

grow

Wisconsin's Magazine for the Life Sciences • Spring 2013

food & agriculture • environment • energy • health

Branding Wisconsin Meat

**The quest to make locally crafted meats
as renowned as the state's artisan cheese**



College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON

FARM-FRESH SCHOOL LUNCHES • BIODIVERSITY IN CHINA • MEET THE REAL BUCKY





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Wisconsin's Magazine for the Life Sciences

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The smokestack affixed to the Ag Bulletin Building, located between Hiram Smith and King Hall, is one of very few 19th-century chimneys remaining on campus. This past fall, masons did some touch-up work to ensure its presence well into the future.

Dean Kate VandenBosch

Why We're Growing



The start of a new year prompts thoughts about the future. That's certainly been true for me as I wrap up my first year as dean and, together with an array of stakeholders on campus and around the state, move through the forward-looking process of strategic planning for CALS.

Chief among our stakeholders are our students. And when it comes to thinking about how and why our college is growing, students are a revealing group to consider.

Their numbers confirm that in fact we are growing, and at an impressive pace. CALS has 3,059 undergraduate students enrolled this fall—up 7.3 percent from last year and 33 percent from 10 years ago.

What's drawing students to CALS? Their areas of study are an indication. We're seeing continuing growth in such majors as biology, biochemistry and genetics as well as microbiology, nutritional sciences, biological systems engineering and food science, which has doubled since 2008. Biology, with enrollments divided between CALS and Letters and Sciences, is now the biggest major at UW–Madison, and more than half of biology majors are enrolled in CALS.

“Students want to make an impact on the grand challenges facing our world.”

Deans at our peer colleges around the country report similar trends. What we're seeing is that students, among their reasons for studying the agricultural and life sciences, want to make an impact on the grand challenges facing our world. And yes, they also are attracted to the good job prospects in many of our disciplines.

That's certainly what I'm hearing in talks with students in various settings—at presentations and awards ceremonies and, most extensively, in the CALS First Year Seminar I had the pleasure of teaching last semester. The course, intended to give freshmen an overview of CALS, is designed around the grand challenges that concern them.

Many of our talks focused around the needs of a planet that soon will hold nine billion people. How do we provide enough food, water and energy in a sustainable manner? Our discussions concerned everything from the need to develop crops that make more efficient use of nutrients to tapping the potential of renewable energy to better understanding the impacts of changing climate conditions and what constitutes optimal nutrition.

We need to ensure that we equip students to meet these challenges. We're not here only to teach them about the tools we have today. We need to educate them in a way that allows them to think across disciplines, to innovate, to come up with solutions possibly not yet imagined.

That's a challenge for us now as we formulate our strategic plan. And in the best Wisconsin tradition I invite us all to look forward.

For information and to provide input on the CALS strategic plan, visit www.cals.wisc.edu/about-cals/administration/strategic-planning/

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On Henry Mall

News from around the college

Not Quite Bucky

A study sheds light on the elusive animal behind the mascot

Badgers are notoriously difficult to study. Not only do they spend all day in underground dens, emerging only by night to hunt—they can't even be tracked using radio collars. The devices slip right off of their heads, which taper from shoulder to nose. Badgers are so hard to work with, in fact, that researchers aren't sure how many of them live in Wisconsin, even though the badger is our state animal.

"We don't have a clue. We just don't know much about badgers in Wisconsin," says Jimmy Doyle, a forest and wildlife ecology graduate student who is studying the reclusive carnivores as part of a joint UW-Madison–Wisconsin Department of Natural Resources (DNR) project called the Wisconsin Badger Study.

The project, which relies on surgically implanted radio transmitters to monitor the movements of badgers living in the southwestern part of the state, represents the first big effort in Wisconsin to better understand these animals. It will shed light on the landscapes where badgers prefer to live, where they prefer to hunt, how far they roam, whether their territories overlap and much more.

But first, Doyle has to find and catch them.

Working with various DNR technicians, he has walked through scores of miles of grassland over the past two seasons looking for dens, setting traps and then coaxing badgers into travel crates. The effort yielded three badgers in 2011 and 12 in 2012.

"They tend to be pretty feisty," says Doyle. "There's lots of snarling and snapping."

Once caught, the badgers are driven to Madison for a health exam and to have a small radio transmitter the size of an AA battery surgically implanted just below the skin at the scruff of their necks. It's a quick procedure, and the badgers are returned to their dens within about four hours. The transmitters enable Doyle and his DNR collaborators to track the badgers' movements at night from the comfort of an antenna-equipped truck—without ever needing to get near the animals again.

The project has a second purpose: to help inform



PHOTO COURTESY JIMMY DOYLE

DNR efforts led by DNR grassland community ecologist David Sample to protect grassland-nesting birds in the study area.

Wildlife ecology professor Tim Van Deelen, who is Doyle's advisor, explains the connection. "Grassland birds have this problem in the Midwest where they have to pull off reproduction in a very predator-rich environment—just think of all the small rodents that would love to eat a little bird egg," he says. "Badgers might actually be good for birds because they might suppress some of those predators—by eating them."

—NICOLE MILLER MS'06

**Badger researcher
Jimmy Doyle posing
with our misunderstood
state animal**

Biofuel for Teens

A CALS-trained teacher brings bioenergy into high school classrooms



Biofuel potential?
Teens examine
samples of organic
matter they have just
collected outdoors.

As students in Craig Kohn's class at Waterford Union High School can tell you, you don't need a grant or Ph.D. to do scientific research. A question and some curiosity are all that's needed—along with a sturdy pair of gloves.

Kohn BS'08, who earned degrees in biology and agricultural education at CALS, teaches a class called Biotechnology and Biofuels in which students hunt for bacteria that naturally secrete enzymes called cellulases. Cellulases are named for their ability to break down cellulose, the sugar polymer in plant cell walls that gives stems and leaves their structure.

"Cellulases are important for bioenergy because they are necessary to turn cellulose into a ferment-

able product that can be made into ethanol and other biofuels," says Kohn.

To find those cellulase-producing bacteria, Kohn sends students out to collect samples from the compost heaps and animal pens behind their school in a quest known as "bioprospecting."

Back in the classroom, students drop the samples into test tubes filled with media solution and a strip of filter paper. If cellulases are present, the cellulose-based paper will disintegrate as the enzymes do their work.

That process of discovery excites students. "You see this light in their eyes when they realize that they are participating in science directly, and that their work could lead to actual breakthroughs and results," Kohn says.

Kohn developed the activity as a participant in "Research Experience for Teachers," a program at the UW's Great Lakes Bioenergy Research Center (GLBRC). For his project he shadowed Cameron Currie, a CALS professor of bacteriology and a GLBRC researcher who uses genomic and ecological approaches to study biomass-degrading microbes.

"Teachers are not only learning about current science—they are embedded in the lab," says John Greenler, GLBRC's director of education and outreach. "When teachers have that primary experience, they are in a better position to engage their students because they 'get it.'"

Connor Williams, a high school senior who helped develop the bioprospecting lab with Kohn through his participation in the National FFA Organization (formerly Future Farmers of America), says his favorite element is the hands-on, independent work.

"I learned that answers to biofuel challenges literally can be found right in our backyards," Williams says. "You just need to know where to look."

—CELIA LUTEBACHER



Whey to Go!

Wondering what's fueling the success of UW athletes? Look no further than Red Whey, a recovery drink composed of tart red cherry juice and whey protein. The beverage was developed as a collaboration between the UW–Madison Athletic Department, CALS' Center for Dairy Research and industry partners including Country Ovens–Cherry De-Lite. You can buy the drink at Metcalfe's in Madison's Hilldale Mall or order it from Country Ovens at (920) 856-6767, www.countryovens.com. It will soon be more widely available, producers say.

A Fresh Approach to Fighting Hunger

CALS experts offer help to a former prison farm that feeds the needy

Wisconsin has hundreds of diversified, fresh market vegetable operations, but there's one on the outskirts of Franklin that's in a class by itself.

Most of the state's market farms are small. They grow produce on a few rural acres, rely heavily on family labor and sell at farmers markets or roadside stands. But "the Farm," as it's simply called, is different. It's big—it grows 26 kinds of fruits and vegetables on about 150 acres—and anything but pastoral, being located on the grounds of the Milwaukee County House of Corrections. Hundreds of people, mostly volunteers, work the fields. And everything they harvest is given away.

The Farm is operated by the nonprofit Hunger Task Force (HTF) as a way to supply fresh produce to more than 80 food pantries and meal programs in the Milwaukee area. HTF leases the former prison farm from the county for a token fee, and with help from hundreds of community volunteers and several dozen workers employed through its job training program, provides hunger relief sites with 350,000 pounds of everything from apples to zucchini.

That's impressive, especially considering that HTF embarked on the project some eight years ago with little expertise in horticulture. Farm manager Rich Richardson's background is in information technology.

That's where CALS comes in. For the past few years, CALS and UW-Extension specialists in horticulture, soils, agronomy, entomology, plant pathology and other disciplines have been providing hands-on, in-the-field advice on topics ranging from soil fertility and weed control to irrigation and orchard management. And CALS dairy science grad Jay Janowski BS '07 is Richardson's second in command.

The UW experts have been happy to help—the project not only serves a worthy cause, it also offers a unique set of challenges.

"This is very ambitious. It's not a market garden, it's a very large, diversified vegetable farm," says CALS horticulture professor Jed Colquhoun. "It's a tremendous task when you consider the number of crops and that most of them have to be hand-harvested."



"They're doing a great job," agrees CALS soil scientist Matt Ruark. "Last year they were having issues with nutrient deficiency. We reviewed their fertilizer program and helped them make adjustments. Everything looked good this year. Now we're working with them on trying some other management practices, such as cover cropping, to improve fertility."

HTF executive director Sherrie Tussler says her organization is grateful for the help. "CALS has helped us overcome many of the challenges we've faced as new farmers," she says. "The expertise CALS provided helped us grow 350,000 pounds of fresh Wisconsin produce this past season. Hungry people in Milwaukee were fed—and for this we are thankful to our friends at CALS."

—BOB MITCHELL BS'76

CALS experts meet regularly with the Hunger Task Force to help improve farm productivity. Jed Colquhoun (above, right) discusses crops with Jay Janowski BS'07 while Matt Ruark (below, left) reviews soil with farm manager Rich Richardson.



To learn more about the Farm's impact on families in need, visit www.hungertaskforce.org/the-farm

classAct

Logan Wells

Hardwood and Soft Skills



PHOTO BY BOB MITCHELL BS'76

When CALS sophomore Logan Wells tells you he spends his spare time sawing logs, he doesn't mean he's catching up on sleep. He's actually out in the woods, running logs through his portable sawmill, making lumber for clients—and making money to help cover his college expenses.

Wells's Smock Valley Timber is more than a business—it's part of his education. He started it as a hands-on project for the National FFA Organization, the youth program focused on agricultural and natural resource careers, while he was still in high school. Wells enjoyed working the wood and growing the business so much that he opted to enroll in CALS as a forest and wildlife ecology major with an eye toward a career in forestry or forest products.

While practicing and studying forestry keeps Wells busy, the program that sent him into the woods in the first place keeps him even busier. Logan is a state vice president in the Wisconsin FFA Association, representing 24 FFA chapters in Dane, Rock and Green counties.

Much of that work involves going out to middle and high schools, where he encourages FFA members to get active in the program and talks with them about the importance of "soft" skills—a positive attitude, good work habits, teamwork and other traits that can put them on the path to success.

His own high school FFA project helps them understand where a good idea and a good attitude can take them. His timber enterprise paid off in more than money. It earned a top prize in a national FFA competition, which in turn earned him a spot on an agricultural exchange trip to Costa Rica featuring visits to banana, coffee and cacao plantations, whitewater rafting and trips through the rainforest on zip lines and suspension bridges—all very exciting stuff for students to hear about.

"I get to tell them my story and inspire them to do something like that for themselves," Wells says.

NAMED Fellows of the American Association for the Advancement of Science (AAAS), **Paul G. Ahlquist**, a professor of plant pathology, and **Dietram Scheufele**, a professor of life sciences communication. Ahlquist received the honor for his significant contributions to the area of molecular virology, viral evolution and pathogenesis. Scheufele was honored for elucidating how various sectors of the public understand, engage with and appreciate science, technology and engineering.

