresh, healthy, nutritious food, how can we make it available, accessible and affordable?”

And it's not just the number of farmers, adds Will Allen: “We need farmers with a different skill set.” Farmers who are willing to explore high-value production techniques in urban settings, such as vertical growing systems incorporating aquaponics. Farmers who know how to build soil through worm composting

as well as how to use renewable energy. “We don’t have enough farmers in the type of agriculture we’re going to do in the future,” says Allen, whose organization provides such training all around the country.

Filling those blank spaces in the food map also presents an opportunity for new Americans. The ag industry is already heavily dependent on immigrant labor, including about 40 percent of Wisconsin’s dairy labor force. But immigrants and refugees also are starting their own farms. Ag census numbers show that the number of Hmong farmers in Wisconsin has roughly doubled in the last few years—and they’re probably still undercounted, says Kathy Schmitt, who does minority outreach at the Wisconsin Farm Center. She works with UW Extension throughout the state, holding workshops in Hmong that teach sustainable production methods, food safety and marketing. She also recently worked with the CALS/UW Extension Environmental Resources Center to convert a series of fresh market growing guides into “plain language” for people whose native tongue is not English.

These farmers from different ethnic backgrounds are helped along by some 50 farm incubators nationwide. In Verona, Wisconsin, the Farley Center for Peace, Justice and Sustainability runs a 43-acre organic farm incubator where Latino, Hmong, African American and European American farmers produce food for market. They’ve formed two CSAs that sold more than 35 shares in their first year. The center operates a matchmaking service pairing farmland owners with potential renters. Translators facilitate this process and also help in accessing other market and business development opportunities that are more readily accessible to native English speakers.

CALS and UW Extension faculty and alumni sit on the incubator’s advisory committee, and the project

already has landed three different grants. Growing new farmers is “utterly essential,” says Janet Parker, who secured Farley’s incubator funding. The solution, says Parker—a UW–Madison Nelson Institute alumna who did her master’s degree project with CIAS—is more farmers, more diverse farming and more farming for local consumption. “What more meaningful work could there be than growing food for others?” she asks.



BACK ON THE YELLOW
Barn Farm, Rebecca Claypool reflects on her journey so far. Her choices haven’t always been easy. “In some circles you’re a rock star and in other circles people don’t really know what to talk to you about,” she says.

She’s thankful for the backing that got her started—a Farm Service Agency loan for socially disadvantaged farmers, for which she, as a woman, qualified—and is hoping to slowly grow the farm. Moving a greenhouse onto more fertile ground would allow her to add a spring and winter share for her CSA. Flowers and turkeys, too, are on the wish list. And she just needs to get her healing hands into the earth. “The soil needs a lot of help. It needs to be built, it needs to be loved,” she says. “I like that nurturing part of the job. There is something I really like about feeding myself and feeding others.”

Committed as Claypool is to her own path, she’s not taking sides in ongo-

ing debates about “conventional versus alternative” agriculture. She has too much respect for anyone who does the hard work. “People do what works for them. I get it. I can’t tell you what’s right for you,” says Claypool.

Terry Quam shares that view. “Consumers are going to want to pick and choose—they’ll settle it in the end,” he says.


One thing is certain—food presents Wisconsin with a real economic opportunity. “We could go to 9 billion people on this planet by 2040, and we have resource depletion in many parts of the world,” notes Dick Cates. “If you look at the globe, we have one of the green spots, literally one of the few fertile parts of the world. If we can’t continue to capitalize on that, then we’re really missing out.” 



PHOTO COURTESY OF THE FARLEY CENTER

Gathering flowers at the Farley Center, home of an incubator in which farmers from a wide range of ethnic backgrounds grow various crops for market.

Blank

NUMEROUS LAKES
AND STREAMS ARE

DRYING UP in the
Central Sands, but
there's little agreement
on what's causing it.

An initiative led by
CALS brings together
scientists, farmers,
residents, environmen-
tal advocates and other
stakeholders to shed
light on the problem
and pave the way
toward solutions.

VANISHING



PHOTO BY WOLFGANG HOFFMANN BS'75 MS'79

Where's the water?
Not too long ago, Long Lake
extended beneath the pier.

By Nicole Miller MS'06

WATERS?



EVEN BEFORE HE BOUGHT A SUMMER CABIN on Long Lake in 2004, Brian Wolf was concerned about the water level. At its deepest point, the Waushara County lake was only about five feet deep, down from historical highs around 10 feet. “I contacted the folks at a state agency asking, ‘Can you tell me what’s up? I’m worried it’s a dying lake,’” says Wolf, a psychologist based in Kenosha. “The response I got back was, ‘There’s no such thing as a dying lake.’”

During his family’s first summer there, Wolf’s worries seemed unfounded. His children caught and released dozens of bass. But by the summer of 2006, the lake had gone almost completely dry—it was a muddy bed littered with dead fish. Now it’s just a grassy field that floods during rainy spells. “Do we still enjoy our cabin? Absolutely. Do we enjoy it as a lake place? No,” says Wolf. Property values dropped so much that “they basically stopped taxing folks on Long Lake as having lake property,” he says.



PHOTO BY NICOLE MILLER MS'06

And Long Lake wasn't the only place with water problems. Around the same time, a number of other lakes and streams in the Central Sands region, the heart of Wisconsin's \$6 billion potato and vegetable industry, went dry or hit record lows. A landscape once covered in prairie and scrub oak, the region is now a mosaic of circles—160-acre fields of potatoes, sweet corn, peas and other specialty vegetables watered by center-pivot irrigation systems. These systems keep the region's crops alive between rains and are fed by high-capacity wells that each can pump more than 100,000 gallons per day from the region's aquifer. Many of those concerned about the area's disappearing surface waters see the pumps as the obvious culprit, sucking water up and away from local ground-

water-fed lakes and streams. Yet the problem may not be that simple.

To help understand and solve the region's growing water dilemma, CALS has launched a Central Sands Water Initiative with support from the college's Wisconsin Institute for Sustainable Agriculture. The initiative aims to bring together a broad network of stakeholders—including farmers from the Wisconsin Potato and Vegetable Growers Association, members of local lake and environmental groups, state and federal agency staff, and scientists from UW-Madison and beyond—not only to study the impact of irrigation pumping on the region's ground and surface waters, but also to find solutions to help refill the dry lakes and streams. At the same time, the initiative's scientists

also plan to explore the possibility that a larger force is altering the overall water balance in the region: climate change.

"Some believe the facts are well established, that irrigation is the only reason for the problem, but we don't really know that yet," says Sam Kung, a professor of soil science and the initiative's coordinator. "It's also possible that the region's climate has changed in such a way that the atmosphere is taking more water away from the system."

Either way, water shortages are expected to increase around the world, where 70 percent of the fresh water people use goes to food production.

"Water is on the cusp of being limited in a substantial way almost everywhere around the globe, and because of water's importance in agriculture, it's

When Dan Trudell bought a summer home on Lake Huron, the water level came up to where he is standing. Trudell has watched the lake's water level decline since about 1999. "Twenty-three years ago when we bought this property, there were very few irrigation pivots, but now they're everywhere," he says. "We're not scientists. There's a correlation, but is there a causation?" Trudell believes so, citing research by George Kraft of UW-Stevens Point.

obvious that solutions will have to have an agricultural focus," says A.J. Bussan, a horticulture professor who leads the initiative's crop production studies. "Through this initiative, the Central Sands has the potential to serve as a model for other places with multifaceted water demands, showing them how a community can come together to devise a water policy that's effective."

