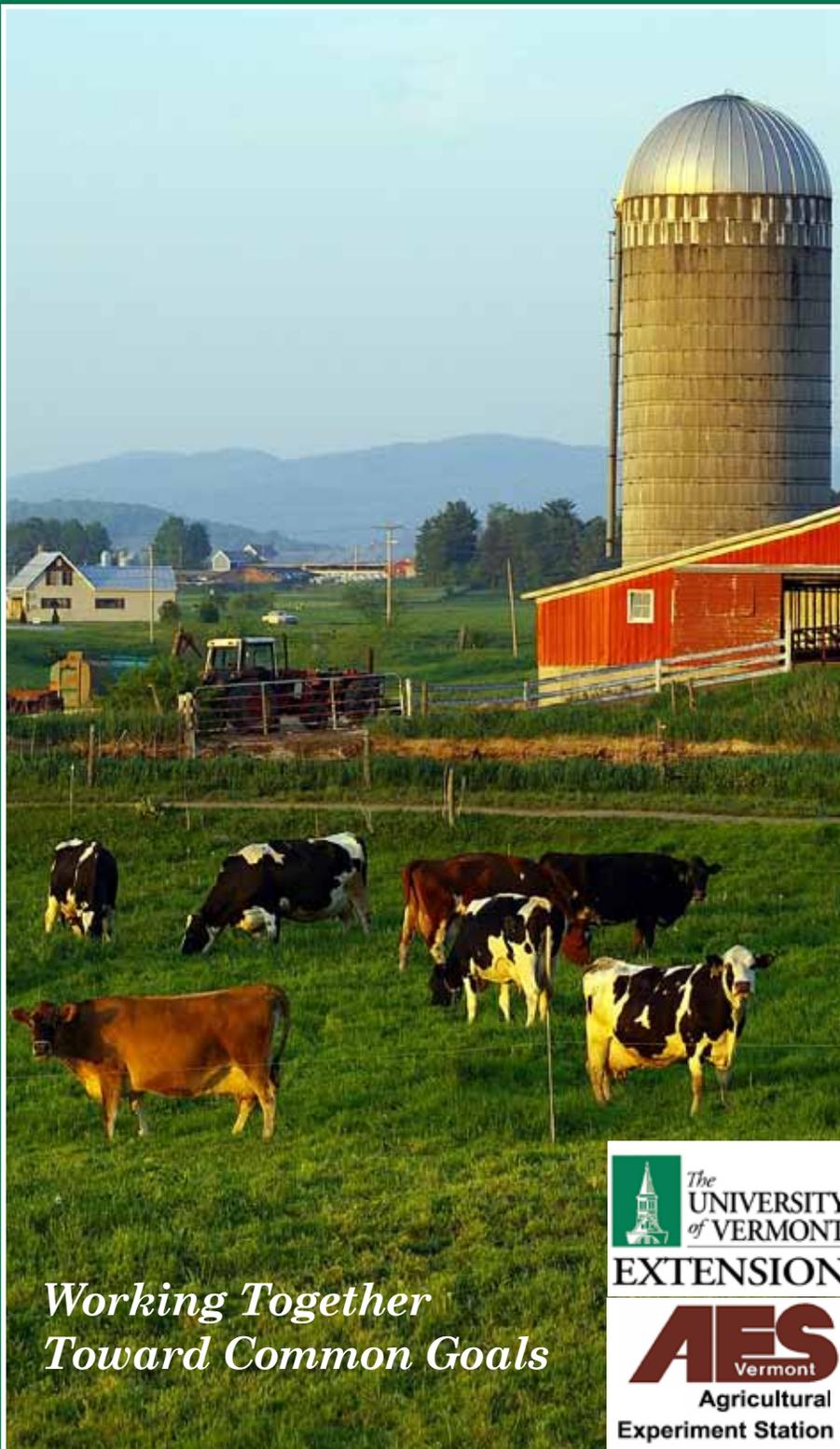


ANNUAL REPORT

for the Fiscal Year 2009



*Working Together
Toward Common Goals*





The fifth generation Elm Gate Farm in West Windsor was a Jersey and then Holstein dairy through the 1990s and has now added beef cattle, meat goats, chickens and pigs. This photo, by the farmer herself, won the Vermont Agency of Agriculture's 2009 Agriview photo contest.