AWARDED a Grand Challenges Explorations grant from the Bill and Melinda Gates Foundation, biochemistry professor **Doug Weibel**, for his work in creating a simple, inexpensive bacteria test that could save infants from deadly infections in developing countries.

HONORED with a WARF Innovation Award, animal sciences professor **Mark Cook**, for developing a feed additive that reduces common infections in poultry.

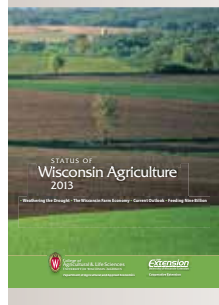
RECOGNIZED for their work with CALS' Agricultural Research Stations: **Thomas Wright**, superintendent of the West Madison Agricultural Research Station; soil science professor and UW Extension specialist **Carrie Laboski**; and UW Extension specialist **John Peters**, director of the UW Soil Testing, Plant Analysis and Feed and Forage Analysis Laboratories. They received ARS' Staff, Research and Service awards, respectively.

HONORED with a Prince Philip Prize, milking technology involving research by biological systems engineering professor **Doug Reinemann**. **Prince Philip** himself was "very interested and clued up" on the Milk-Rite Impulse



Air liner technology, according to manufacturing executives from Avon Dairy Solutions who presented the device to him personally at Buckingham Palace (photo, left).

Number Crunching



27.2 BILLION POUNDS OF MILK

were produced by Wisconsin farms in 2012, setting a record for the seventh consecutive year. That's particularly impressive given that 80 percent of the state was under some level of drought that reduced yields and quality of forages and grains used for feed. This figure and many more are presented and explained in the 2013 Status of Wisconsin Agriculture report, www.aae.wisc.edu/pubs/status/

how to make quark

T

here's a new cheese in Wisconsin, and it has a rather funny name. Quark (pronounced "kwark"), a fresh cheese that is very common in Europe, mostly is



eaten as a spread on bread—much the way we use cream cheese—or mixed with fruit or herbs and eaten like yogurt. Master cheesemaker Bob Wills, an alumnus of the CALS Center for Dairy Research (CDR) and owner of Cedar Grove Cheese in Plain, may be credited with bringing quark to our state. He's producing it at Clock Shadow Creamery, his new cheese plant in Milwaukee. You can buy quark there or in a number of supermarkets under the Cedar Grove label—or you can be bold and try making your own. It's easier to make than yogurt and requires no special equipment. You'll need three cups to make the scrumptious German cheesecake recipe we link to below. Here's a quark recipe from Mike Molitor, CDR process pilot plant manager.

Makes 1 1/3 cups of quark

Ingredients: 4 cups whole milk
3 Tablespoons buttermilk with live cultures

Preparation: Use a large pan with a lid. Heat milk to about 170°F for at least 30 seconds. It's fine if a skin forms on it, but avoid scalding the milk to prevent a cooked or burnt flavor.

Remove from heat, put on the lid and let milk cool to room temperature. Then whisk buttermilk into the milk. Replace the lid and let the milk sit undisturbed at room temperature for 12 to 14 hours or until it's the consistency of yogurt.

Once the milk has curdled, strain it by layering a sieve with cheesecloth, pouring the milk into the sieve and allowing it to drain overnight in the refrigerator. What's left in the sieve is quark. You may need to stir the quark a few times to get it to drain thoroughly.

Even Easier, Buttermilk Only

Instead of adding buttermilk to plain milk—a process that essentially means you are “making” buttermilk—you can simply purchase a gallon of buttermilk (typically 1 percent butterfat) and strain it in the refrigerator as directed in the last paragraph above to obtain the quark.

Where to find quark from Clock Shadow Creamery:
<http://clockshadowcreamery.com/where-to-buy/>

For recipe for Kasekuchen with Quark:
See “Know How” at www.grow.cals.wisc.edu

Five things everyone should know about . . .

Spotted Wing Drosophila

By Phillip Pellitteri



PHOTO COURTESY ED SHOW

1 | There are 113 species of fruit flies. Why worry about this one? While most other fruit flies attack only overripe or damaged fruit, the female spotted wing drosophila can cut a slit and lay eggs in healthy fruit. Typically this insect will strike just as the fruit begins to color. It prefers such soft-skinned fruits as raspberries, blueberries, strawberries and blackberries.

2 | What's been the regional damage so far? This native of eastern Asia, which began proliferating on the West Coast about four years ago, was first spotted in Michigan in 2010, where it has caused problems in cherries, blueberries, raspberries and strawberries. Untreated fruit will begin decay within three to four days of egg laying and have numbers of small white larvae (maggots) inside when harvested.

3 | What have we experienced in Wisconsin? *Drosophila suzukii* was first reported in adult fruit fly traps in Wisconsin in 2010, but no damage was seen until last August, with major crop losses in fall raspberries, blackberries and late strawberries in at least 15 counties. Cranberries, thankfully, have been spared so far, possibly due to the thickness of that fruit's skin.

4 | What are the challenges of controlling this pest? The insect must be killed before eggs are laid in the fruit; eggs and larvae inside the fruit cannot be controlled by sprays. There are treatments that can be used to control this insect in organic production, but multiple sprays and

thorough coverage are needed. We do not know if this insect is capable of surviving our winters or can be brought in on southerly winds or infested produce from out of state.

5 | What actions are we taking during the coming growing season? The use of vinegar-based adult fruit fly traps will help growers determine when the spotted wing drosophila first appear in their fields. Treatments must be started on sensitive crops when the first flies are captured.

Phillip Pellitteri is a distinguished faculty associate in the CALS Department of Entomology and a UW-Extension specialist. He runs the Insect Diagnostic Lab, which was established to identify insects and insect-damaged plant material from around the state and recommend controls to both county UW-Extension offices and commercial concerns. He also teaches in the Master Gardener program.

COSTA RICA



Sloths thrive at chocolate source

Like many and much more nimble Neotropical fauna, sloths are running out of room to maneuver.

As forests in South America and Central America are cleared for agriculture and other human uses, populations of these arboreal leaf eaters, which depend on large trees for both food and refuge, can become isolated and at risk. But one type of sustainable agriculture, shade-grown cacao plantations, could become critical refuges and bridges between intact forests for the iconic animals.

In Costa Rica, CALS forestry and wildlife ecology professors Jonathan Pauli and Zach Peery are using a complex of intact tropical forest, pasture, and banana and pineapple plantations—all connected by a large, shade-grown cacao farm—as a field laboratory to explore the ecology of two species of sloths in a rapidly changing environment.

“We know a lot about sloth physiology,” says Pauli. “But when it comes to sloth ecology and behavior, we know almost nothing. It’s a giant black box.”

But some of that mystery is being peeled away as studies of both the brown-throated three-toed sloth and Hoffmann’s two-toed sloth, two common species, are yielding new insights into their mating habits and how the animals navigate the landscape.

The fact that sloths require forested habitat and are sedentary makes them vulnerable to deforestation, says Peery. “Once a tract of tropical forest has been cleared, sloths have relatively little capacity to seek out new habitats.”

But the shade-grown cacao plantation, with its tall trees and network of cables for moving the pods that ultimately become chocolate, seems to be a *de facto* refuge and transit hub.

“Because of the diverse overstory of native trees, the cacao farm appears to provide excellent habitat for both species of sloths,” explains Peery. “We want to compare sloth populations in cacao to populations in intact tropical forests to see if cacao provides habitat that is of as high a quality as their natural forests.”

Fleshing out those ecological parameters, however, requires a better basic understanding of sloth behavior, knowledge the CALS researchers are now beginning to accumulate.

For example, in a study recently published in *Animal Behavior*, Pauli and Peery described the



PHOTOS COURTESY JONATHAN PAULI

mating system of Hoffmann’s two-toed sloths and showed that, unlike many other animals, the females tend to disperse from their home range and that the breeding territories of males can slightly overlap, with males tolerating competitors on the fringes but excluding them, sometimes violently, from the core. And Hoffmann’s two-toed sloths of both sexes seem to have multiple partners as well. “They’re more promiscuous than previously thought,” says Pauli. “We see a much more flexible system of multiple matings.”

That’s not so for the three-toed sloth. In another study, published in *PLoS ONE* in December, they found that three-toed sloths are strongly polygynous—males exclude other male competitors and mate with many females.

In addition to contributing to basic sloth knowledge, these findings should help wildlife and land managers in the Neotropics make sound decisions to better balance development and conservation.

“Understanding how shade-grown agriculture can benefit sensitive tropical animals such as sloths is highly relevant, considering the ongoing and rapid loss of biodiversity in the Neotropics,” notes Pauli. “What kinds of ecological services can these already altered landscapes provide? Can we mitigate future biodiversity loss with a greater emphasis on shade-grown agricultural systems than crops grown in monocultures? That’s the future we’re facing.”

Because of their sedentary nature and dependence on forest, sloths can be viewed as an “umbrella species,” says Peery. “Protecting sloths could indirectly protect many other animal species in tropical forests that are harder to measure and study.”

—TERRY DEVITT

Pauli and sloth friends (two-toed on top and three-toed below): These slow-moving animals have found a refuge in cacao farms.

Hidden and Growing

It's not just the number of jobs but the kinds of jobs that will help alleviate rural poverty in Wisconsin, note CALS researchers **Katherine Curtis and Leann Tigges**



KATHERINE CURTIS AND LEANN TIGGES are professors of community and environmental sociology at CALS.

Curtis (photo, left) studies “spatial inequality,” the unequal amounts of resources, services or qualities in various locations, along with such related elements as population loss, socioeconomic disadvantage and environmental sensitivity. Her research forms the core of a UW-Extension program that provides educators with information for local programming to reduce poverty and meet the needs of economically vulnerable residents.

Tigges teaches courses on labor markets and place-based poverty. Her research examines the livelihood strategies of rural Wisconsin families, the changing employment practices of Wisconsin manufacturers and the ethanol industry as a source of employment in Wisconsin.

What does poverty in rural Wisconsin look like?

Katherine Curtis: One thing that makes rural poverty particularly interesting is that it's actually hard to see. Often, when considering urban poverty, neighborhoods with boarded windows, litter and graffiti, or other symbols of disorganization and economic hardship come to mind. Poverty in urban places tends to be clustered and visible. In contrast, rural poverty is “hidden” in the sense that impoverished people and households are not spatially clustered. The rural poor live near the financially secure or, in especially sparsely settled communities, they tend to be isolated from other people. The rural poor are often out of view.

How serious is the problem of rural poverty in Wisconsin? Has it increased in recent years?

Curtis: For the state as a whole, poverty grew from 8.7 percent in 2000 to 13.2 percent for the period covering 2006 to 2010, marking a nearly 52 percent increase in poverty. At the same time, poverty increased in rural counties in Wisconsin. In 2000, the average poverty rate for rural counties was 9.6 percent. For the 2006–2010 period, poverty had grown to 12.6 percent. Poverty increased similarly in the state's urban counties (7.2 percent in 2000 and 10.1 percent in 2006–2010). However, the level of poverty was consistently lower among urban counties compared to rural counties.

Can you please define rural poverty for us?

Leann Tigges: The poverty level in the United States is around \$11,000 a year for a single person. You add about \$4,000 per person to that to determine the level for different-size families. So for a family of three: about \$19,000. If you make more than that, you're not considered “poor” and if you make less than that, you are. That's true whether you're in a high cost of living area or a low cost of living area.

Many people think that people in rural areas actually need much less than urban people in terms of income, but a lot of things besides housing take more of a rural family's budget. Transportation costs can be higher, utility costs can be higher. So lots of things that rural families need are more expensive. If you just adjusted poverty for cost of living, which would mainly be housing, you wouldn't capture that rural–urban difference.

Tell us a little bit about what contributes to rural poverty.