But getting the Central Sands community to sit down and talk won't be easy. Its members are engaged in a contentious debate about the region's water woes, and with so much at stake—including growers' livelihoods, residents' investments and the survival of local lakes and streams—it's bound to be a difficult conversation.

"This isn't the typical CALS situation where there's a problem out there that everybody acknowledges, we marshal CALS science and go solve the problem, and everybody lives happily ever after," says Peter Nowak, a rural sociologist and emeritus professor at UW's Nelson Institute for Environmental Studies who last summer agreed to moderate a series of community forums for Central Sands citizens.

Nowak was tapped for the job because of his success in the late 1990s with the Wisconsin Buffer Initiative, which brought farmers and environmentalists together to address the problem of agricultural runoff in the state's waterways.

"The beginning of the process is just getting everybody to talk," says Nowak, who expects the new initiative to be an even bigger challenge. "This is a hot situation. This is what social scientists would call rancorous conflict."

TO UNDERSTAND the recent history of irrigation in Wisconsin, one can start at Coloma Farms. Now a beautiful 2,700 acres of potatoes, soybeans and field corn, Coloma Farms began with just 80 acres in 1961, when the

Diercks family established it as one of the first irrigated operations in the Central Sands.

To the Diercks family and most of those who grow crops on the region's 200,000 acres of farmland, irrigation doesn't just make their farms more productive; it's an essential part of the business model. Sandy soils drain quickly. That's an advantage for root crops because well-drained soils harbor less disease, but it also means they need frequent replenishment.

WATER IS ON the
cusp of being limited in
a substantial way almost
everywhere around
the globe.

"Even if it rains two inches, you still only end up with three-quarters of an inch held in the topsoil, which is only about two days' worth for potato plants during the summer," says Andy Diercks BS'93, who co-owns the farm with his father, Steve. Full-season potatoes—the thirstiest of Coloma Farms' crops—require between eight and 12 inches of irrigated water during a typical growing season.

Until recently, water wasn't widely seen as a problem in the Central Sands. The region gets about 32 inches of precipitation in an average year, and it has a vast aquifer composed of sandy sediment permeated by water more than 100 feet deep in most areas. Rainfall and snowmelt continually recharge the aquifer, in stark contrast to the situation in the Great Plains, where extensive

pumping for agriculture and other uses is steadily depleting the 174,000-square-mile Ogallala Aquifer. But clearly something has knocked the Central Sands hydrology out of balance.

And it's not just dry lakes and streams. Beneath the surface, the water table has dropped to a worrying degree at a number of U.S. Geological Survey monitoring wells around the region. About eight miles north of Coloma Farms, the Hancock Agricultural Research Station's well has dropped an unexpected three to five feet over the past 15 years. "From a pumping standpoint, that's not a lot because the aquifer is so deep," says soil science professor Bill Bland. "But it's that top six feet of groundwater that feeds the area's streams and maintains the lake levels, so it's a big problem for people with lake cottages."

Diercks is well aware of the surface water problems in the area, but he's not willing to pin the blame on growers without more information. "The question is, what's causing these problems? And how do we solve them, if we're at fault?" he says. "If the scientists convince us that we're the cause, then we'll certainly be the first ones to line up to work out a solution."

But figuring out what's going on is a challenge. Scientists would like to compare the aquifer recharge that occurs on crop fields versus recharge on fields of native vegetation. Recharge, in turn, is affected by the amount of water that plants give off in the form of evaporation and transpiration, known together as evapotranspiration, or ET.

"You can think of evapotranspiration as a reverse, invisible rain. It's happening all the time, but you can't see it," explains Bland. "If it doesn't rain for two weeks, the native plants slow their water use—like they're starting to go dormant—and there's much less ET from the landscape they cover. However, our irrigated crops are always evapotranspiring water at the rate the atmosphere will accept it,"



transferring, in essence, water from the aquifer to the atmosphere, where it blows away.

Unfortunately, it's difficult to quantify ET and recharge in the field, so scientists often turn to computer models and other methods for answers. Using a computer model, Bland found that stands of prairie do a better job recharging the aquifer than forests and irrigated field corn. A statistical analysis, performed by Kung, shows that ET has increased significantly across the entire western part of the Great Lakes region over the past 15 years—evidence, he believes, that climate change could be a factor in the Central Sands' water situation. "It's like nature is taking away more from us across the whole landscape," says Kung. "It's like an invisible hand is steal-

ing our water."

But another study by hydrogeologist George Kraft PhD'90, director of the Center for Watershed Science and Education at UW–Stevens Point, points in a different direction. Kraft reports seeing bigger water level drops in areas with intensive irrigation compared to areas with relatively little agricultural development. "Because all of the well levels, lake levels and stream flows that I looked at were within the Central Sands region, that rules out climate change as a major factor," Kraft explains. Kraft's results have been widely embraced by members of Central Sands' lake and environmental groups.

These studies aside, Wisconsin's climate has changed. The average annual temperature in the Central Sands

increased by one degree between 1950 and 2006 and the growing season lengthened by one to two weeks, according to a 2011 report by the Wisconsin Initiative on Climate Change Impacts. Although these changes would be expected to increase the overall ET in the area, explains Chris Kucharik, an agronomy professor and one of the report's authors, the impact of ET appears to be minimal compared to one of the other major climate-related changes they found: increased rainfall. Over the 57-year period covered in the report, average annual precipitation in the region increased between two and four inches. "If anything," he says, "the way climate has been changing should actually help elevate groundwater levels, not cause them to decline."

Big irrigation systems, shown here and on the next page at Coloma Farms, helped turn the Central Sands into a produce powerhouse. Coloma's Andy Diercks, photo right, has been an active participant in efforts to address the region's water woes.



As part of the Central Sands Water Initiative, scientists from UW–Madison, UW–Stevens Point, the Wisconsin Department of Natural Resources, and the U.S. Geological and Natural History Survey have begun meeting regularly to share their work, and agreement is building around the idea that pumping and climate both may play a role, with climate change possibly exacerbating or mitigating farmers' need to pump. The group is now seeking grants to do the studies that may enable them to reach a scientific consensus. In the meantime, the problem won't be put on hold. "We can't wait around for another year or two to connect the dots," says entomologist Jeff Wyman, who conceived of the initiative and now helps coordinate it through the Wisconsin Institute for Sustainable Agriculture. "The agricultural response is already happening."

IN THE DEBATE over Central Sands water use, nothing has embodied "rancorous conflict" more than the dispute over high-capacity wells. Local lake and stream advocates say the wells are draining the aquifer and drying the lakes—especially since they've been allowed to proliferate in the region (at 2,300 and counting in Adams, Portage and Waushara counties) with little regard for environmental consequences. To growers, high-cap wells are indispensable, the

foundational technology that enabled the Central Sands region to become one of the nation's leading vegetable bins.