Ann Yates

2009 Annual Report

Welcome to a compendium of the 2009 Annual Report of the Vermont Agricultural Experiment Station and University of Vermont Extension, which highlights exemplary research and programs conducted from Oct. 1, 2008 through Sept. 30, 2009. Whether you're reading the traditional paper version or our new interactive, online edition, here you'll meet Vermonters whose research and community outreach are on the cusp of attracting attention statewide and nationally.

A word about our new online format: while in past years we printed our reports on recycled paper, this year we greatly reduced the number of printed copies and employed online technologies that are not only "greener" but are more convenient and personally tailored for our busy readership. In January 2010, we sent a series of stories via colorful, linked emails, we've posted this report as an interactive pdf (and it is a page-turner!) and we offer the complete and thorough report of our programs, projects and financials at our websites: www.uvm.edu/vtaes and www.uvm.edu/extension. Please tell us what you think.

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FRONT AND BACK COVERS

Front: Grass pasturing of cattle is seeing a revival in Vermont as at this Enosburg Falls farm.
Back: Vermont's working landscape is a patchwork of forests, farms and communities banked by waterways.
~Steve Mease Photos

For a full summary of this annual report visit



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AGRICULTURE

Cutting Bovine Gas Cuts Greenhouse Gas

by Joshua Brown

Cows belch. This might not seem like a big deal unless you're writing "Emily Post Visits the Farm." But within those belches lurks methane, a potent greenhouse gas.

An average U.S. beef cow burps up more than a hundred pounds of methane each year, thanks to bacteria in its gut. Multiply this by 99 million cows, and about two percent of this country's contribution to global warming comes out of the mouths of livestock.

"In America, agriculture alone produces more greenhouse gases than all the industries, transportation and animals in Australia – combined," says André-Denis Wright, who arrived from Australia's national science laboratory in September to become chair of the University of Vermont's animal science department.

Wright aims to improve these statistics world wide, and help farmers at the same time.

Here he will continue his decade-long quest to develop a vaccine that targets the methane-producing bacteria in the front stomach, or rumen, of livestock.

"The big goal is to increase their efficiency of digestion and reduce their environmental footprint at the same time," he says, pointing to a photo of a protozoan taken through an electron microscope. "This free-living guy is about 20 microns." It looks like a gigantic gray sack with a tail. "Now, look at these little guys here," he says pointing to what look like rice grains stuck to the outside of the sack. "These are the bugs that produce methane."

A large population of these bugs, or methanogens, is not only a problem for global warming, it also signals that an unnecessarily large portion of the cow's food isn't feeding the cow.

Improved Emissions

Some methane production is natural as cows discharge hydrogen that would otherwise build up in their guts. But Wright believes it's possible to both cut emissions and also increase milk and meat production.

"If you can reduce methane production, you're returning some of that energy back to the animal," he says. "That 2 to 15 percent of the gross energy intake (used by the bacteria) is lost energy for the animal and lost profit for the farmer."

Wright projects that a successful dairy cow vaccine could increase milk production by five percent or more.

Ruminants need bacteria in their gut to break down plants, making protein and nutrients available. But some bacteria are better than others.



Cheryl Dorschner

Livestock play a little-known role in global warming. André-Denis Wright, the new chair of Animal Science, has a bovine emissions plan.

"You have good bacteria breaking down the cellulose and the lignin," in grass and other plants, says Wright, which, combined with cud-chewing, makes the plant digestible. "And you have bad ones producing the methane. We want to develop something that will target the bad guys and leave the good ones."

In a previous experiment, highlighted in the journal "Nature," Wright and former colleagues in Australia were able to do that: in 30 sheep, they demonstrated that a vaccine could reduce methane output by almost eight percent. But in subsequent experiments, they got different results due to variety in diet, place and seasons, he said.

"The trick is getting something that covers all the methanogens from A to Z," he says. "If we're going to design strategies and protocols for reducing methane-producing bugs we need to know about the bugs we're trying to get rid of," he says. And that opens a big can of bacteria.