Curtis: One of the biggest issues in rural communities is economic development. Some of the main drivers in Wisconsin are actually underemployment and unemployment. When we look at the distribution of poverty across the state and different counties, we notice that it tends to be clustered in the northern part of the state, where there is less economic development. Specifically, we think about forest-related industry as well as the agricultural industry or extractive industries in general. When we have a community that might be solely dependent on a particular type of industry, if anything happens to that industry, whether it's due to local reasons or, more likely, national or even global industrial reasons, then that community is susceptible to contractions.

Single female-headed households are another factor commonly associated with poverty, and we also see it in Wisconsin. Recent census data show that the proportion of single-father households also is increasing, and at a faster rate than single-mother households. Household structure is a factor in poverty because it identifies the number of potential earners. When you have one adult earner, by simple math, you can understand that that household is going to be making less than a dual-earner household.

What can we do to address the problem?

Tigges: The problem of poverty is a problem of job quality for rural people. Joblessness is not as big of an issue, but what's happened is that the jobs aren't paying enough to lift a family out of poverty. Rural jobs tend to pay less, they tend to have worse benefits and they tend to be more seasonal and part-time. So job quality is a huge issue. There's still a rural-urban difference where rural single-earner poverty rates are higher than urban single-earner households, and that's because job quality is generally lower. So, if you ask what would be an anti-poverty strategy it would be to improve jobs. Not just providing more jobs but improving wages.

Can you describe a situation that lifts someone out of poverty?

Tigges: One way of looking at it is having people pay for fewer of life's necessities with their income—for example, having more subsidies for childcare, more public transportation, more relief in terms of health insurance. All of those things can take big bites out of family income, and any emergency in those areas can throw a family into poverty or make it impossible for a family to climb out of poverty. So, if you can't improve wages you need to reduce the things for which the family has to use its wages.

The other factor about wages, though, is that in most Wisconsin counties the living wage for a family of three is around \$17 an hour—and that's about \$10 more than the current minimum wage, \$7.25 an hour. The minimum wage, which is raised only when Congress takes action, has failed to keep up with the cost of living. In 2011 it was worth only about 70 percent of its value in 1968. Consequently, a person who worked full-time, year-round at the minimum wage in 2011 fell \$7,732 short of the income necessary to lift a family of four one dollar above the poverty line. We're not going to lift people out of poverty with adjustments to the minimum wage unless we finally look closely at what "minimum" is supposed to mean and who is really affected by the minimum wage.

People tend to think that minimum wage workers are mostly teenagers, but an issue brief published by the Economic Policy Institute last August showed that raising the federal minimum wage to \$9.80 by July 2014 would directly affect 409,400 of Wisconsin's 2.5 million workers. But because people working for wages close to the minimum are likely to have their pay scale adjusted by their employers, an additional 175,653 Wisconsin workers also would benefit from an increase in the minimum wage. Of the 585,000 workers likely affected, 25 percent would be parents and 83 percent would be age 20 or older.

“Jobs aren't paying enough to lift a family out of poverty.”

What changes do you see as most likely in coming years?

Curtis: One of the things we anticipated was the increasing importance of underemployment versus unemployment. It's not necessarily an issue of the number of jobs but of job quality. So, if things move ahead in their current direction, what we would anticipate is a continued increase in poverty. But, on a positive note—something can be done about job quality and wages. Communities can pursue economic development strategies that reduce poverty and benefit all members of the community.

Tigges: And political will can influence the wage levels. Last March, Senator Tom Harkin introduced the Rebuild America Act, which included incremental increases in the federal minimum wage and required indexing it to inflation after it reached \$9.80 in July 2014. That step alone could improve the situation for one fifth of Wisconsin workers. But we don't need to wait for the federal government to act. States can set their own minimum wage levels and can index them to inflation to maintain their buying power without annual legislative action.

Great steaks start with sound science: Researchers evaluate subtle differences in texture, appearance and other characteristics in an effort to improve beef quality.



Meats *made in* Wisconsin

CALS is partnering with businesses, the state and other stakeholders to develop a Wisconsin meats brand that could emulate the success of the state's artisan cheese.

By Mary Makarushka



Geiss Meat Service in Merrill, Wisconsin, has been butchering livestock for farmers in Lincoln County and surrounding areas since 1956, cutting about 6,000 pounds of beef a day—that's an average of eight to 10 beef cattle—into fresh steaks, chops, loins and roasts. But when third-generation owner Andrew Geiss took over the company in 2005, he was ready to try something new.



"I wanted to figure out a way to build up a retail business by expanding our sausage line," he says. "I thought there was more money to be made by diversifying our products." He added a smokehouse and started taking basic meat science classes at CALS—and soon discovered a satisfaction in crafting his own specialty meats that meat cutting alone couldn't provide.

"There's a lot of pride and art that goes into it. For instance, getting that

perfectly round shape and uniformity in color when making a ham," says Geiss. "You can't imagine how much one thing in the smokehouse—for example, the humidity levels—changes everything, and how much work is involved."

But the business side wasn't going as well as he had hoped. "Honestly, I was at a point where we needed to make some serious changes with the consistency of our products in order to please customers and expand sales," he says.

He found exactly the help he needed in 2010, when he was accepted into the inaugural class of the Master Meat Crafter training program at CALS. He and his classmates—16 men and one woman from small meat operations all around the state—traveled to Madison regularly over the course of two years for rigorous, hands-on instruction in meat science and processing, covering such areas as fresh meats, fermented and cured meats, cooked and emulsi-

Master Meat Crafter students learn the finer points of ham manufacturing with meat science Ph.D. student Amanda King, who assisted in Jeff Sindelar's workshop

fied sausage and meat microbiology and food safety.

That training earned Geiss the right to use the formal designation of Master Meat Crafter. But even more than the title, the program gave him the skills he needed to improve the quality, yields and markup on his products. "Now we're doing a ton of different kinds of sausages, and everything is turning out just perfectly," he reports. "And I don't have to second-guess anything. I know that everything is exactly the way that I want it to be, and it turns out the same every time."

The industry already has taken note of his improvements. Last summer Geiss Meat Service entered products for the first time in the American Cured Meat Championships and won awards in four categories, including first place in cooked ring bologna.

But even seasoned meat crafters see the value of the master course. The debut class included Louis E. Muench, a third-generation sausage maker who was inducted into the Wisconsin Meat Industry Hall of Fame in 2009. Since 1970, Louie's Finer Meats in Cumberland has been crafting ham, bacon, bologna, breakfast links, salami, summer sausage and dozens of other products—and winning more than 300 state, national and international awards for their quality. Its creative staff also designs an extraordinary assortment of bratwurst, including applewurst, bacon cheeseburger, blueberry, pumpkin pie and wild rice and mushroom.

Why would someone with that level of expertise be interested in going back to school? "There's so much technology that changes every day," Muench says. As examples he cites new antimicrobials developed to combat foodborne pathogens and new government food safety, labeling and operations-related regulations, including changes that will for the first time allow Wisconsin's state-inspected small processors to sell



across state borders. "For our business to succeed in the long run, we need to keep current on everything and try to pass on as much knowledge as we can to keep the quality and the food safety up," says Muench.

Within a year of completing the program, Muench had encouraged his son Louis and his brother William to sign up with the next group of students.

That's the kind of success that the Master Meat Crafter program's key partners—CALs, UW-Extension, the state Department of Agriculture, Trade and Consumer Protection (DATCP) and the Wisconsin Association of Meat Processors (WAMP)—envisioned when they determined that state-of-the-art training was needed to take the state's specialty meat production to an even higher level.

Program director Jeff Sindelar, a CALs professor of animal sciences and UW-Extension meat specialist, designed it to be like an academic postgraduate program that would benefit even the most skilled and experienced artisans.

In both structure and intent, the new program mirrors the Wisconsin Master Cheesemaker program run by the Center for Dairy Research at CALs, which was a key player in turning Wisconsin's specialty cheese business into a globally acclaimed leader that today accounts for more than 20 percent of Wisconsin's total cheese production, up from a mere 4 percent in the 1990s.

The Master Meat Crafter program's success will be measured over the long haul, says Sindelar: "It's which of these plants will grow, add on, which plants are going to pass along the business, whether to family members or to other people who can continue the name. It's really about longevity and viability of the industry."

"We look at building leaders, at providing them with information that they didn't have otherwise, making them stronger advocates for the industry," says Sindelar. "We're trying to use our knowledge, expertise and facilities on this campus to help people grow and succeed."



The program includes a product showcase in which Master Meat Crafter candidates demonstrate their skills. Below, candidate John Franseen (left, with program director Jeff Sindelar), served up some celebrated smoked salmon from Hewitt Meat Processing of Marshfield. Left, some specialty hot beef sticks from McDonald's Meats Inc., of Clear Lake, Minnesota.

Wisconsin may best be known as America's Dairyland, but the state has long been home to a thriving meat industry as well. Only 27 states have small, state-inspected meat plants, and Wisconsin has more than any other: about 375 processors and locker shops.

"These state-inspected meat plants are located mostly in small towns and rural areas where they provide food, jobs and services that are critical to the local farms and families, from harvesting livestock to dressing venison and other game meats," says Jeff Swenson, the state's livestock and meat specialist at DATCP. Together with more than 120 large, federally inspected plants, they're part of the state's \$12.3 billion meat and poultry industry, which employs 19,000 people directly and 88,000 people in allied fields.

"We have a unique meat-eating and meat industry culture in Wisconsin," says Jeff Sindelar, noting that it is rare to find so many aspects of the industry so well integrated in a single state.

"When you look at Wisconsin in terms of the total package, we raise animals—we're a big agriculture state. We harvest the animals; three of the largest beef packers in the country have processing plants in Wisconsin. We have an array of very notable further processors such as Johnsonville Sausage, Oscar Mayer and Jack Link's," he says. "Then we have this huge array of small processors that a lot of people consider specialty shops. And we have a fairly significant level of interest from chefs, from the retail sector." People in that last group, Sindelar says, are ordering and even beginning to produce their own custom meat products.

The field may be diverse, but the solidarity is strong. "It's a really tight-knit industry," observes Kevin Ladwig, a vice president at Johnsonville Sausage, which started out in 1945 as a small butcher shop and now employs 1,300 people in Sheboygan Falls and sells

sausages in more than 30 countries.

"Regardless of the size and shape of your business, everyone wants the same thing, which is to keep the industry healthy. I don't care if you're a large, well-known multinational or a small corner sausage shop or locker plant, we're all in this together."

And consumers are on board as well. Wisconsin's meat eaters have an appetite not found in every state. In addition to cheering on their favorite Klement's Famous Racing Sausage mascot at Miller Park, Milwaukee Brewers fans consumed 900,000 of the five million sausages eaten at all Major League ballparks in 2012, according to the American Meat Institute—and that's not even counting hot dogs.

And just as the Racing Sausage mascots drafted a Chorizo character in 2006 to join the previous lineup of Bratwurst, Polish Sausage, Italian Sausage and Hot Dog, both processors and customers are excited to try new flavors and recipes.

"There's no way that the small meat industry would survive in a lot of states because there isn't that consumer support," says Sindelar. "We have the consumers and the population to support the drive for new and unique foods."

While Wisconsin has long produced specialty meats, the Master Meat Crafters title and a new, shield-shaped "Specialty Meats of Wisconsin" logo—offered through the Specialty Meat Development Center at DATCP—are part of a new effort to brand them, a step inspired by the successful marketing of the artisanal cheese industry over the past 18 years.

"The Master Cheesemaker program and the marketing of the artisanal cheese industry have been very, very successful," notes DATCP Secretary Ben Brancel. "It has elevated our cheese industry to be renowned not only in the United

States but also around the world. And I think that will be true of the meat industry as well."

Swenson is working at DATCP to promote the state's meat processors through a variety of channels including social media, the Discover Wisconsin TV show and website, and an interactive map on DATCP's website that allows users to pinpoint the closest specialty meats purveyor (follow the links at <http://go.wisc.edu/4rf5xz>).

Wisconsin's small processors currently produce 77 million pounds of product a year, according to DATCP's Food Safety Division. Given access to larger markets and more diverse consumer groups, predicts Brancel, "You will see an explosion of new products coming out of these small plants."