To hear Andy Diercks tell the story, things started out amiably enough. He is a member of the Wisconsin Potato and Vegetable Growers Association (WPVGA), which has long prided itself on taking a proactive approach to environmental problems. The association helped initiate talks that led to Wisconsin's first high-capacity well law in 2003. The law, known as Act 310, helps protect certain surface waters from pumping, stipulating that high-cap wells should be at least 1,200 feet away from large springs, trout streams and other pristine waters.

"We sat down for probably 18 months, just a small group of six or seven of us, hashed out something between agricultural and environmental concerns that we thought both sides could live with, and then took it to the legislature," recalls Diercks, who participated in the process and notes that a number of "important parts" of the bill got cut before it passed. "Ever since, the environmental side has been saying, 'Okay, great. That was a good start, but it's not enough. We need more.'"

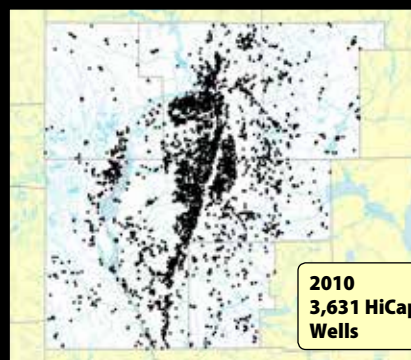
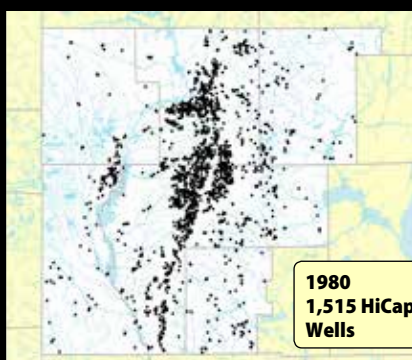
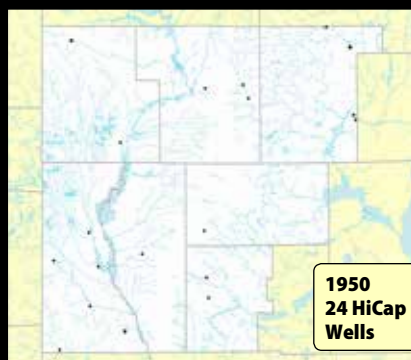
In 2009, inspired by a report assessing Wisconsin's groundwater resources,

state Senator Mark Miller (D-Monona) and then-Representative Spencer Black (D-Madison) started working on a new bill that would go farther to protect surface waters from high-volume pumping. While stories differ on the extent to which growers were involved in the legislative process this time around—from some to very little—it is generally agreed that the final product ended up containing more for environmentalists to like than for growers.

Although the legislation ultimately died in committee, the experience left a bad taste with the growers. "They felt that the environmentalists not only were wrong about the science, but that they had violated the trust that had been developed during earlier discussions," explains Nowak.

Afterward, the WPVGA decided to take a hard look at the situation—on its own terms. It founded a Water Task Force in 2009 that includes Central Sands growers, representatives from area vegetable processing companies and local officials as well as some UW–Madison scientists. "It's sort of a water-users group for the Central Sands," says Diercks. "We're basically trying to figure out if we're the cause of the area's surface water declines or not."

HOW THEY HAVE GROWN—Increase in Central Wisconsin's high-capacity wells from 1950 to 2010



To that end, the group began collecting annual well depth information for more than 250 irrigation wells across the region and is gearing up to start gathering data on a quarterly or monthly basis. It's also training growers how to measure their wells so that the information collected might be accurate enough to use in scientific studies down the line.

Now, with the advent of the Central Sands Water Initiative, the WPVGA is once again ready to work with the other side. "I think the WPVGA recognizes that this conflict isn't good for their growers or their industry, and they want to reach out to their neighbors and find a workable solution," says Nowak, who moderated a stakeholder forum in Stevens Point last summer. It became an object lesson in rebuilding community.

Aware of the situation's delicacy, Nowak took great pains with forum arrangements. He had members of the local community—about 30 in total, roughly split between the two sides—sit at the front of the room around a large U-shaped grouping of tables. Diercks and homeowner Brian Wolf were there, seated three seats apart. Everybody else sat in the back of the room, including the initiative's leaders, other scientists, agency staff, lobbyists and others invited to listen.

"I didn't want lectures from scientists. I didn't want agency people up there talking about rules," says Nowak. "The critical thing was to get the local residents talking to each other." It was Nowak's hope that a good discussion would set the stage for the initiative to become a true civic science project, where engaged citizens participate in the process from start to finish, helping to develop and refine research questions and implement and assess the solutions.

With Nowak's guidance, the group shared questions and discussed answers when available. Questions that couldn't be answered may serve as fodder for future initiative-led research projects.

Are there better crops—with lower ET rates—to grow in the area? How can lakes near Plainfield, like Long Lake, be low when others just 10 miles away are overflowing? Why doesn't the DNR factor in the cumulative impact of existing high-cap wells when they consider approving new ones? How big would a no-pumping zone have to be to refill Long Lake? How will solutions be paid for?

"I came out of the meeting feeling optimistic that a civil discourse had begun," says Nowak. "The two sides didn't agree on much, but they resolved to continue the discussion."

THE CRITICAL
THING was to get the
local residents talking to
each other.

Diercks thought the meeting "went about as well as could be expected," but didn't focus enough on climate change's potential role in the problem. Wolf appreciated the open dialog but came away worried that solutions wouldn't come fast enough. "People are going to keep drilling wells while we discuss these things," he says. "We need to stop the damage now."

The group did reach agreement on two important points. Every person at the front table acknowledged that high-cap wells have some kind of impact on nearby surface waters. And everybody, with only one exception, wanted the group to meet again.

They did so this past December and have a third meeting scheduled this spring. By all accounts, they are making good progress.

SOLUTIONS TO THE area's water problems will likely take a number of forms, including farmers adopting more water-efficient farming practices in the region. Last fall, horticulture professor A.J. Bussan, who works closely with the state's potato and vegetable growers, received a large U.S. Department of Agriculture grant to explore a number of innovative, water-saving irrigation and cropping systems. This is the university's first big research grant under the Central Sand Water Initiative's umbrella—and the first of many that the initiative's leaders hope to receive.

But to actually refill specific dry or depleted surface waters likely will require more aggressive, targeted approaches. Farmers may need to take fields out of production or shut down wells near troubled lakes and streams. "It may work out that a farmer needs to move a well one mile away from a stream, but can still farm the same field. That's a pretty okay solution from the farmer's perspective," says Diercks, who notes that the high-cap well legislation his group proposed in 2003 originally included a mitigation fund to help farmers pay for these kinds of changes. "It would have been funded by high-cap well fees, but it got cut from the final bill."

Some mitigation strategies already are being employed to help the Little Plover River, a trout stream just south of Stevens Point. In the summer of 2005, stretches of the river ran dry for the first time in recorded history. It happened again in 2006. The river flowed all through 2007, 2008 and 2009, but only because farmers pumped groundwater from high-cap wells into its headwaters.