"I'm interested in the origin and distribution of all eukaryotic life," Wright says. Born and raised in Nova Scotia, he received a doctorate at the University at Guelph in evolutionary biology.

That's why Wright has traveled the world collecting gut bacteria from South American birds, Norwegian reindeer, dromedary camels and Australian wallabies. He's also exploring the new science of metagenomics that uses computers to help sort the DNA from the great swamp of microorganisms living in an animal's gut – only 15 percent of which can be cultured and grown in a lab.

"Kangaroos produce undetectable amounts of methane, a thousand times less than cattle," Wright says. Since they evolved in Australian isolation, their gut bacteria are very different than what lives in a ruminant.

"I wonder," he says, "could you put those into cows?"



AGRICULTURE

Cow Health Benefits from Bedded Pack Barns

By Lisa Halvorsen

On a cold, rainy day last autumn, more than a dozen dairy farmers gathered on Earl Fournier's farm in Swanton to discuss the use of bedded pack for manure management and soil amendment. They listened as Tom Gilbert, executive director of the Highfields Institute for Composting in Hardwick, discussed how to build and maintain bedded pack composting systems, jumping in often with questions and to share their own experiences.

Fournier, a certified organic farmer who milks 75 cows on his 240-acre farm bordering Missisquoi Bay, is one of nine dairy producers in Franklin, Addison and Orange Counties participating in the Winter Pasture and Bedded Pack Management for Vermont Dairy Farms project. The three-year study, which began in 2009, is funded through a USDA-Natural Resource Conservation Service Conservation Innovation Grant.

Fostering Farmer-to-Farmer Education

The Vermont Pasture Network and Pasture Program at the UVM Center for Sustainable Agriculture, along with UVM Extension, the UVM department of plant and soil science and other partners, are working with these farmers to monitor the effectiveness of various pasture management practices – composted bedded pack, outwintering (outside winter feeding) with stored feed and late-season planting of forage crops to extend the grazing season – in reducing feed and energy costs and improving soil and forage quality. Developing a core group of innovative farmers willing to share information with other producers is an intrinsic part of the grant.

“We can provide research-based information,” says Rachel Gilker, UVM Pasture Program coordinator, “but it’s often farmers talking with other farmers that leads them to adopt new ideas.”

The workshop on the Fournier farm was sponsored by the UVM Center for Sustainable Agriculture, the Northeast Organic Farming Association of Vermont and Northeast Sustainable Agriculture Research and Education (SARE). Other grant participants have hosted farm visits and pasture walks to discuss the logistics and sustainability of their management practices.

Fournier showed farmers the 4,000 square-foot hoop barn where he has housed his six- to 12-month-old heifers on bedded pack for three years.

“This is a less stressful environment for them,” the dairyman told the group, noting that cows don’t like to be crowded. In



Lisa Halvorsen

Tom Gilbert, second from left, of Highfields Institute for Composting in Hardwick, discussed bedded pack composting systems with farmers gathered in Swanton for a 2009 workshop.

winter he keeps a maximum of 25 head here. “I’ve never had to use any antibiotics in this barn. The vet has not stepped inside except to check for pregnancy.”

Benefits for Cows, Farmers, Soils

Guy Choiniere, who has a certified organic Holstein operation in Highgate Center, agrees that his herd is healthier – and more comfortable – on bedded pack.

“I have more upfront costs, including greater expenses for bedding, but that’s offset by better herd health and improved milk production. Less labor is involved, which saves me time.”

Choiniere, also a participant in the study, attended the workshop for ideas on managing his bedded pack more efficiently, including composting to improve the health of his soil.

Doug and Heather Donahue who farm in Gouverneur, New York, drove seven hours round-trip to learn from industry experts like Gilbert and from other farmers. They have only been farming for three years and currently milk 50 cows.

“I like the idea of using bedded pack from the standpoint of reducing barn chores,” Doug Donahue says.

His wife agrees, but ponders if it is feasible for their operation.