Changes in regulations are helping pave the way for growth. As noted, a new pilot program will allow some of the smaller state-inspected plants to take advantage of a change in the federal interstate sales regulations and for the first time begin selling their products outside of Wisconsin, including in Chicago and the Twin Cities.





PHOTO BY MARK HOPPMAN/MILWAUKEE JOURNAL SENTINEL

While there's an art to creating great meat products, there's also a lot of science. Understanding the ingredients—muscle and other animal tissues—is a lesson in applied biology. To be able to convert those ingredients into world-class sausage and sliceable meats that are appealing, flavorful and pathogen-free, and to keep them that way during packaging and shipping, a 21st-century meat crafter has to be part biochemist, part microbiologist and part engineer. And as the industry eyes emerging markets outside of the food business, expertise in such areas as human health and pharmacology could be a plus.

The need to train a new generation of science-savvy meat industry leaders is one reason that UW-Madison plans to construct a \$42.8 million livestock and poultry products laboratory. The new facility, half of which will be paid for by private funds, will feature state-of-the-art pilot plants—small-scale versions of the set-ups used by today's most advanced meat processing firms—where scientists and their students can study

every angle of meat quality and safety.

The lab will also allow researchers to explore opportunities to create new, high-value non-food products for use in human and veterinary medicine, among other applications. And, through the Master Meat Crafter program and many other programs for students and professionals alike, the lab will serve to educate the innovators who are creating new products and growing the meat industry.

"This will be the most advanced building of its kind when it's completed," notes Dan Schaefer, professor and chair of the Department of Animal Sciences.

The new facility is important to the state of Wisconsin, says Ben Brancel, from the perspective of faculty recruitment, graduate employment and programs that benefit the meat-loving public: "It will provide us with a whole new industry that's prepared for the future."

The state's meat industry concurs. "It's critical that we do this," says Johnsonville's Kevin Ladwig, who chairs a committee of business leaders who

are helping raise funds for the project.

Regardless of size, the some 500 meat plants in Wisconsin rely on the university for education, for consultation when problems arise and for leadership on the ideas and trends they should be paying attention to in the future. "Without facilities that are modern and updated, the fear is that we're going to lose that leadership role," says Ladwig.

As the industry moves forward, food safety continues to be a huge concern—and an integral part of all equipment and manufacturing demonstrations, meat-crafting conversations and the industry's operations protocols, says Jeff Sindelar. "It's where the most research dollars in post-harvest animal agriculture are invested today," he says. "All but one of my research projects are either entirely focused on food safety or have a significant food safety component."

UW-Madison is home to one of the world's foremost food safety research programs, and the new meat products lab will give it a one-of-a-kind research facility: an "isolatable" biosafety level-2 laboratory equipped with safeguards

(Left) Bucky's Butchery, an offshoot of the meat science laboratory, offers students opportunities to cut, process, package and sell a variety of meat products to an appreciative public. Here, students Madi Potratz and Elizabeth Kopp remove netting from cured hams.

(Right) Food safety research is a crucial component of meat science activities on campus. Kathy Glass, associate director of the Food Research Institute, gathers pepperoni samples that she will test to see how thermal processing methods affect various strains of *E. coli*.

required to introduce microbes that cause the nastiest foodborne illnesses. It will be a proving ground for strategies to detect and eliminate pathogens in the kind of setting found in a commercial food plant.

In its never-ending quest to explore new markets, the meat industry is looking beyond the meat case and, in fact, outside of the grocery store. One of the most promising areas for both research and industry growth involves the parts of animals that people don't eat. Here, too, the new facility is expected to further advancement.

The inedible portion of a meat animal may constitute 25 percent to 50 percent of its total weight. Some of that has long been turned into products such as leather, bone meal and tallow (no longer used for candles but employed as a lubricant in the steel industry). But there are costs associated with disposing of the remaining millions of tons of feathers, hooves, tissue and bone generated every year.

Animal sciences professor Mark Cook thinks of it not as waste but as untapped potential. "This material has all the life support mechanisms for an animal," he marvels. "We're only eating the meat, but essentially, everything else is what keeps the animal alive."

"We haven't touched the surface" of this relatively new field of research, says Cook, who holds more than 20 patents and has started three companies based on discoveries from his three decades of research at CALS.

Developing new co-products from meat animals, from using pig aortas for human transplants (as is already being done with porcine heart valves) to extracting novel enzymes and other complex molecules, would not only add considerable value to the carcass (pound for pound, most traditional animal by-

products have a low market value) but also have the potential to improve human and animal health.

In fact, such co-products could one day be worth more than the meat, says Christopher Salm, CEO of the Denmark, Wisconsin-based Salm Partners, which makes sausages with customized collagen protein casings for a variety of name-brand customers. That already has happened in the shrimp industry, Salm notes, where the protein in the processed shells—which gives hairsprays their gloss and styling power, among other uses—is more valuable than the shrimp meat.

Efforts to tap markets outside of the food chain have expanded the value of pig intestines, the outer walls of which have been used for centuries to create natural sausage casings. Scientific Protein Laboratories in Waunakee now extracts and purifies the anticoagulant heparin from the pig's intestinal mucosa, an inner cell layer that is involved in immunological functions and regulating nutrition.


Indeed, the pig is a treasure trove of useful proteins. "We've already identified more than a dozen applications for them," says Dhanansayan Shanmuganayagam, research director in the lab of animal sciences professor Jess Reed, whose team focuses on finding ways to use compounds derived from agricultural products to advance cardiovascular health and immunology.

Shanmuganayagam is excited by the potential a new facility would hold for a wide range of interdisciplinary research—and UW-Madison is uniquely positioned to take advantage



of it, he says. Few institutions are home to world-class research programs in all of the relevant disciplines—including animal sciences, human and veterinary medicine, pharmacology, biomedical engineering and microbiology—all clustered on the west side of campus. Interdisciplinary work could result in the next generation of powerful imaging machines, new whole-tissue therapeutics and new control mechanisms for pathogenic threats such as diarrheal diseases that kill 1.5 million children worldwide every year, Shanmuganayagam notes.

"You can only do this here," he says. "There aren't a lot of animal science departments at agricultural land grant colleges where there also is a biomedical presence and a collaborative environment to pull this off. It takes all that to make this happen."

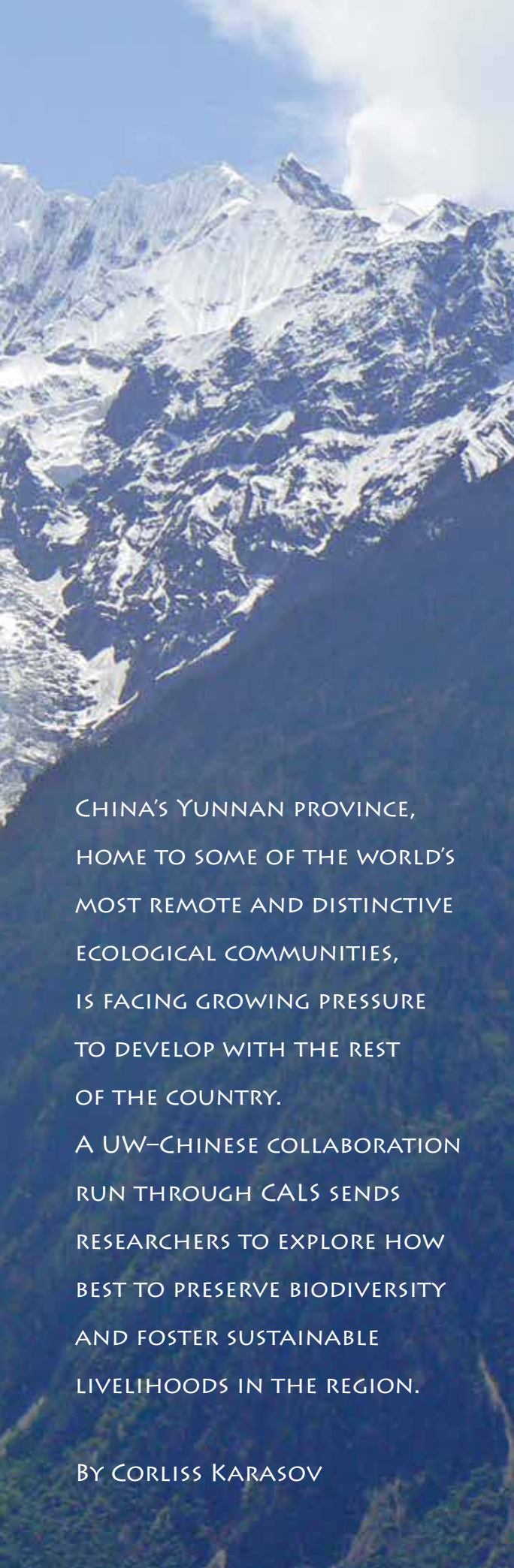
"This is very forward-thinking not only of the university, but also of the members of the meat industry who have stepped up to be part of it," Shanmuganayagam says. "Many of them are excited by what they can do beyond meat—to be part of something that benefits human as well as animal health." 

For more information about the new lab, visit <http://meatandmore.wisc.edu>. For more on the Master Meat Crafter program, visit <http://go.wisc.edu/4rf5xz>



South *of the* Colorful Clouds

PHOTOS COURTESY OF IGERT TRAINEES AND
THE AUTHOR UNLESS OTHERWISE NOTED



CHINA'S YUNNAN PROVINCE, HOME TO SOME OF THE WORLD'S MOST REMOTE AND DISTINCTIVE ECOLOGICAL COMMUNITIES, IS FACING GROWING PRESSURE TO DEVELOP WITH THE REST OF THE COUNTRY.

A UW-CHINESE COLLABORATION RUN THROUGH CALS SENDS RESEARCHERS TO EXPLORE HOW BEST TO PRESERVE BIODIVERSITY AND FOSTER SUSTAINABLE LIVELIHOODS IN THE REGION.

BY CORLISS KARASOV



Beautiful and threatened: Yunnan Province in southwestern China is one of the most biologically diverse places on earth (red area on map, left) and the home of other natural resources that also are crucial to the region. Many millions of people depend on fresh water passing through the Three Parallel Rivers of Yunnan Protected Areas (far left).

Not long ago, one of the most biologically and culturally diverse regions on earth—Yunnan Province on China's southwestern border, with its great river gorges, sweeping grasslands and majestic Himalayan mountains—was virtually inaccessible to outsiders.

Golden snub-nosed monkeys, black-necked cranes, snow leopards, Tibetan bears and an astounding number of other animals and plants thrive in its temperate forests and alpine meadows. And five million people from 26 of China's 55 ethnic minorities live in the province's remote high-altitude forests and valleys.

This biologically sensitive region has for the past half-dozen years been a field site for collaboration between the University of Wisconsin–Madison and the Chinese Academy of Sciences in Yunnan, a partnership that focuses on biodiversity conservation and sustainable development.

The idea arose from conversations between visiting scientist Ji Weizhi, former director of the Kunming Institute of Zoology at the Chinese Academy of Sciences (CAS) in Yunnan, and Kenneth Shapiro, an emeritus professor of agricultural and applied economics who was then associate dean of international agricultural programs at CALS.

“Ji was impressed by the interdisciplinary approaches that some of the UW departments were using to address complex problems like



A language-rich region: IGERT trainees learn Mandarin, but they also often need help from native Chinese students—and sometimes from several interpreters when communicating with people from ethnic minorities who don't speak Mandarin.

biodiversity conservation,” says Shapiro. “Ji could see that the traditional narrow ‘stovepipe’ or isolated discipline approach to biodiversity research cannot bridge the gaps in understanding diverse problems in biodiversity conservation. He understood that scientists needed a broader understanding of the relationships between the biology, livelihoods, economics and politics of Yunnan to protect its biodiversity and promote sustainable development.”

Yunnan’s name roughly translates to “south of the colorful clouds”—and indeed, the province’s beauty is self-evident. Less obvious, perhaps, is its environmental importance. The region provides critical ecological services across much of Asia. To take water alone as an example, nearly half of China’s population, along with millions of other southeast Asians, depend on the fresh water passing through the Three Parallel Rivers of Yunnan Protected Areas,

which lie within the drainage basins of the Yangtze, Mekong and Salween rivers. If the natural forests in this region were destroyed, vast areas and populations downstream would suffer from severe floods and huge reductions of water supplies and quality.