"When the river dried up, it was like it died. I mourned for it," says Barbara Feltz, who lives on the river and in 2005 helped found the Friends of the Little Plover River to try to save it. Feltz serves as the group's president.



Over the years, the Friends group has wrangled an assortment of agreements to keep the Little Plover River flowing. The Village of Plover, for one, transferred some of its municipal pumping to a more distant well. It's also seeking funding to purchase 40 acres of former agricultural land near the river's headwaters—the first step in a proposed 140-acre land acquisition—for a wetland restoration and multi-use park. Farmers near the stream grow some low-water crops like snap beans, peas and short-season potatoes, and a Del Monte vegetable processing facility now sprays used processing water on a field near the river. But that's far from enough, Feltz believes: "It's very difficult to drive behavior change when everything's voluntary and it affects people's pocketbooks."

Feltz and other surface water advocates would like to see the Central Sands region designated an official state groundwater management area. As such, the region would have a water budget that limits pumping to protect the area's lakes and streams. They want this system codified into law and take some heart in a little-publicized state Supreme Court decision in 2011, Lake Beulah Manage-

ment District v. State of Wisconsin Department of Natural Resources, that found the DNR has the authority and duty to consider the impact of proposed high-cap wells on the state's waters before approving them.


Nowak believes a new groundwater law is inevitable. "It's not a question of if—it's a question of when and the nature of that law," he says. He would like to see it done right—and done once—preferably incorporating aspects of adaptive management, where water allocations are decided based on the levels of nearby lakes and streams, local groundwater levels, regional weather predictions and other science-based information.

But growers are wary of new legislation and are concerned that production uncertainties associated with a water budget could drive processing companies out of the state. "It's not our preferred outcome to have a board—which we may or may not have representation on—tell us what our businesses can do," says Diercks. "We don't want any new legislation unless it's reasonable." Growers, he says, would prefer community-level agreements that address specific problems.

Despite these differences, both sides express hope that the Central Sands Water Initiative can help the community find common ground and workable solutions.

"What we get accused of—and that might be a strong word—is wanting to put the ag people out of business. That certainly isn't anybody's intention," says Wolf. "Let's work together on this. Let's agree that there's an issue and that everybody should be able to share in that resource, whether it's a grower who needs to irrigate his fields or a landowner who wants to sit on his dock and dip his toes in the water."

If the Central Sands community is successful—if they can figure out how to maintain agricultural productivity in the area while keeping the region's aquifer and surface waters full—they will have created something valuable and increasingly rare in this world: a secure, sustainable source of water that meets the needs of the entire community.

"Compared to other potato-growing regions in the United States, the Central Sands has abundant rainfall and water supplies," says Diercks. "This seems like a place where we should be able to make this work." 



tech tr

The discovery-to-marketplace trail blazed by Harry Steenbock remains strong today. Here are some CALS-based businesses you should know about.

BY NICOLE SANDLER and DAVID J. TENENBAUM

When CALS biochemistry professor Harry Steenbock experimented with vitamin D in the early 1920s, his work proved groundbreaking in more ways than one.

Steenbock's discovery that he could increase the vitamin D content of foods through irradiation with ultraviolet light eventually eliminated rickets, a then-common and often deadly disease characterized by softening of the bone due to vitamin D deficiency.

With his own \$300, Steenbock patented his discovery and offered it to the University of Wisconsin. When the university declined, Steenbock conceived of the idea to form a foundation to collect, invest and distribute money earned through research-based discovery—a pivotal step in establishing the Wisconsin Alumni Research Foundation (WARF), the nation's first university technology transfer office. WARF's first licensing agreement with Quaker Oats in 1927 led to the fortification of breakfast cereals with vitamin D.

Since then WARF has patented nearly 2,000 university inventions. And—in the grand tradition of Steenbock—many of them stem from the labs of CALS scientists and alumni. Here we present some highlights from recent years.

transfer showcase

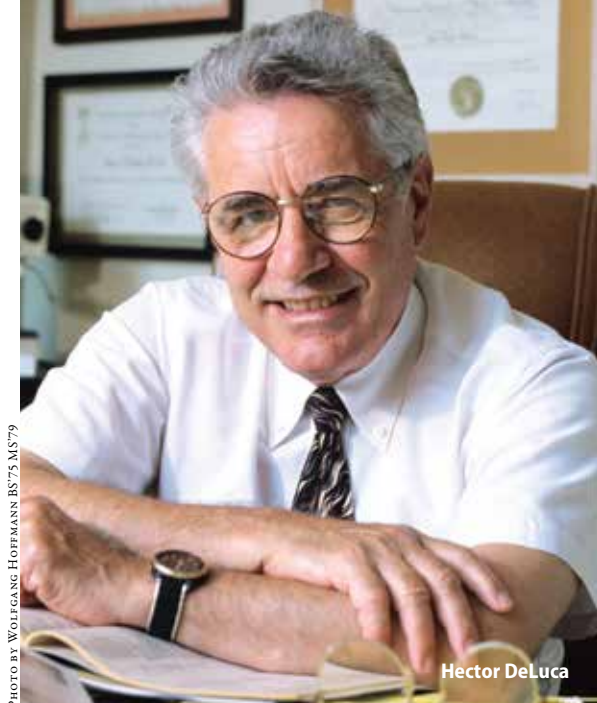


PHOTO BY WOLFGANG HOFFMANN BS '75 MS '79

Hector DeLuca

Deltanoid

Though the term biotechnology was little known in his time, Steenbock was one of the world's first biotechnologists—and he passed on that torch to his gifted graduate student, Hector DeLuca.

The path was not always smooth, and DeLuca hit some obstacles when his own seminal work on vitamin D in the 1960s led him to WARF. When he discovered the active form of vitamin D and chemically identified its structure, he was unable to file a patent due to unwieldy government restrictions. DeLuca eventually obtained a patent with the help of WARF patent attorney Howard Bremer and some influential people in Washington. That same group worked with federal legislators on the 1980 Bayh-Dole Act, which allowed non-profit organizations to obtain patents spurred by federally funded research. As a result, WARF now holds more than 200 active patents from the DeLuca lab.

DeLuca is the founder of three spin-off companies, each stemming from his vitamin D work. Bone Care International, a maker of drugs to treat dialysis patients, was sold in 2005 to the biotech firm Genzyme for nearly \$600 million. A second company, Tetronics (now SAFC Pharma), was acquired by Sigma Aldrich Fine Chemicals in 2004 for close to \$60 million.

Now DeLuca's main focus is Deltanoid Pharmaceuticals, which he

founded nearly 10 years ago with his fellow biochemistry professor (and wife) Margaret Clagett-Dame. The company is testing various vitamin D derivatives against osteoporosis, psoriasis, and kidney and autoimmune diseases, as well as other types of compounds to treat kidney failure. In clinical trials one vitamin D derivative seems to be highly effective in

stimulating bone growth, and a number of other Deltanoid products are nearing the human testing phase.

With a business office located on Madison's Monroe Street and about 10 employees, DeLuca describes Deltanoid as small but tenacious. "Our plan is to keep the company lean and mean until it has an income of its own," he says.

TRAC Microbiology

Food contamination outbreaks generate headlines, especially when they result in illness or death. Virginia Deibel, while still a graduate student in food science and bacteriology at CALS, combined her interest in both subjects by forming TRAC Microbiology, a company that helps keep our food supply safe.