“We have a tie-stall and stanchion barn built in the 1880s. It’s a challenge to keep clean. I like the idea, too, but how do we manage it, so it works for us?” She adds that it was well worth the long drive to view Fournier’s operation and talk with other producers, both those who use bedded pack, and those still on the fence.

“This is the first year of the grant, so we have little evaluative data yet,” Gilker says. “However, judging by the interest in the farmer-led discussions and farm visits, farmer-to-farmer education has proven successful for sharing information on winter pasture management.”



ENVIRONMENT

New Notions of Good Guys vs. Bad Guys

by Cheryl Dorschner

Ask someone about nematodes, and you'll likely hear tales of bad and worse. Some nematodes topple plants by attacking roots or transmitting diseases in fruits, vegetables, trees and turf. Others infect livestock, pets and even people. Conversely, their neighbors, earthworms, are extolled as underground architects. Tunneling to aerate and drain soil and bring subsoil to the surface, they turn detritus into rich humus and leave fertile castings. Earthworms were the darlings of Darwin and are the Vita-Mix of vermiculturists.

Now two University of Vermont plant and soil scientists are turning traditional thinking on its ear. Deborah Neher and Josef Görres tease out the truth. They demonstrate that sustainable ecosystems are a delicate balance of species indicators that signal the overall soil health and of communities where small creatures may be linchpins of the food web.

Neher Knows Nematodes

When it comes to nematodes, we don't know half the story. It is likely we identified the pests and overlooked the rest.

"This is the last frontier – we know more about outer space and the deep sea than we know about the organisms in our own back yard," Neher says. "Soil animals make up 23 percent of the total diversity of life, yet we know only about 10 percent of the species and little about their ecology. It's not enough to discover and name these ubiquitous albeit barely visible creatures." Over the past 20 years Neher has begun to reveal their significant role in the ecosystem.

One early discovery is "that disturbances such as cultivation have a more detrimental effect on soil food webs than disturbances such as fertilization or pesticides," she says. "I think there's a lot these soil communities could do for us, but we have no idea what they *could* do, because we feed them fertilizer which makes them lazy, or we chop them up with the tiller."

So Neher narrowed her focus to a less disturbed ecosystem – woodlands – where she identifies how soil animals function. Smack dab in the middle of the food web, these microinvertebrates are "a keystone link" between predators and herbivores above ground and bacteria and microbes below ground, she says. By measuring how well they predict the quantity of nitrates and ammonium in soil and whether they regulate populations of microbes that decompose lignin or cellulose, Neher found that they are a soil health indicator.

"Microinvertebrates integrate biological, physical and chemical properties to tell us if the soils are providing the ecosystem services that we expect," says Neher. "We need decomposition to recycle nutrients, however, we don't want such fast decomposition that we lose all the carbon to the atmosphere."



Cheryl Dorschner

Josef Görres, left, studies earthworms while Deborah Neher researches the microscopic nematodes in forest duff. Both scientists are adding new information on how small creatures affect woodland ecosystems in extensive ways.

Görres' New Angle on Worms

Nutrient recycling and fast decomposition define earthworms. Josef Görres sees that where worms congregate in the forest, "there is no leaf litter, no organic layer and not as much pore space," he says. As a result, "the seed bank is exposed to predators and harsh weather. This is where small plants germinate, but because the duff is gone, they can't do that, and there are fewer herbaceous plants."

In addition, earthworms leave soil fertile in nitrogen, phosphate and potassium.

"Native plants may not adapt to the fast release of nutrients that earthworms cause," says Görres. "One hypothesis is that exotic invasive plants move in instead, because they have fewer competitors, bare ground to colonize and an edge over natives, which are slower to become active in early spring."

Worms' effects on wildflowers and shrubs are documented, but Görres studies long-term change of the forest canopy and "how earthworms change the chemistry of soil in production maple forests, because that could change the flavor of syrup and the color of the foliage," he says. "That part is speculative, but no one has looked at that."

American colonists brought *Lumbricus terrestris* on rootstocks and in ship ballast; over time these all but replaced native earthworm populations and spread to wormless areas. Görres estimates about 15-20 invasive earthworm species in the Northeast. Nowadays, worms are introduced by construction, nursery plants, gardeners who purchase red wigglers and fishermen who dump bait.