After centuries of semi-isolation, Yunnan—the northwestern part of the province in particular—has been discovered by China’s new middle class of tourists, most of them Han Chinese, who make up more than 92 percent of China’s population. Where only hikers, horses and mules trod before, roads are being built by local and provincial governments to carry millions of tourists. Old-growth forests are being logged to accommodate them. Yunnan’s ethnic communities are having to transform centuries-old land use traditions. And the government is pressing Yunnan for economic development. Ji was aware that transforming Yunnan could have devastating effects on its biodiversity, on China’s fresh water supplies and on the livelihoods of ethnic minorities.

What Yunnan’s scientists needed was a model of an interdisciplinary approach to sustainable development and biodiversity conservation. Collaboration

with UW, it was hoped, would mark a pioneering step toward developing that model.

Shapiro and other UW scientists, led by the late Josh Posner (see sidebar on page 27), found a home and funding for their part of the partnership under the auspices of IGERT (Integrative Graduate Education and Research Traineeship), a highly competitive National Science Foundation program that supports scientists and engineers pursuing graduate degrees in fields that cross disciplines and are deemed to have broad societal impact. The UW proposal drew on the strong support of the staff of CALS international programs, and the research also benefited from significant supplementary funding from the Graduate School, the chancellor’s office and the CAS.

Nineteen UW doctoral students, called “trainees,” were selected from disciplines ranging from political science and economics to conservation biology and anthropology, and included five CALS trainees from agronomy, forest and wildlife ecology, and community and environmental sociology. All participants were expected to learn Mandarin Chinese and, beyond their own disci-

Yunnan has become a popular tourist destination for a new Chinese middle class.

plines, become literate in other fields relevant to conservation and sustainable development. While in Madison, trainees also attended weekly seminars on Northwest Yunnan's history, politics, culture, society and ecology.

While some trainees received help getting their initial permits and contacts in Yunnan, it was up to each of them to work through such daily obstacles as getting around, finding translators for the many dialects and gaining the trust of locals.

Most trainees had done some kind of international work before joining IGERT. For example, Jodi Brandt in forest and wildlife ecology had worked in Guatemala with the Peace Corps, and community and environmental sociologist John Zinda had lived and taught in China.

But even those with extensive international experience hadn't anticipated all the obstacles. Some researchers had to find new collaborators and renegotiate permits midway through their projects when their Chinese scientist contacts were moved to new institutions and positions. In rural areas, just knowing whom to ask for permission to do research presented a challenge. "The level of government that grants approval in one village isn't always the same in the next," says land resources trainee Brian Robinson.

The opportunities of doing research in a little-studied environment, however, more than offset the frustrations. "As a doctoral student you're looking for an important question that many others haven't already asked," says Brandt. "That's one of the biggest advantages of doing research in a place like Yunnan. Almost any question you ask is important—and no one has asked it before."

Here are a few projects conducted by CALS trainees that illuminate the spirit and value of the IGERT program.



Nature Tourism and Biodiversity

As a community and environmental sociologist, John Zinda is concerned about how tourism is changing the livelihoods of communities and affecting biodiversity conservation.

To gain a firsthand understanding of that dynamic he spent three summers and the better part of a year working alongside and interviewing villagers, most notably residents of Tibetan villages in two national parks. In one, Meili Snow Mountain, residents of Tibetan communities give tourists mule rides to scenic places around the sacred peak Kawagebo. In Pudacuo National Park, by contrast, community-run tourism has been replaced with a set of roads and tour buses run by an outside company. "At peak season as many as 7,000 tourists a day visit Pudacuo," notes Zinda. "Rather than run their own tourism businesses, community residents must work for the park. Their livelihoods

have been transformed."

To further attract tourists, the provincial government went so far as to change the name of Zhongdian, a primarily Tibetan county, to "Shangri-la" after James Hilton's fictional paradise. Now it's a tourist mecca where Han tourists buy trinkets and snap photos of "quaint" ethnic minorities.

"Anyone exploring questions about livelihoods, policies or politics has to gain the trust of the people first," says Zinda. So he did what he could to be accepted. "I started by getting to know residents, often people who drive tourists around the region in minivans. If people invited me into their communities, I asked to help with work in exchange for housing."

Zinda did everything from run a shop at a hitching post for mule rides to help harvest potatoes. "One day I carried a basket filled with 70 pounds of mushrooms down a long, steep mountainside trail to get a feel for the kinds of things people in these communities



PHOTO COURTESY INTERNATIONAL CRANE FOUNDATION

Black-necked cranes, the world's only alpine crane species, are affected by changing agricultural practices and water availability in Northwest Yunnan.

do every day," he says. After a hard day's labor he would join the other workers for yak butter tea, a traditional Tibetan hot drink made from yak butter, tea leaves and salt (most Westerners find it unpalatable).

Zinda also interviewed government officials, policymakers and commercial tourism managers at protected areas across southwest China to identify the effects of nature tourism—that is, tourism revolving around the region's natural beauty—on biodiversity conservation, including whether revenue from nature tourism was being channeled back into it.

His conclusion? Whether local villages or larger companies run nature tourism, profits are not being reinvested in active conservation management.

"One of the main reasons for this is that the tourism and conservation departments in the provincial government are under separate lines of oversight and have different priorities. Strong conservation management only happens when the central government takes an interest," Zinda says. "In parks with high-profile conservation targets like pandas or elephants, outside agencies make conservation investments that local governments are slow to make. Meanwhile, tourism's impacts on how local residents use resources like firewood and mushrooms depend on how tourism is organized. Does every-

one get a chance to participate? Does tourism make people too busy to gather mushrooms, or does it just become one more thing they do? You have to look at the details to understand how tourism affects resources."

Zinda also looked at how much China is using scientific expertise provided by nongovernment organizations (NGOs) such as The Nature Conservancy. In years past, The Nature Conservancy (TNC) and several other international NGOs worked closely with Yunnan's government to advise on projects and train staff. In fact, Pudacuo National Park in Yunnan—China's first national park—is a product of collaboration between TNC and the Chinese government. Planners from Yunnan designed the park's tour buses, boardwalks, and interpretive programs with TNC's support, based on models in the United States and other countries. "Now the role of foreign-based NGOs in Yunnan is declining," notes Zinda.

The future of conservation in China, Zinda says, will likely depend on committed Chinese citizens and conservation-oriented government agencies working to shape conservation and development efforts.

Saving the Black-necked Cranes

One of the few birds that can be seen flying above the Himalayas is a large, elegant grayish bird with a black neck and black wingtips. The black-necked crane is the world's only alpine crane species. These vulnerable birds summer

in the Himalayan wetlands at altitudes of 9,000 to 15,000 feet, far from the reach of most humans.

For the past four years, James Burnham from forest and wildlife ecology has tried to clarify how human activities affect the cranes. Because they have little if any contact with humans in their breeding grounds, Burnham focused on the winter season, when they flock in agricultural fields and wetlands near barley and spring wheat crops.

Two scientists from the Kunming Institute of Zoology introduced Burnham to Napahai, a large nature reserve in Shangri-La County that the Chinese government set aside in part to protect the cranes in their winter range. Roughly 90 percent of the central of three separate wintering populations of black-necked cranes winter in Napahai and in similar agricultural fields and reserves across Northwest Yunnan.

Depending on the time of year, Napahai is a lake, a pond or an open grassland. Tibetan farmers grow crops and raise livestock there, and the birds are remarkably tolerant of humans and other animals. "You can watch them feeding right next to livestock like yak, sheep, horses and pigs," Burnham notes.

But conditions in Napahai and other grasslands are changing, and the black-necked crane population in Northwest Yunnan is declining rapidly. Alterations in traditional agricultural practices have reduced the availability of waste barley and spring wheat that the birds feed on. Some scientists speculate that the biggest threats to the birds are human activities that affect water levels and

A Mrs. Gould's sunbird graces the cover of Jodi Brandt's multilingual birdwatching guide, which includes audio of birdsongs, Tibetan music and more. (See resource list below for link to a free pdf with audio.)

quality—irrigation, dams, and draining may pose some of the biggest threats.

On the positive side, Tibetans and other cultures have revered and protected cranes from harm for centuries. Even now, all crane species are protected throughout their ranges in China. The penalty for hunting cranes is imprisonment.

Burnham describes himself as a mud-on-the-boots kind of scientist, someone who enjoys hands-on fieldwork and collecting data. But in his ongoing work he also needs to sit at a computer to analyze satellite images that may help clarify how changes are altering the distribution of crops, wetland vegetation patterns and what those changes mean for wintering cranes.

Among preliminary findings is the discovery that the construction of water reservoirs and dams has created many new wetlands. While the full impact of these created wetlands on wintering black-necked cranes is still unclear, reports from Burnham's colleagues in the area indicate that they are used by the birds for roosting and foraging and could help explain an increase in other populations of black-necked cranes counted in regular surveys for the species.

New Threats to Ancient Forests

Most of the trees that Western tourists see from their buses in central and eastern China are probably fairly young. Starting in 1958, Chairman Mao Zedong ordered the widespread cutting down of forests for firewood to melt metal for industrial machinery. By the 1980s, only 8 percent of China's trees remained. After numerous catastrophic floods washed away billions of tons of soil, Mao's successors started reforestation campaigns, placing bans on logging in much of the country.

Jodi Brandt from forest and wildlife

ecology, wishing to see how much the logged areas of Northwest Yunnan had recovered, compared satellite images taken in 2009 with those taken over the past few decades since Mao's reign over China ended.

Brandt wasn't surprised to see tree growth over 60 percent of the land. "What didn't make sense was that logging was taking place on 20 percent of the land in Yunnan's most precious

and biodiverse forests—the old-growth forests," says Brandt. "These were forests that previously had been spared from logging due to their remoteness."

The likely answer was tourism, according to Brandt. Logging rates decreased everywhere except places where tourism was booming. Because many of the tourist destinations are near old-growth forests, that's where developers are logging.



PHOTO BY JOHN AND JEMI HOLMES



Researchers Jodi Brandt and Michelle Haynes came to the assistance of yak herders who reported that their animals were suffering from decreasing grazing grounds.

by 40 percent over the previous 20 years—an average 2 percent decline annually. This information gave the herders some solid data to show government officials.

Brandt and Haynes also sought to shed light on why shrubs were invading. They considered sev-

eral factors that could affect how shrubs invade an area, such as the possibility that there were fewer fires than before or that more grazing allowed shrubs to spread. However, it seemed more likely that the cause was changes in climate. With rising temperatures and decreasing snowfall, woody vegetation can grow at higher and higher altitudes in the Himalayas, thus encroaching upon the animals' grazing grounds.

Preserving a Valuable Native Food Crop

Agronomist Mary Saunders went to Yunnan to learn how the cultural traditions and values of an ethnic minority, the Yi, serve to preserve the seeds of a native plant called tartary buckwheat—a practice that not only protects a crop that has sustained the region's people for thousands of years but also serves to protect agricultural biodiversity.

Saunders climbed, hiked, and rode on horseback and in the back of pickups to reach 45 diverse ethnic villages and interview 230 families, Yi and non-Yi, to learn more about the crop with the delicate yellow flowers. Tartary

Brandt hit upon an extraordinary resource to help document the effects of logging and other development on bird populations. Many Tibetan villages have designated “sacred forests,” areas that might be as small as a football field or as big as a mountain. These are spiritual places for people to visit; logging, farming and hunting are not allowed. The sacred forests gave Brandt a chance to look at the effects of logging on bird populations by inventorying birds inside and outside of the forests. Sacred forests, she found, have distinctive bird communities and a greater diversity of birds compared to the more disturbed habitats surrounding them.

As one product of her study Brandt teamed with linguist Ellen Bartee to create a book and accompanying CD called *The Birds of Shangrila*, a colorful Chinese-Tibetan-English birdwatching guide enriched with birdsongs and Tibetan stories, songs and poems relating to the birds. It has been distributed to local Tibetan schools for use in teaching, and local women are earning money by using it to lead birdwatching tours. (See resource list below for a link to a free, audio-enriched pdf of the book.)