Deibel describes how it felt when TRAC played a pivotal role in identifying the type and location of bacteria that forced a shutdown in a large meat processing plant. The culprit turned out to be *Listeria monocytogenes*, the same bacteria that recently killed several dozen people who ate contaminated cantaloupes.

"We went in and found where the bacteria were harboring, removed it and tested that it was effectively gone. We then rewrote the client's food safety programs, retrained all their employees and presented our corrective actions to

the USDA," Deibel recounts. "During the retraining phase I had employees coming up to me and thanking me for reopening the plant, which impacted entire families. That made me realize what we could do for a community."

Deibel founded TRAC (for Testing, Research, Auditing and Consulting) 12 years ago. She was less than 18 months away from completing her Ph.D. when she began redirecting her energy toward writing a business plan and securing a start-up loan of \$400,000.

"I knew from my work as a food scientist that there were many smaller companies that needed help with food safety," says Deibel. "They simply did not have the necessary infrastructure to implement food safety systems."

Initially TRAC services included helping food plants develop and update their food safety systems, train their quality assurance personnel and provide scientific justification for such practices as freezing, packaging and adding preservatives.

"Our original goals were to conduct research projects and provide food safety consultations," says Deibel. But she soon discovered that many small food companies needed testing to meet customer requirements. That need inspired Deibel to expand its testing services, and TRAC, which eventually grew to 30 employees, soon succeeded in attracting larger clients from around the region.

Last fall Covance, one of the nation's leading bioscience companies, announced the acquisition of TRAC Microbiology. Covance had paid close attention to TRAC and tapped Deibel to head development of its own food safety consulting division.

"Covance has excelled in so many different arenas—drug development, nutritional chemistry. I'm enjoying the challenge of helping such a respected company develop and grow a food microbiology arm," says Deibel.



Virginia Deibel

NimbleGen

The first sequencing of the entire human genome was all over the news in 1998, when Michael Sussman, a CALS biochemistry professor, was appointed director of the UW Biotechnology Center. An overwhelming amount of DNA information had become available, and Sussman was poised to help solve the problem of sifting through and interpreting the instructions carried by the genome's roughly 30,000 genes.

A new tool called the gene chip was critical to that effort. The gene chip is a piece of glass, like a common microscope slide, with hundreds of thousands of different pieces of DNA attached to one surface. It allows scientists to visualize the activity of each and every gene in the genome of living cells instead of having to analyze each gene individually.

When a scientist runs a tumor sample through a chip, for example, it may show that 300 genes have become

either less or more active—meaning they are likely to be involved in the cancer process. Indeed, by identifying such activity, gene chips have helped explain why a significant percentage of breast cancers fail to respond to drugs, notes Sussman.

But early gene chip technology was still far from being convenient or flexible. To address its limitations, Sussman sought the help of UW engineering professor Franco Cerrina, an expert in assembling semiconductors, along with CALS bacteriology professor Fred Blattner, who also was an experienced entrepreneur in the field of DNA software. The three went to work on improving gene chip technology—and met with great success.

“The chips we created could simultaneously detect activity in 30,000 genes on a glass surface just two centimeters square, allowing us to measure the entire genetic expression of a newly sequenced organism in a few days at low expense,” says Sussman. “With other chips you would have to wait a month or more and at great cost.”

Their invention in 1999 formed the basis of their company, NimbleGen, which quickly established itself as a maker of high-speed DNA analysis equipment. About five years ago NimbleGen was purchased by pharmaceutical giant Roche for about \$270 million

and evolved into Roche NimbleGen, which maintains a development lab in University Research Park. The company continues to develop novel gene analysis and profiling tools that allow scientists worldwide to apply genetic sequence information to advance diagnostics and therapeutics.

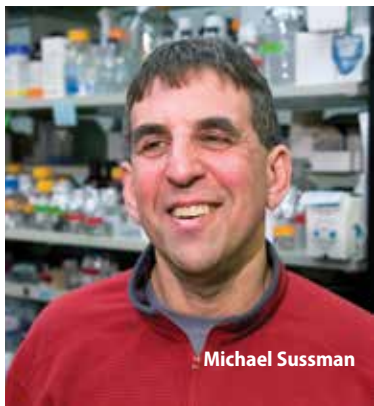
While the founding scientists are no longer involved in the company, Sussman continues to innovate new ways to use chips in molecular biology research.

LifeGen Technologies

To be forever young—or at least slow down the clock—is one of humankind's most enduring desires. So it's no surprise that Richard Weindruch was drawn to study the biology of aging, still a fledgling field when he entered it more than 35 years ago. In particular the idea of restricting calories as a way to slow down aging “jumped out” as a novel and fascinating concept, says Weindruch, a professor of geriatrics with the UW–Madison School of Medicine and Public Health.

The quest to understand and manipulate aging now forms the foundation of a highly competitive industry. And one of the first companies to embark on commercializing the technology needed to identify genes involved in aging was LifeGen Technologies, founded in 2000 by Weindruch and CALS genetics professor Tomas Prolla. Soon after they'd met, their research interests had intersected in what became “an alignment of good luck,” says Weindruch.

His collaboration with Prolla, an expert in gene chip technology, allowed them to fish out specific genes that appeared to control aging in mice that were fed high- versus low-calorie diets. The key to efficiently identifying genes of interest was to look for changes in gene activity or expression. Of the initial



Michael Sussman

6,347 genes examined on gene chips, approximately 120 showed statistically significant changes in expression. Weindruch lights up when he recounts his excitement at that time. “We were just wired—crazily excited—looking for those genes,” he says.

The two scientists focused on finding “supermarkers of aging,” genes that clearly play critical roles in aging in the context of caloric restriction. That entailed studying multiple strains of lab mice rather than just one and doing massive screens with genetic tools to find shifts in gene expression shared by them all. “We did find very robust gene expression changes with aging in specific

tissues,” says Weindruch.

The result: LifeGen has created one of the world’s leading databases of genetic information related to aging. Such data is being used to screen for drugs or nutrients that can mimic the effect of caloric restriction in the body and hence impact aging. “The potential to affect changes in aging is monumental,” Weindruch says.

Late last year LifeGen was purchased for nearly \$12 million by Nu Skin Enterprises, based in Provo, Utah. Weindruch and Prolla continue to do research for the company and oversee lab operations that remain in Madison.

Quintessence Biosciences Inc.

Too often RNA is the Rodney Dangerfield of cell biology. As the chemical middleman in the translation of DNA into functional proteins, it generally doesn’t command the same respect as those other two players. But what if manipulating RNA activity could be used to stop the growth of cancer cells?

That’s what CALS biochemistry professors Ron Raines and Laura Kiessling, a husband-and-wife team, set out to do in founding Quintessence Biosciences Inc. nearly a dozen years ago. Their work focuses on modifying a class of proteins called ribonucleases whose job is to break down RNA molecules in the cell. By altering the amino acid sequence of ribonucleases so that they are no longer well controlled by the regulatory protein that usually keeps them in check, the ribonucleases degrade a lot more RNA, disrupting the conversion of genetic information from DNA to RNA to proteins. Quintessence’s most promising product so far, a modified ribonuclease called QBI-139, targets the RNA in cancer cells, thereby killing the cells.