While people are well aware of devastating invasive forest insects such as emerald ash borer and hemlock wooly adelgid heading toward Vermont, here's a surprise.

"Crazy snakeworm was first discovered in the 1990s in nine commercial greenhouses in New York City. It is many times more voracious than other earthworms," says Görres.

He's identified one himself – in 2008 – in a patch of ferns at the woodland edge of UVM's own Horticultural Research Farm.



ENVIRONMENT

Improving Missisquoi Bay Water Quality

By Lisa Halvorsen

High phosphorus inputs from the Missisquoi Watershed in Vermont and Quebec have made Missisquoi Bay one of the most eutrophic areas of Lake Champlain. Although not the only source of nonpoint source pollution, runoff from agricultural fields contributes to the high phosphorus levels that may cause excessive aquatic vegetation growth and toxic blue-green algae.

To help farmers minimize runoff of excess nutrients from farmland, Bourdeaus' and Bushey Inc., a feed and farm supply store in Middlebury, and UVM Extension teamed up to develop customized nutrient management plans for 30 small livestock farms in the Missisquoi Watershed. Although the Vermont Agency of Agriculture, Food and Markets requires medium and large farms to have such a plan, the same regulations do not apply to farms with fewer than 200 mature animals. The two-year project, which concluded in 2009, was funded by a \$200,000 federal appropriation to the International Joint Commission and implemented by the Lake Champlain Basin Program and the New England Interstate Water Pollution Control Commission.

"This is a prime example of outreach that provided research and expertise to Vermont farmers through a collaborative project which, unlike many programs, did not require a cash match by farmers," says Bill Howland, LCBP manager. "Bourdeaus' and Bushey has a good reputation for farm services in the Missisquoi region. UVM Extension's involvement provided important credibility as well. It's a different story if a regulatory agency knocks on the door."

Keeping Soil Nutrients on the Farm

Jim Bushey of Bourdeaus' and Bushey Inc. applied for the funding, bringing UVM Extension field crops and nutrient management specialist Jeff Carter on board to help write the grant proposal and talk with farmers about their current and planned management practices, farm and crop records and other aspects of their operation. Sally Flis and Jonathan Chamberlin, the Bourdeaus' and Bushey Inc. Nutrient Management Team, conducted farmer interviews, soil testing, manure sampling and other tasks necessary to collect the data needed to prepare the detailed nutrient management plans based on USDA-Natural Resource Conservation Service Conservation Practice Standard 590 (Nutrient Management) for each farm.



Lisa Halvorsen

Jeff Carter, left, and Jim Bushey find that with a thorough farm nutrient management plan, Missisquoi Bay area farmers can reduce phosphorous runoff into the watershed.

"Our objective was to document changes in phosphorus loss as measured by a decrease in Phosphorus Index scores of fields as farmers in the study adopted alternative farm management practices," says Carter. The Vermont Phosphorus Index was developed by former UVM Extension soils specialist Bill Jokela and others to calculate potential phosphorus runoff into water based on a number of input and transport variables.

Carter notes that compliance with the nutrient management plans was voluntary. Participating producers implemented changes on their farms, particularly in crop and pasture management practices, based on plan recommendations and discussions with the certified crop advisors involved in the project.

The data collected from 385 individual crop fields – a total of 4,286 acres of tillable land – between 2007 and 2008 indicated that the loss of phosphorus through runoff into surface water decreased by eight percent, a significant reduction for a one-year time span. A final report for the project was prepared for the farmers and public to document the improvements in water quality protection that the farmers achieved as a result of the project.

"The project was designed to help farmers prevent nutrients from leaving the farm, from not going into the water," Bushey says. "But by following soil test recommendations for fertilizer, crop yields may increase and their fertilizer costs decrease. Better crops may mean they'll need to purchase less feed so their overall costs are less."

Although it's too early to predict the full impact that this project will have on the health of Missisquoi Bay and other waterways within the watershed area, Howland feels that the project has been a success. "Reaching 30 farms in a troubled watershed is a step in the right direction, in a non-regulatory way," he says, "towards protecting Lake Champlain."