Yak Herders and Vanishing Meadows

The yak, a large hairy bovine with curved horns pointing upward, is one of the Himalayas' showcase animals, often featured in guidebooks to the region. These natives are often photographed with herders or in grasslands calmly grazing next to sheep and pigs. Both the domestic yak and the smaller wild yak are rarely seen lower than the high-altitude regions; the adaptations that allow yak to thrive at high altitudes also prevent them from living at low elevations.

When Jodi Brandt learned from fellow IGERT trainee and ethnobotanist Michelle Haynes that yak herders were convinced that the alpine meadows where they graze their animals were shrinking, she decided to help investigate. The herders also reported that their yak were losing weight and getting sick.

Using Haynes' extensive ethnobotanical surveys and Brandt's satellite imagery, they worked together to measure the change in alpine meadows. They found that in fact meadow area had decreased

Women thrashing tartary buckwheat, a nutritious native crop that has spiritual significance for many who grow it.

buckwheat is a bitter-tasting relative of the buckwheat commonly used in the United States today. This highly nutritious crop was domesticated about 4,500 years ago in its place of origin, the Himalayas of southwest China.

Currently the Chinese government is trying to convince villagers who grow tartary buckwheat to switch to more lucrative and productive food and cash crops such as potatoes and corn.


The Yi are one of the largest ethnic minorities in the Himalayas, living in a range of environments and altitudes. Saunders learned that, just as their lifestyles, livelihoods and dialects differ, so do their farming and cultural practices. While one Yi group living at lower elevations has given up growing tartary buckwheat, Yi living at high altitudes rely on tartary buckwheat as one of the few crops they can grow there.

Convincing some suspicious villagers that she wasn't a government official or a judgmental Westerner wasn't easy, but with persistence and the help of Chinese students accompanying her, Saunders gained their trust. Her interviews revealed a variety of cultural traditions in which Yi use tartary buckwheat, giving them cause to continue growing the



plant. Some Yi cultures regard tartary buckwheat as a sacred crop and use it in rituals—even in exorcisms. Others told Saunders how buckwheat was given to them by the gods. As reliable producers of tartary buckwheat, many Yi villages serve as seed sources for neighbors of other ethnicities who occasionally plant the crop.

Through her study Saunders was able to confirm how cultural, environmental and dietary incentives motivate some Yi communities to continue growing

tartary buckwheat, thus preserving the genetic makeup of the plant for generations to come—and functioning more or less as a living seed bank. 

To learn more:

- IGERT program overview, www.igert.org/projects/102
- Jodi Brandt's bird guide as a free pdf: <http://silvis.forest.wisc.edu/research/story/Birds-Shangrila>
- Mary Saunders' blog, http://birdbirdfly-blog.blogspot.com/2008_06_01_archive.html
- John Zinda's China research: <http://ssc.wisc.edu/~jzinda/research.htm>

Posner's Passion

The scope and success of UW's IGERT Biodiversity Conservation and Sustainable Development program is due in no small part to the late Joshua Posner, an agronomy professor and international agriculture expert who served as director until he passed away in 2012. Posner had dedicated his life to promoting sustainable development in countries with poor resources in such regions as West Africa and Latin America. "Josh was the perfect leader for the China IGERT program," says William Karasov, chair of the



Department of Forest and Wildlife Ecology. "He was a great motivator who had a knack for providing steady guidance while making faculty and students alike feel welcome to share their ideas about the project's design and implementation."

Posner saw the collaboration as having implications for the kind of research scientists could do well beyond China.

"Our hope is that these students will be part of a new generation of scientists with the interdisciplinary skills to carry on important work toward protecting biological treasures," said Posner in describing the China IGERT program.

Many of the new scientists emerging from the collaboration are moving on to postdoctoral fellowships and jobs associated with biodiversity conservation and sustainable development. Jodi Brandt is doing research in the Congo and at least two other alumni returned to China to continue their work.



THE Locavore School

ILLUSTRATION BY DIANE DOERING

A program with deep roots at CALS helps school districts around Wisconsin serve fruits, vegetables and other goods from local farmers—and introduces children to the joys and benefits of healthy eating.

By Joan Fischer

The setting seems unlikely, but Sara Tedeschi discovered one of her life's passions in a noisy Madison elementary school lunchroom, where she helped as a parent volunteer.

Tedeschi was already working at CALS' Center for Integrated Agricultural Systems (CIAS) on a program called Farm to College, which sought to increase purchasing of locally grown foods by Wisconsin colleges and universities. But looking around her children's cafeteria, she saw another arena for improvement.

Kids were being served plastic-sealed lunches in the form of "hot packs" and "cold packs" featuring meal components delivered largely through national distribution companies or the USDA commodities program. Hot packs contained items to be heated up—a meat patty and french fries, for example—in a school kitchen so minimally equipped that no real cooking could take place there, a typical set-up in many school buildings. Cold packs contained accompanying items—a bun and ketchup for the burger, for example, and a serving of a raw fruit or vegetable such as carrots.

"There were no choices or self-serving that would allow children to take ownership of what they ate," recalls Tedeschi. It also squandered "a potential learning moment," she says, for teaching children all kinds of things about food—what makes a good portion size, the pleasures of colors and textures, what nutrients are found in different foods and why they're good for you—in a hands-on way that could set kids on a course of healthier eating for life.

That was in 2001. And Tedeschi and her fellow parents weren't the only ones who wanted to make some changes. In lunchrooms around Wisconsin and, indeed, the nation, parents and professionals in nutrition, agriculture, food service, health care and education were starting to envision and create improvements. Their efforts emerged alongside growing interest in strengthening local food economies and concern about the consequences of poor diets such as the rise in childhood obesity, particularly in areas with limited access to fresh fruits and vegetables.

Their grassroots initiatives became known as "Farm to School," programs that connect schools



This middle school student loves vegetables she helped grow in her school's summer garden program.

with local or regional growers in order to serve their produce in school cafeterias, often drawing many other types of food businesses—food processors, manufacturers, distributors and related operations—into the process. Farm to School also encompasses educational activities such as school gardens, field trips to farms, food tastings and cooking classes with local chefs and farmers, all focused on growing, preparing and eating healthy food.

Resources serving Farm to School sprang up as interest grew. Today they include the nonprofit National Farm to School Network (NFSN), a USDA program and numerous grant opportunities at federal, state and local levels. According to NFSN, Farm to School programs now operate in more than 10,000 schools in all 50 states.

From the beginning the movement had a vibrant presence in Wisconsin. When Tedeschi had her "cafeteria moment," she shared her ideas at CIAS, most notably with her mentor, Jack Kloppenburg, a CALS professor of community and environmental

Middle school children in a summer program with Casey Bilyeu, of Madison School & Community Recreation, try to identify their veggies from taste alone. Below, Madison elementary school kids tend a garden with REAP Food Group's AmeriCorps staffer Tamara Baker.

sociology who had long been working to strengthen ties between urban communities and area food growers. He and Tedeschi received federal and other funding to launch "Wisconsin Homegrown Lunch," essentially Wisconsin's first Farm to School program, with Tedeschi serving as coordinator. The program was carried out in partnership with REAP Food Group, a Madison-based nonprofit that Kloppenburg helped found and that remains a Farm to School leader in southcentral Wisconsin.

The Wisconsin program had a wide influence and helped ignite other Farm to School initiatives nationwide. CIAS remains a leader in the field, providing technical assistance and resources throughout the state and region. Activities include working with the state Department of Agriculture, Trade and Consumer Protection (DATCP) on a Farm to School AmeriCorps program that provides staff for eight Farm to School sites around the state; serving as host of the Great Lakes Region Farm to School Network, one of eight regional groups comprising the national

network; and advising on Wisconsin's first Farm to School legislation, passed in 2009, which among other things calls for a new staff position at DATCP to foster development of Farm to School. And CIAS last year convened the first statewide Farm to School summit in Wisconsin to serve the growing demand for information, networking and assistance.

Wisconsin Farm to School

programs are blooming in school districts large and small. Chilton, a district of nearly 1,200 students in Calumet County, has set the gold standard for what Farm to School can be by incorporating not only fruits and vegetables but also meat and dairy from area farms into a healthful, varied menu of scratch-cooked meals. Middleton-Cross Plains, a district feeding 6,250 children, during the fall features a local item on the menu almost daily and, with such long-storage items as apples and potatoes, maintains a regular appearance of local foods throughout the school year.

The message: Successful Farm to

School programs come in all shapes and sizes, depending on each school district's needs and resources. And it's a good thing that Farm to School can be so varied, because the challenges school districts face feeding vast numbers of children day in and day out—the context in which any Farm to School program must function—are immense.

Consider the following:

- The Madison Metropolitan School District feeds kids some 20,000 meals a day, a logistical feat involving receiving deliveries from several large food service vendors and sending five refrigerated trucks out to schools twice a day, in addition to doing a considerable amount of food prep and cooking at a central commissary. But even districts much smaller than Madison wrangle with the complications of serving hundreds or thousands of meals each day.

- Just over 40 percent of Wisconsin schoolchildren (some 355,150 kids) qualify for a free or reduced-price lunch, up more than 10 percent from 2005, according to the Wisconsin Department of Public Instruction. For many of these children, schools may offer the only balanced meals they get all day.

- Schools are on tight budgets. They are reimbursed for meals under the National School Lunch Program, but that usually does not cover all costs—and schools must always seek the best deals in order to qualify for reimbursement.

Given those circumstances, larger districts in particular rely on national food service companies and "hot packs/cold packs" for a reason: They feed huge numbers of children reliably and affordably. Local products certainly can be a much bigger part of the mix than they are at present, but at least for now they can't fill the bill entirely.

Beyond scale and budget, Farm to School advocates face other challenges:

- Even minimal food processing—washing, peeling, cutting—is extremely labor-intensive. And many schools, as noted, are not equipped for cooking; they don't have full working kitchens and instead rely on a central commissary for the district.

- Regulations and guidelines can be tough to navigate. For example, some districts require that any grower



PHOTO BY BILL LUBING



PHOTO BY BILL LUBING

selling to schools be certified through the USDA Good Agricultural Practices (GAP), which is intended to ensure food safety but imposes requirements that many smaller, diversified growers find difficult to meet.

- Growers and school food buyers are still learning to communicate with each other, whether about matters as apparently simple as getting their measurements to jibe (pecks or pounds?) or as complex as understanding how the variables of a growing season may affect a lunch program.

Yet all these challenges haven't put the kibosh on Farm to School; rather, they've infused Farm to School with ver-satility and creativity in meeting them. Amid the wide range of Farm to School programs, a number of markers for success have emerged and serve as pearls of wisdom for anyone contemplating introducing Farm to School:

Engage your district's school nutrition or food service director.

These hardworking and mostly unsung professionals live where the rubber meets the road in implementing Farm to School. "That's the department that has a responsibility for making this happen," notes CALS food science instructor and administrative dietitian Monica Theis. "They're the ones that have the opportunity to make it happen and need to do all the work behind it."

Start small. "Baby steps are best," advises Michelle Denk, food service director for the Mount Horeb Area School District, which feeds about 1,600 students. "Try doing a Harvest of the Month—a program highlighting and serving a locally grown fruit or vegetable during that period—or just purchasing one locally grown item and going from there," she says. Denk started small and now runs a program in which local food purchases make up about 6 percent of her budget—a share she hopes to increase in coming years.

Susan Peterman, school nutrition coordinator for the Middleton–Cross Plains Area School District, runs a vibrant Farm to School program and serves as chair of the state advisory council to the governor for Farm to School. For Peterman, it all started with apples.

CIAS had a grant to connect school districts to local apple growers. Lapacek's Orchard in DeForest couldn't find a market for their grade B apples, which are smaller than the grade As prized by supermarkets.

"But for K–5 children, that apple is perfect," says Peterman. "We've partnered with Lapacek's for six seasons now, and my students have the opportunity to taste 28 different varieties of apples between the start of school and the middle of January."