The first phase of a clinical trial testing QBI-139 as an anti-cancer drug—examining its safety and efficacy against solid tumors, including breast, colorectal, ovarian, pancreatic and prostate cancer—is now under way. The trial has enrolled more than 40 patients and is taking place at the UW Carbone Cancer Center and the M.D. Anderson Cancer Center at the University of Texas in Houston. So far patients are tolerating the drug well, with no evidence of toxicity.

Quintessence could be on the brink of something big. But Laura Strong, Quintessence’s president and chief operating officer (and Kiessling’s former grad student), remains cautious, citing a recent study by the Biotechnology



LifeGen’s Richard Weindruch (left)
and Tomas Prolla

PHOTOS (ABOVE AND OPPOSITE) BY WOLFGANG HOFFMANN BS '75 MS'79



Laura Kiessling and Ronald Raines,
founders of Quintessence

Industry Organization reporting that the success rate for bringing new medicines to market—cancer drugs in particular—is as low as one in 10.

“This is not for the faint of heart,” Strong says. “You draw your plans, put them down on paper and develop the milestones, yet it never quite goes the way you envision. Still, it is all incredibly rewarding.”

Aova Technologies

A lifelong fascination with the egg led Mark Cook, a CALS professor of animal sciences, to create Aova Technologies Inc.

“I’ve always worked in poultry and had always thought that there is really so much more to the egg aside from its use as a food,” says Cook. “Besides, it’s such a cool package. Not only is it sterile, but it contains all that is needed to grow an embryo into a chick.”


Back in the mid-’80s Cook decided to focus one area of his research on a single type of protein that is highly enriched in the egg—antibodies. He had always been interested in how birds transfer their natural antibodies into their eggs, and he pondered how this phenomenon could be applied on a larger scale to benefit the poultry industry.

At the same time, Cook was investigating ways to promote growth in animals through regulating the inflammatory process. He combined these two lines of research, and what resulted was a platform technology involving the manipulation of poultry antibodies to block inflammation, thus improving growth. The strategy entails processing egg antibodies into a powdered food supplement that is then added to livestock feed. Animals that have experienced improved health and accelerated growth from the feed include chickens, laying hens, pigs,

calves, cattle and even fish.

Cook filed patents for his initial discoveries with WARF. He then embarked on years of work developing technology allowing egg antibodies to be produced in a way that was both safe and economical—and which could then be introduced as an additive in animal feed.

Cook now has more than 20 patents to his credit and Aova Technologies has five employees. The company continues to market products worldwide and recently expanded into the \$70 billion global aquaculture market.

Despite that global growth, Aova remains in many ways a local company. The animal feed additive is made in Madison, the key ingredient—the eggs—are produced at a farm in Whitewater and the company uses a drying facility in Union Grove. Cook is proud that he has retained these local connections and remains loyal to the state of Wisconsin as his company expands. 

The Grow Dozen



Travis Balinas



Kajsa Dalrymple



Dennis Dimick



Patrisia Gonzales



Staci Griesbach



Gale Kirking

Travis Balinas BS'09 MS'10 Life Sciences Communication • Balinas works as an inbound marketing manager for Zenoss, a start-up company that makes commercial open source software for managing IT infrastructures, whether they are accessed online (i.e. "cloud-based") or on local servers. Balinas is responsible for cultivating a specific image, direction and voice through all major social media channels—a great fit, considering that he had created his own master's degree emphasis on social media and public opinion. "Understanding how large crowds form opinions plays a major role in my duties," he says.

Kajsa Dalrymple PhD'11 Life Sciences Communication • Freshly minted PhD Dalrymple is an assistant professor in the School of Journalism and Mass Communication at the University of Iowa, where she also is a faculty associate of the university's Water Sustainability Initiative. As part of a new plan to prevent flooding in the Iowa-Cedar Rivers Basin, Dalrymple is researching public concerns and individual attitudes toward flooding. "This will help shape the group's communication and education initiatives to encourage preventive behaviors and overall watershed awareness," says Dalrymple.

Dennis Dimick MS'74 Agricultural Journalism • As executive editor for the environment at *National Geographic* magazine, Dimick has a job that thousands of aspiring journalists dream of. His favorite part, he says, is coming up

with story ideas—exploring new scientific developments and discoveries that can produce interesting stories. When asked how he chose his field, Dimick says, "Perhaps it chose me. I grew up on a sheep and hay farm in Oregon, my parents were biologists, my grandfather was a doctor who loved photography. All of these influences are combined in what I do today as a journalist who works on environmental issues, trying to make them relevant and animated through visual storytelling." Dimick, who last year received a WAA Distinguished Alumni Award, remembers his time at CALS as "very empowering." "It showed me I could rely on my own instincts and initiative to do anything I wanted, if only I set a goal and went after it," he says.

Patrisia Gonzales MS'05, PhD '07 Life Sciences Communication • As a professor of Mexican American and American Indian studies at the University of Arizona, Gonzales specializes in indigenous medicines. "Indigenous medicines are healing systems that tell us much about how knowledge is maintained, constructed, preserved and asserted by indigenous peoples," says Gonzales, who is of Mexican American, Nahua, Kickapoo and Comanche heritage. Gonzales has worked as a traditional herbalist and birth attendant alongside making her name as a scholar, documentary producer and columnist, including writing the "Column of the Americas" with Roberto Rodriguez MS'05 Life Sciences Communication. Her books include *The Mud People* (Chusma, 2003) and the forthcoming *Red Medicine: Traditional*

Indigenous Rites of Birthing and Healing (University of Arizona Press, 2012).

Staci Griesbach BS'00 Life Sciences Communication • "I'm not going to lie—it is fun to work with the likes of Kevin James, Adam Sandler or a legend like Kris Kristofferson," says Griesbach, vice president of worldwide publicity for Sony Pictures Home Entertainment. Griesbach joined Sony in 2005 and has executed campaigns for movies and TV shows including *The Social Network*, *Spider-Man*, *Julie & Julia*, *Seinfeld* and *The Smurfs*. Despite her dizzying climb, Griesbach remains a down-to-earth young woman from Hortonville. "People often ask me, 'How did you go from the College of Agricultural and Life Sciences to working in the entertainment industry in Los Angeles?'" Griesbach says. "I usually laugh and say I was told I could do anything if I put my mind to it. Turns out, I think that's true."

Gale Kirking BS'87 Agricultural Journalism • Kirking was raised on a family farm near Lodi and in the 1980s was a reporter for *Agri-View*. But for the past 20 years he has lived in Europe and now owns English Editorial Services, a firm based in the Czech Republic offering communication expertise in finance and the life sciences. Previously, Kirking had a career in stock brokerage and investment banking and also wrote a book, *Untangling Bosnia and Hercegovina*. Kirking is about to launch a consulting division to help American companies develop their businesses in Central Europe.