From the start Peterman paid recognition to Lapacek's Orchard on school

menus that kids carry in their backpacks to more than 6,000 households. So not only did Frank Lapacek sell his apples, he got free advertising that drew families out to his orchard for all kinds of fun (and profitable) activities, including a pumpkin patch and fruit-picking.

Develop something doable.

Can't do lunches for an entire district? Identify something more manageable. Madison's REAP offers a weekly snack program at 10 elementary schools that introduces some 4,500 children to the joys of fruits and vegetables, including such initial nose-wrinklers as kohlrabi. Sourcing locally straight through the winter means offering kids things like sweet potatoes and spinach as well.

"We process with industrial french fry cutters, so they make the carrots and sweet potatoes and kohlrabi into these uniform, perfect little sticks—which makes them appealing to the kids as well," says REAP Farm to School manager Sarah Elliott. "The kohlrabi is really crunchy and juicy. It has a great texture, which is why I think the kids like it so much."

But it's the accompanying education that makes the difference, Elliott feels. The schools receive a USDA Fresh Fruit and Vegetable grant due to their high percentages of free and reduced lunch recipients. Three times a week the kids get a raw fruit or vegetable snack; once a

week it's from REAP, which sends AmeriCorp staffers to offer tasty lessons along with it.

"Just giving the kids carrots isn't always enough," Elliott says. "We have these smiling, enthusiastic people getting them excited and offering fun facts about the nutrition and history of the vegetable or information, with pictures, about the farmer who grew it." And it helps that kids are not offered a choice, Elliott notes; it's the vegetable or no snack at all, which is incentive enough to try it, and maybe come to like it.

REAP exemplifies, too, the use of creative partnerships to overcome obstacles. Processing 26,000 pounds of produce a year is a challenge. For years REAP did all the washing, cutting and packaging with a crew of some 30 volunteers every Sunday, using a kitchen lent to them by RP's, a local pasta producer. Last year they acquired a whole new labor force by partnering with the Catholic Multicultural Center in south Madison in a program providing hard-to-employ persons with food service skills. And the Madison Metropolitan School District (MMSD) kicks in by distributing snacks to schools once they've been processed.

REAP and MMSD also hold several "Fall Farm Days" featuring local produce in lunches at four elementary schools. And this year they're pilot testing "garden bars," salad bars featuring local veggies and fruit, at a handful of elementary schools.

Think big. As nutrition director for Chilton and Hilbert schools, Diane Chapeta transformed lunches by heading a North East Wisconsin Farm to School initiative that grew to involve 47 schools and a cadre of beef and pork producers, fruit and vegetable farmers and dairy and meat processors.

Now she's onto something even



PHOTO BY MIKE EICHER/PREVENTIONSPeAKS.ORG

bigger. She recently joined the newly founded Fifth Season Cooperative as operations manager. "I saw an opportunity to create infrastructure that would move regional food to institutions on a much larger scale through the existing system," says Chapeta.

Based in Viroqua, Fifth Season is building up a membership that comprises a complete supply chain for offering schools locally and regionally grown foods. Services will include aggregating produce from growers of all sizes, processing, sales and distribution—exactly the level of scaling up that's needed for local growers to go from bit to major players in school cafeterias. Members already include such giants as Organic Valley/CROPP and Reinhart FoodService, the nation's third-largest food service distributor.

Farmers and chefs are your stars.

Kids in Madison know Farmer Rufus Haucke (Keewaydin Farms), Farmer Judy Hageman (Snug Haven) and Chef Tory Miller (L'Etoile, Graze). Kids in Holmen know Chef Thomas Sacksteder (Gundersen Lutheran Hospital). Kids in Middleton know Beekeeper Eugene Woller (Gentle Breeze Honey), who sold honey to the district and then visited schools with his colleagues in full beekeeper regalia to hold tastings with kids and talk about their work. Their visits also served to enrich an accompanying science curriculum about bees.

Few things are more memorable for children than having a farmer or chef visit their schools for something as small as a classroom tasting or as grand as an all-school cooking event. Putting a face on the experience can make things click for kids: where food comes from, who

grows it, how it's prepared.

For farmers and chefs it's just as gratifying. "The kids are so excited about having a farmer in the classroom, and that's the part I really love," says Haucke. "I'm always surprised at the reaction we get when we serve them our raw veggies. They absolutely love it."

Farmers are willing to put in the time even if the business isn't quite profitable for many of them just yet. Haucke works with four school districts and sold them about \$7,000 worth of produce this past season—"A relatively small portion of our business, but it does continue to grow," he says, echoing several other farmers. Haucke made an investment in Farm to School by obtaining federal grant funding to build a processing kitchen. "Once that's fully operational, I think school sales could really take off and become a bigger part of what we do," he says.

If you offer it, will they eat it?

Midway through the fall 2012 semester, which debuted new National School Lunch Program guidelines mandating more fruits and vegetables—students must now put a fruit or vegetable on their tray every day in order for the school to be reimbursed—the news media ran stories about student opposition across the nation, including photos of cafeteria garbage cans heaped with rejected veggies and even a protest video ("We Are Hungry") with more than a million views on YouTube. (The USDA eventually responded by doing away with daily and weekly limits of meats and grains.)

The reaction came as no surprise to CALS nutritional sciences profes-

Schools in Chilton (left) set the gold standard by allowing children to serve themselves scratch-made meals featuring locally grown produce, meat and dairy.

sor Dale Schoeller: “There will be complaints after any change in school lunches. It’s human nature.”

And it’s no reason to back down from a commitment to serving fruits and vegetables, notes Tara LaRowe PhD’05, a nutritionist with the UW–Madison School of Medicine and Public Health. “It takes a lot of exposures—as many as 10 or 12—for children to become familiar with the food and decide they’re going to try it and possibly like it. So putting something on a lunch tray and seeing it end up in the trash after one day doesn’t necessarily mean it was a failure and you shouldn’t try it again. In fact, you should be trying it again.”

Schoeller and LaRowe know more than most people about getting kids to eat their vegetables. They carried out a multiyear Farm to School impact assessment at public elementary schools as part of a study exploring various community health initiatives, including ways to prevent obesity in children. Their work was commissioned by the state Department of Health Services (DHS), which, citing recommendations from the Centers for Disease Control and Prevention (CDC), has identified Farm to School as “one of the most viable strategies for improving young people’s access to fruits and vegetables.”

Eating more fruits and vegetables—in addition to providing valuable nutrients—is thought to prevent obesity mostly by displacing high-calorie, less nutritious foods. “In the case of fruits, they’re sweet, so maybe they can take the place of sugar-sweetened beverages, candy and desserts,” says Schoeller. “And with vegetables, they’re bulky—high in fiber, low in calories for their volume—so they should provide more satiety and fullness.”

So what’s the connection to Farm to School? Part of Schoeller’s evaluation involved analyzing some 4,500 student lunch trays through “before and after”

photos showing what kids had actually eaten. Yes, there was some waste. But the photo study and other data had some very positive findings for Farm to School. Children at schools with Farm to School programs consumed 40 percent more fruits and vegetables than kids at schools just starting Farm to School. Moreover, students in schools with several years of Farm to School programs were more likely to choose a greater variety of fruits and vegetables.

And Wisconsin kids need that help. Nearly a fourth of high school students are overweight or obese. “Many children consume diets in which more than 25 percent of their energy comes from sugar, and one in three high school students consumes fruit or vegetables less than once per day,” notes Schoeller. “This diet pattern is associated with excess weight gain. A change in the diet pattern is needed, and one place to start that change is in school meal programs.”

His study of Farm to School has made him a believer in the program not as a magic bullet but as part of a long-term strategy toward better eating habits.


“This is something that needs to be done more broadly and year after year,” Schoeller says. “It’s not like getting an inoculation—something that you do once and it lasts for years. It has to be constantly reinforced until it becomes an ingrained behavior.”

Schoeller and his team have received funding to expand Farm to School studies as part of the Transform Wisconsin Fund, a five-year, \$25 million grant from the CDC administered by the UW’s Wisconsin Clearinghouse for Prevention Resources. Schoeller’s team will broaden evaluations at their current sites and add up to 14 schools over the next two years.

And over at CIAS, Farm to School initiatives continue to grow. In one project CIAS is partnering in scale-up efforts being pioneered at Fifth Season.

The center just received a \$76,000 grant to get more Wisconsin-grown vegetables and potatoes into schools by bringing in Fifth Season and Maglio Readyfresh for processing and using industry giants Sysco and Reinhart for distribution.

That degree of systemic change is what Sara Tedeschi had hoped for when she embarked on Farm to School. If anyone had told her a dozen years ago where Farm to School would be today, she would have been very pleased, she says.

“We’re working in a different world now in that we have partners in industry who understand what Farm to School is and want to help advance it,” Tedeschi says. “They’re no longer asking why we should do this—the question they’re asking is how.” 

Nutritional sciences professor Dale Schoeller and his team did “before and after” evaluations of lunch trays to see what kids were eating (photos below). Among their findings: kids participating in Farm to School programs ate more fruits and vegetables.



in the field



Rhona S. Applebaum



Dan Berg



Ann Berres-Olivotti



Donald H. Burr



Margaret Dohnalek

Rhona S. Applebaum PhD'81 Food Science • Rhona Applebaum is vice president and chief scientific and regulatory officer at The Coca-Cola Company, where she leads global scientific and regulatory affairs. "We're responsible for driving evidence-based research and education programs and advancing regulatory science strategies to fuel innovation and marketing of our products," she says. Her group's other responsibilities include helping communicate the company's positions on scientific and regulatory matters and promoting dialogue and understanding of Coca-Cola's products and ingredients.

What fuels her passion? "Making a difference and giving back," she says. "I am totally committed to the importance of mentoring and coaching young people in their careers. And I'd be less than truthful if I didn't say I guide them into STEM (science, technology, engineering

and math) disciplines at every chance."

And when Applebaum offers advice on graduate study? "For those wanting advanced degrees in food science or another STEM specialty, UW is at the top of my list," she says. "Wouldn't the world be grand if more folks were Badgers?"

Dan Berg BS'94 Food Science, MS'03 Food Chemistry • Dan Berg is a senior client manager at Covance Laboratories, where he assists clients in using Covance's testing services for nutritional and food safety purposes. "The work I do challenges me to be an expert at understanding foods, their chemistry, the methods and the regulatory framework that guides how testing should be used to ensure a safe and high-quality food supply," he says.

His education at CALS gave him the foundation to understand the chemistry and processing of foods and the techniques to tackle complex problems and come up with solutions, Berg notes: "As I have progressed in my career, the importance of my education has become more evident with each position I've held."

Ann Berres-Olivotti BS'80 Bacteriology, Food Science • Ann Berres-Olivotti is a senior manager on the technical service team at Foremost Farms USA, where she primarily works in pharmaceutical lactose operations in the areas of quality assurance, process improvement and product functionality. "My favorite parts of the job are process improvements and educating end users regarding

product capabilities," she says. "Designing a practical process for a new product is one of the more exciting aspects of the job."

Donald H. Burr PhD'83 Bacteriology • Keeping the public safe from emergencies or outbreaks involving biological, chemical or radiological contamination of food is all in a day's work for Donald Burr, who is a captain in the U.S. Public Health Service assigned to the FDA's Center for Food Safety and Applied Nutrition. Burr helped design the FDA's Food Emergency Response Network (FERN), which coordinates the response of food-testing laboratories at the local, state and federal levels following an emergency or outbreak. FERN was formed following the highly publicized anthrax attacks of 2001, and since then Burr has remained involved in the agency's food defense and counter-terrorism activities. "It's been gratifying to see the effectiveness of this program when there have been threats to our food supply," Burr says.

While earning his doctorate at CALS, Burr worked at the UW-Madison Food Research Institute, where he helped develop animal models for infant botulism. After graduating he decided to pursue careers in both the U.S. Navy and the U.S. Public Health Service. "That allowed me to continue in the field of public health microbiology while at the same time serving my country," he says.

Margaret Dohnalek PhD'88 Food Science • Margaret Dohnalek is the global head of technology scouting in

About In the Field

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

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

Next issue: Alumni from Landscape Architecture

Alumni who are making a difference in Food Science



Kurt Fenster

James Pestka

Kim Premo

Virginia N. "Jenny" Scott

corporate research and development for PepsiCo. Simply put, her job—which the company created about two years ago—is to search the world for “the best of the best” in technology advancements and innovations that could benefit PepsiCo’s current and potential products and portfolio.

“Scouting is a complex function that requires the team to keep up on major technology advancements and innovation trends that are relevant to our business,” Dohnalek notes. “Leading technology scouting is a tremendous career opportunity because of the diversity of scientific challenges my team and I engage with on a daily basis—from advancing innovations in food and agro science to managing strategic partnerships with leading global innovators.”

Kurt Fenster MS’96 Food Science, PhD’02 Food Science, Bacteriology As a manager in bioprocess development with Dupont Nutrition and Health, Kurt Fenster examines the effects of various strains of bacteria—lactic acid bacteria, bifidobacteria and propionibacteria—in manufacturing cultures for such products as probiotic dietary supplements, dairy cultures and silage inoculants.

“Scientifically, it is exciting to unlock the secrets of these strains,” says Fenster. “We’re creating superior products for our business units to bring to market—and, ultimately, our customers get the benefit.”

James Pestka Post-doctoral research ’82, Environmental Toxicology • Jim Pestka

received his Ph.D. in microbiology and immunology from Cornell University and conducted post-doctoral research at UW–Madison’s Food Research Institute, working with “giants in the field whom I have tried to emulate as role models,” he says. For the past 30 years he has been a professor in the Department of Food Science and Human Nutrition at Michigan State University. His current research could one day be applied to address obesity. His team focuses on how molecular mechanisms activated by foodborne toxins, in addition to activating a classic immune response, also can initiate anorectic and vomiting responses that prevent further intake and expel the offending food.

“What’s exciting is that these latter effects are extremely rapid and mediated by gut satiety hormones which normally signal our brain that it’s time to stop eating,” he says. “Interestingly, by feeding low levels of these toxins, we can reverse obesity in experimental mice. By understanding the underlying mechanisms, it might be possible one day to tease apart the satiety-inducing effects from illness effects, thereby leading to novel pharmacotherapies applicable to the obesity epidemic.”

Kim Premo BS’77 Food Science • “Chocolate peanut, red velvet, refreshing lemon fig. When it comes to ice cream flavors, Kim Premo has not only tasted a lot of them, he’s made them,” wrote the *Milwaukee Journal Sentinel* in a recent story about Premo, who serves as vice president of research and development at Denali Ingredients in New Berlin.

There he oversees product development for such things as stabilizers affecting ice cream texture and shelf life as well as flavorings and “inclusions”—all the goodies that can be added to an ice cream base, such as nuts, chocolate chips and cookie dough.

Premo, who grew up on a dairy farm, admits his work is pretty fun. “In ice cream people always want new ideas and the industry always rotates new flavors into the line-up. It’s much more rewarding to work on something new than to keep retooling existing items,” he says. “The other great thing is that when you tell somebody you make flavorings for ice cream, their eyes light up. It makes you feel good that people enjoy what you are doing.”

Virginia N. “Jenny” Scott MS’75 Bacteriology • The Food Safety Modernization Act signed into law by President Barack Obama in January 2011 called for all kinds of new food safety regulations and guidelines—and Jenny Scott, as a senior advisor in the FDA’s Center for Food Safety and Applied Nutrition, serves as the technical point person for questions and consultation needs related to preventing hazards in food. In her position she develops and implements policies, regulations and guidelines related to food safety and provides technical expertise in a variety of food safety areas. She also leads the U.S. delegation at the Codex Alimentarius Committee on Food Hygiene. Codex is an international body whose food standards are recognized by the World Trade Organization in the resolution of trade disputes.

—BY NATALIE HINAHARA

Catch up with ...

James Natzke BS'91 Food Science

Raised on a 40-cow dairy farm in Bonduel, Jim Natzke has been involved in the dairy industry his entire life. He worked at a local butter manufacturer and at a milk bottling plant before finding an abiding passion in specialty cheese. For some 14 years he served in various management positions at Roth Käse and then Emmi Roth USA, including as vice president of supply chain and logistics. Natzke now finds himself in two fairly new positions. One is serving as operations manager for a small Monroe-based group that owns Maple Leaf Cheese, Alpine Slicing and Cheese Conversion and Edelweiss Cheese. The other is serving as board president of the Wisconsin Specialty Cheese Institute, which works to promote a robust state industry that now produces nearly half of all specialty cheese in the United States.

● **What's the role of the Wisconsin Specialty Cheese Institute among other industry organizations?**

We try to focus on networking and education. For example, we recently started having a small exposition every spring to focus on one topic, such as labeling or marketing. We have a panel discussion with industry experts and then invite vendors to set up small displays and have discussions with individual companies. More than any other industry organization, I think we offer some basic information in an unintimidating environment so that smaller manufacturers, or people who are new to the industry, can get some facts and make some connections. The energy level and attitude produce a terrific environment for sharing and learning.

● **If you had to pick your own favorite Wisconsin specialty cheese, what would it be?**

Because of my career path so far, I probably ought to say Maple Leaf Cheddar or Edelweiss Emmenthaler, or even Roth Käse Gruyere, but I have to say Blue. Wisconsin has several really great Blue producers. Each one has a unique make process and a unique flavor. Some are technically better than others and would score better at a contest, but for me each has a personality that I enjoy tasting. Some are sharp and tangy and others are more on the musty side. Buy a few Wisconsin Blues and taste them side by side, and I think you will be surprised at the variety among them.



● **Any thoughts about the new dairy plant slated for CALS?**

To get such solid industry backing, especially since the economy in general is not that strong, is an indication of how important this project is to the industry. Since I graduated more than 20 years ago the building really has not been upgraded very much despite the fact that dairy processing is such a big part of our state economy. Dairy is not just an important industry for our state—it is part of our state's identity as well. We have a great competitive advantage in dairy compared to the rest of the world. We have a critical mass of talent, infrastructure and, of course, milk to stay ahead. We need to support that potential by having an educational infrastructure that presses that advantage and makes the industry strong for future generations. I really hope it happens.



Ride to Farm takes place on June 1. Last year's riders included a colorful assortment of CALS faculty, staff and alumni led by Dick Cates PhD'83 (center, in red and white visor cap), director of the Wisconsin School for Beginning Dairy and Livestock Farmers.

GRAND OPENING of the **Wisconsin Energy Institute** happens on **Friday, April 5**, with a ribbon cutting, public symposia and a career fair. The fun continues on **Saturday, April 6**, with family-friendly events and activities. More at: www.energy.wisc.edu/events.

ADMIRE STUDENT RESEARCH at the **Undergraduate Research Symposium** on **Thursday, April 18**, in Union South. The event highlights undergraduate research from all areas of study, with a rich showing from CALS disciplines. Visit: www.learning.wisc.edu/ugrsymposium/

FUTURE OF FOOD Learn more about the challenges and opportunities of agriculture and food systems in a seminar series led by CALS/ UW-Extension's **Jed Colquhoun**. HORT 375 is open to the public and meets **Tuesdays, 5:45–6:45 p.m.**, in 1520 Microbial Sciences. Drop-ins welcome.

RIDE TO FARM This year's **benefit bike ride** for the Wisconsin School

for Beginning Dairy and Livestock Farmers takes place on **Saturday, June 1**. The all-day ride starts and finishes at Birch Lake Park in Barneveld and takes place on about 60 miles (100K) of hilly landscape, with a lunch stop in Spring Green and two farm rest stops featuring local foods for refreshment. More info soon at www.cias.wisc.edu

BETTER BABCOCK BUYING at the Babcock Hall Dairy Store's fabulous new website: www.babcockhalldairystore.wisc.edu/

SPECIAL REQUEST: UPDATE, PLEASE! We're talking about your e-mail. Maybe it's been a while since you've visited your directory account at the Wisconsin Alumni Association, www.uwalumni.com (see "Log in: Alumni Directory" under Quick Links). You can also e-mail your information to us at alumni@cals.wisc.edu. Updating your e-mail and other contact information offers a very easy way to stay in touch with CALS. Many thanks for your help!

Seeds of Greatness

When she first came to UW from Manitowoc, Ashya Kaderabek-Vela already knew she loved genetics, in part for the answers genetics seem to hold in explaining various health-related conditions that were passed down in her family. Initially her career goal was to become a genetic counselor.

"I would be able to help other families understand the issues happening in their families and help them cope," she says.

But in her freshman year at CALS, Kaderabek-Vela discovered another passion, wildlife ecology—and, most excitingly, a way to combine both of her interests in the field of conservation genetics, an interdisciplinary science that applies genetic methods to the conservation and restoration of biodiversity.

"It's really important to help conserve the many threatened plant and animal species on our planet," she says. "They are a part of the earth as much as we are and play huge roles in all aspects of life."

Coming from a family of limited financial means, Kaderabek-Vela feels fortunate to attend UW–Madison. Her path through the UW has been greatly eased by a grant from the Great People Scholarship fund, which offers need-based grants to fill gaps between various other sources of financial aid.

"I don't have to worry about whether I can afford to go to school the following semester," Kaderabek-Vela says. "This grant makes it easier to focus on my schoolwork rather than on how to pay tuition."

Donations to Great People may be earmarked toward a particular school or college, including CALS, and are matched by the UW Foundation. Donors also may set up a named endowment under the auspices of Great People.

The Foundation match makes Great People an especially powerful way to provide assistance—and helps ensure that CALS continues to foster students from all backgrounds in their development as great students, great professionals and great citizens of the world.

To contribute to the CALS Great People Scholarship fund, visit

<http://supportuw.org/giveto/greatpeople> and go to "Agricultural and Life Sciences" in the drop-down menu.

For more information about Great People and CALS, contact Sara Anderson, sara.anderson@supportuw.org, 608-263-9537.



Ashya Kaderabek-Vela can focus more on her studies thanks to aid from Great People.



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



KNOWLEDGE POWERS WISCONSIN FARMERS

AGRICULTURE CONTRIBUTES MORE THAN \$50 BILLION TO WISCONSIN'S ECONOMY EVERY YEAR. Keeping this industry strong is a top UW priority, as evidenced by world-class research and specialized degrees in agricultural business, animal sciences, plant sciences, biochemistry, genetics and food science. Campus experts and trusted UW-Extension educators bring discoveries from the lab to the field, helping Wisconsin producers remain profitable and productive.

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Biochemistry

1. Cleavage of the peptide bond falls into which major class of biological chemical reaction?

- a. Oxidation/reduction
- b. Hydrolysis
- c. Condensation
- d. Group transfer
- e. Rearrangement

Wildlife Ecology

2. What is the pathogen that causes Lyme disease?

- a. A tick
- b. A bacterium
- c. A protozoan
- d. A virus

Animal Science

3. An example of allelomimetic behavior in dogs is:

- a. Males sniffing a female when they meet
- b. Stray dogs forming a pack and killing prey animals
- c. Males spraying to mark territory
- d. Females mothering a stuffed animal
- e. Pups play-fighting with littermates

Biological Systems Engineering

4. What survey instrument can be used to measure elevation or differences in elevation?

- a. An optical engineers' level
- b. A laser level
- c. A total station instrument
- d. A transit
- e. A theodolite
- f. Only A and B
- g. Only A and C
- h. All of the above

Genetics

5. What did Gregor Mendel conclude from his experiments with pea plants?

- a. Traits are controlled by factors (genes) that come in pairs
- b. An organism that is homozygous for many recessive traits is at a disadvantage
- c. Recessive genes occur more frequently than do dominant ones
- d. There is considerable genetic variation in garden peas
- e. Genes are composed of DNA

LAST ISSUE: Answers were 1: C, 2: B, 3: A, 4: B, 5: D. Congratulations to Amanda Jutrzonka BS'09, who was randomly selected from the five people who correctly answered all questions. She wins a gift certificate to Babcock Hall.

THE BEAUTY OF SHANGRI-LA

A Tibetan monk watches birds in China's Yunnan Province, one of the most biologically and culturally diverse places in the world. Find out what CALS researchers are learning there beginning on page 20.

PHOTO BY JOHN AND JEMI HOLMES