12

Alumni who are making a difference in Life Sciences Communication



Robert Manwell



Jodi Minzlaff



Susan Orth



Andrew Peterson



Marcus Steed



Sheri Nelson Sutton

Robert Manwell BS'73 Forest Science, MS'95 Agricultural Journalism

• Manwell has always been passionate about the environment—so when he was appointed deputy spokesperson at the Wisconsin Department of Natural Resources, he pretty much landed his dream job. Any day might find him producing video and audio about Wisconsin's precious resources, writing news releases or working to get reporters information on deadline. Manwell continues to serve the DNR as a senior public affairs manager.

Jodi Minzlaff MS'07 Family and Consumer Journalism • Minzlaff is a business development manager with American Express in London, where she leads initiatives to acquire and retain customers throughout much of Europe. She works daily with colleagues in Germany, France, Italy and other countries. "It's a culturally diverse environment, and I enjoy developing strategic opportunities and marketing/communication messages tailored for each audience," she says. While at CALS Minzlaff had worked as a marketing communications research assistant in the department of life sciences communication, where she helped develop and implement a new department brand. That experience has served her well at Amex, she says.

Susan Orth BS'06 Animal Sciences, Life Sciences Communication • Orth wears many hats as a sales specialist for the World Dairy Expo, North America's 23rd largest trade show: "I work with the trade show, project management and customer service. We also manage the Dane County Fair." Orth's animal sciences/life sciences communication degrees naturally led her to the Expo, she says. Orth stays involved with CALS as a board member of the Association of Women in Agriculture and as an advisor for the Badger Dairy Club.

Andrew Peterson BS'08 Life Sciences Communication, Animal Sciences • Growing up on Peterson Limousin Farms, his family's operation near Osceola, Peterson was raised with a passion for Limousin beef cattle, a muscled breed that gets the fancy name from its place of origin in France. That he'd somehow work with these cattle seemed a matter of destiny, but that he'd work with them online is due to the excitement he felt on taking his first web communication class at CALS. Peterson is the founder of LIVEstock New Media Communications, home of LimousinLive.com, a website serving Limousin cattle breeders and commercial ranchers. "I love the cattle industry and the diversity and creative freedom each day brings," Peterson says.

Marcus Steed BS'10 Life Sciences Communication • How do you land a great job upon graduation? One way is to do fabulous work as an intern. "Marcus made important contributions to our online service while he was a student intern and comes to us with terrific qualifications," said Wisconsin Public Television director James Steinbach when he hired Steed last summer. As WPT's online editor, Steed reviews, edits and produces content for the organization's website and social media platforms. "I look forward to continuing to grow here," says Steed.

Sheri (Nelson) Sutton BS'09. Life Sciences Communication • Sutton has a big job serving as director of communications for the Wisconsin Farm Bureau. But she also puts her passion into WaterDrops of Hope, a nonprofit she founded to increase access to clean water in Africa. The organization sells reusable water bottles and uses proceeds to build wells where people struggle to find water for drinking and washing. "I wanted to provide a way for people here to feel like they are part of a movement to help people halfway across the world," she says. Sutton credits her LSC program for giving her the necessary website, PR and marketing skills to start her own nonprofit.

About the Dozen

These 12 alumni represent the depth and breadth of CALS graduates' accomplishments. Selections for the list 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

Catch up with ...

Beth Zupec-Kania BS'81 Dietetics

THE SPECIAL DIET SHE WAS USING ON CHILDREN WITH EPILEPSY WAS CHANGING LIVES—but Beth Zupec-Kania BS'81 didn't know it would change her own until she got a call from Hollywood producer Jim Abrahams back in the mid-1990s.



PHOTO COURTESY OF BETH ZUPEC-KANIA BS'81

As a dietitian at Children's Hospital in Milwaukee, Zupec-Kania and her team had been using the ketogenic diet, a high-fat, low-carb diet—think Atkins—shown to greatly reduce or eliminate seizures. And writer/producer Abrahams (*Airplane!*, *The Naked Gun*), whose young son Charlie had been saved by the diet, wanted to partner with her to spread the word.

Charlie had begun having seizures at 12 months, and after going through a half-dozen medications and brain surgery still was having up to 200 seizures a day. "He lived in a car seat," says Zupec-Kania. "It was the only safe place they could put him because he would have a seizure and just collapse."

Through his own research Abrahams learned about the diet and took Charlie for treatment at Johns Hopkins, one of relatively few hospitals that offered it. Almost immediately the boy stopped seizing and after a few years was weaned off the diet.

Abrahams formed The Charlie Foundation to promote access to the diet and soon heard that Children's Hospital in his native Milwaukee

had been another early adopter. Abrahams reached out to Zupec-Kania and her team to help them scale up use and start training physicians, nurses and dietitians at other hospitals.

Zupec-Kania found that work so rewarding that eventually she joined The Charlie Foundation full-time, where she writes journal articles and develops online support materials about the diet along with training healthcare professionals. Her work takes her all around the United States and much of the world, including Saudi Arabia (see photo), the Dominican Republic and Germany.

● **No one knows why this diet works or why it has permanent effects, right?**

That's right, no one knows why the diet affects seizures. But many scientists are trying to solve this mystery—they believe that a healing occurs in the brain. At UW-Madison, physician Carl Stafstrom has done research on this and he's also treating patients with the diet.

● **Is the ketogenic diet just for kids?**

No. We are finding it works in adults as well. The problem with adults is that compliance with any type of diet is difficult.

● **Why is the diet still not a treatment of first resort?**

It's much easier to prescribe a medication, and if clinicians are going to use the diet, they need to have a team

in place—a neurologist, a nurse and a dietitian—to initiate and manage it. The diet is not started at home, it's started in the hospital under medical supervision. Also, there isn't a treatment code for the diet, so insurance reimbursement is really poor. That's been a barrier as well.

● **When you first met Jim, did you feel at all starstruck?**

I did! I remember sitting there when he called, thinking "Is this Hollywood producer really talking to me?" But the more I talked to him, the more he seemed like just a regular guy from Milwaukee because he has that familiar accent. He is the nicest man—the most warm, kind, caring person.

More information at charliefoundation.org.



Financial aid made all the difference to two-time Wisconsin Rural Youth Scholarship recipient Jennifer Holle, of Baldwin, who also recently received an Outstanding Sophomore Award from WALSA.

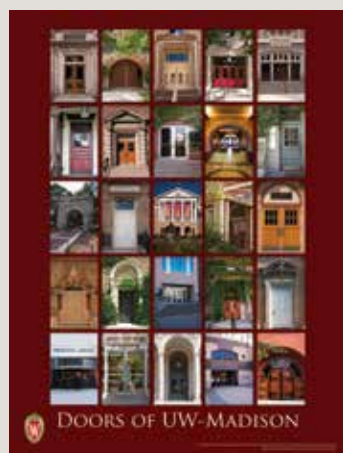
EXPLORE discoveries on campus through **Science Expeditions** on Saturday, April 12, the 10th anniversary of this popular community event. Start your journey at the Wisconsin Institutes for Discovery (330 N. Orchard Street), which will feature more than 50 exploration stations, many involving CALS research. More info at www.science.wisc.edu/events.

ATTEND Alumni Weekend April 27–29, featuring Wisconsin Idea-themed talks, a Friday fish fry and a Saturday night event offering such beloved foods as cheese and the Rennebohm grilled Danish. Visit

uwalumni.com/alumniweekend or call (888) WIS-ALUM for more information.

TAKE PART in **Alumni College** June 21–25, based in Bayfield to explore “Wisconsin’s Northwoods: Resilience and Fragility in Changing Times,” featuring plant pathologist Caitilyn Allen among faculty presenters. Includes visits to Big Top Chautauqua and Raspberry Island. More info soon at uwalumni.com/learning, or contact Sarah Schutt, sschutt@waastaff.com.

SUPPORT need-based student aid offered by the Great People Scholarship Campaign by purchasing a new poster called “**Doors of UW–Madison**” (image left). CALS-affiliated buildings comprise eight of the 25 featured entryways. Posters can be purchased for \$20 at University Book Store (State Street and Hilldale) or by sending a check (\$25 includes shipping and handling, \$30 for international) along with your name and mailing address to DEM Posters, 333 East Campus Mall, Madison, WI 53715-1376.



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

PAY IT FORWARD

Growing up on a family dairy farm didn’t allow much time for slacking off, recalls Jennifer Holle.

“Since I’ve been able to carry a small bucket, I’ve been out in the barn helping with chores,” says Holle, who comes from Baldwin, a small town near River Falls. “Between feeding and caring for calves, milking cows and assisting the vet, I learned the value of a hard day’s work.”

Holle brought that work ethic from the farm to CALS, where she’s majoring in dairy science. She plans to start veterinary school in Madison this fall.

Besides hard work, another key to Holle’s success has been crucial financial assistance. Holle is a two-time recipient of a **Wisconsin Rural**

Youth Scholarship, a program that CALS set up in 2009 specifically for young people like her—promising students whose financial circumstances pose a barrier to education. So far CALS has awarded 34 such scholarships totaling \$56,000—assistance made possible by CALS alumni who contribute to the program.

Wisconsin’s rural young people need that help. Rural per capita income is 20 percent less than in metropolitan areas, and 40 percent of CALS students demonstrate significant financial need. Rising tuition costs make their distress even more acute.

Wisconsin Rural Youth Scholarships make a difference. “Before receiving the scholarship I was working almost 30 hours a week while going to school full time. This ultimately led to spending less time on school,” says Jacob Salzman BS’11, a recent landscape architecture graduate from Fall River. Getting the scholarship in his senior year allowed him to focus on studies and projects that helped him land a job upon graduating.

But it’s not just the kids who benefit. In the long run, educating rural youth can have a profound effect on their home communities. “I already have committed myself to a career in food animal veterinary medicine here on Wisconsin’s dairy farms while being involved in and committed to the dairy industry,” says Holle.

In other words, Wisconsin Rural Youth Scholarships aren’t just cash awards—they’re an investment in Wisconsin’s future.

To help support Wisconsin Rural Youth Scholarships, visit: <http://www.supportuw.org/giving?seq=8105>

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



Five things everyone should know about . . .

Hops

By Judith Reith-Rozelle



1 | Wisconsin was once the nation's largest producer of hops. The 1860s saw “an unbounded zeal” in Wisconsin hop production, according to the *Milwaukee Sentinel* in 1867, when Wisconsin was growing 75 percent of the nation's hops. The state's brewing industry demanded hops at a time when wheat prices were declining, prompting many farmers to grow hops instead. The hop market crashed soon thereafter, but the boom-time infusion of cash helped establish a strong agricultural base in Wisconsin.

2 | There's a wine connection. The Hungarian Count Agoston Haraszthy is believed to have grown some of the first hops in Sauk County, which became the epicenter of the Wisconsin hops craze. But the Count's true love was grapes, and alongside hops he planted vineyards that were to become the heart of Wollersheim Winery, Wisconsin's largest. Seeking a warmer climate for grape growing, Haraszthy moved to California, where he became a pioneer of the state's wine industry.

3 | And a pot connection as well. The hop is a member of the Cannabis family. As its scientific name (*Humulus lupulus*) indicates, hops contain the chemical lupulone, which is a mild sedative. Long before the plant's female flowers were used to provide flavor and aroma in beer, they served a medicinal purpose as a sedative and digestive aid (pillows filled with the flowers, for example, were used to induce sleep).

4 | The Pacific Northwest rules. Wisconsin breweries purchase most of their hops from that region. Washington state leads the pack, growing 77 percent of the nation's hops.

5 | But we're seeing a mini-revival of hop growth here. In Iowa, Sauk, Grant and Dane counties people are buying land and planting hops again. Gorst Valley Hops, near Black Earth, has developed a charter growers program, a cooperative of sorts for hop growers. In northern Wisconsin, many of the smaller brewpubs and microbreweries are beginning to grow their own hops—an example is the South Shore Brewery in Ashland. As you drive around the state, look for tall poles in long lines across a field. It could mean that hops are happening.

Judith Reith-Rozelle is assistant superintendent of CALS' West Madison Agricultural Research Station. She wishes to thank Laura Paine, grazing and organic agriculture specialist with DATCP, for the historical information about hops.

Take the FINAL EXAM!

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.

Agronomy/
Horticulture

1. The effect of a gene on two separate traits is called:

- a. Alleles
- b. Epistasis
- c. Homozygotes
- d. Pleiotropy

Biological Systems
Engineering

2. Which of the following gases is NOT identified as a greenhouse gas?

- a. Carbon dioxide
- b. Nitrogen
- c. Water vapor
- d. Methane

Plant Pathology

3. The biggest difference between the flow of energy and the flow of chemical nutrients in an ecosystem is that:

- a. The amount of energy is much greater than the amount of nutrients
- b. Energy is recycled, but nutrients are not
- c. Organisms always need nutrients, but they don't always need energy
- d. Nutrients are recycled, energy is not
- e. Organisms always need energy, but they don't always need nutrients

Animal Sciences

4. *Tapetum lucidum* is responsible for:

- a. Improved hearing
- b. Improved sense of smell
- c. Improved night vision
- d. Improved sense of taste
- e. Improved tactile sense

Food/Animal
Sciences

5. If a dog food is labeled "Beef Cuts," how much of the product must be beef?

- a. There only needs to be some beef included
- b. At least 3%
- c. At least 25%
- d. At least 50%
- e. At least 95%

LAST ISSUE: Answers were 1: C, 2: C, 3: D, 4: C, 5: C. Congratulations to microbiology graduate student Rosivette Santiago, who was randomly selected from the 12 people who correctly answered all questions. She wins a gift certificate to Babcock Hall.

College of Agricultural and Life Sciences
University of Wisconsin–Madison
136 Agricultural Hall, 1450 Linden Drive
Madison, WI 53706

Nonprofit Org.
U.S. Postage
PAID
Madison, WI
Permit No. 658

PHOTO BY JEFF MILLER/UW COMMUNICATIONS

PET THE PIGLETS

CALS Day for Kids each spring brings upward of 500 elementary school children to the Stock Pavilion for a day of hands-on fun and learning. The event is hosted by the CALS Student Council. Here, two four-week-old piglets sleep under a heat lamp at a Sigma Alpha agricultural sorority-sponsored display. For more cool science, visit us at www.cals.wisc.edu/grow/