NUTRITION, HEALTH & FOOD SAFETY

What 'Eat Locally' Means for Vermont

By Cheryl Dorschner

Looking out their windows onto Burlington's Main Street from the UVM building that epitomizes America's Land Grant University – Morrill Hall – Tao Sun and Qingbin Wang conduct separate demographic and economic research that sheds new light on a burgeoning trend in how Vermonters choose their food.

Colleagues in UVM's community development and applied economics discipline, Sun seeks to answer: who are emerging leaders in Vermont's local food movement? Wang asks what is Vermont's capacity to produce food, and what are consumers willing to pay for the local cache? The gestalt of their results informs how food systems work. Sun and Wang have their fingers on their computer keyboards and on the pulse of Vermont.

Who Tops the 'Local' Network?

Vermont has "dozens of organizations related to local food promotion," he says, "however, as this movement is gaining momentum, there is an increasing call for coordination and information sharing among different organizations."

The USDA agreed by renewing Sun's Hatch funding this year to create a map of the Vermont local food promoters network. Sun fed results of a questionnaire he sent to 100 local food groups into a Usenet computer program that translated data into a diagram of organizational relationships. Sun will be able to see at a glance which organizations are the "go-to" resources for the public, for experts and for each other. He's measuring the amount of contact these groups have with each other in order to understand the very structure of the network itself.

"I want to know who comprises the network, who is the core, who is perceived as powerful," he says. It's not always the people who send out the most messages; "that you send information is not as important as that you receive information," he nods. But he wonders, is there a correlation between an organization's position in the network and the number of years it has served the public, the size of its staff, its budget?

"Sometimes by cracking that (hierarchy) you have a better sense of the organizational communication network of local food promoters in Vermont."

Tao Sun will have a preliminary report in February 2010 – just in time for the delivery of this very report into the hands of legislators at the Vermont State House.

Can Vermont Feed Itself?

In 2006 Qingbin Wang worked with his student Dave Timmons G'06 to determine how much food Vermonters have supplied historically, how much they can supply today and how much are consumers willing to buy and pay for it.



Cheryl Dorschner

Qingbin Wang, left, and Tao Sun's research sheds light on new changes in food systems in Vermont. Their work reveals who are the key players in Vermont food production and how much consumers value local food.

"Vermont has been a leader in promoting local food, but there is very limited information for assessing our programs and the effectiveness of alternative programs," Wang says.

Wang and Timmons were able to answer these questions on a shoestring (\$20,000 over four years) by mining existing 2007 USDA statistical data measuring direct sales from farmers to consumers at the county and state level compared to U.S. trends. They aimed to identify factors that make some areas high or low. The results are more complex than can be explored here, but Timmons published one view in Vermont Commons Journal in 2006 (www.vtcommons.org/journal/2006/04/dave-timmons-local-food-vermont-mixed-messages). Here he points out that while the state has enough land and produces enough dollar-wise to be self sufficient, dairy is the only category in which Vermont produces more than it can use. Vermont produces 38 percent of its food, he figures – low by U.S. standards. He says Vermont must, as it once did, raise a wide variety of products and develop processing industries. However, Vermont enjoys a renaissance of farm-to-family sales 5.5 times the national average, according to USDA figures that, when updated, will likely increase.

In 2008 Wang and colleagues published two methods for quantifying local food indicators for use by Extension professionals. (www.joe.org/joe/2008october/a7.php) And in 2010 articles will be published in the "Journal of Sustainable Agriculture" and "HortScience," all aimed to help consumers, producers, policymakers, leaders and stakeholders to set goals and assess progress concerning local food production and distribution.

A close relative to both men's research on Vermont food, UVM's Center for Rural Studies published a Vermont Local Growers Guide. The searchable website of Vermont-produced foods year round is a joint project with the Winooski Natural Resources Conservation District. (www.vermontgrowers-guide.com)



NUTRITION, HEALTH & FOOD SAFETY

‘Cooking for Life’ and Eating Well for Less

By Lisa Halvorsen

Before she signed up for the “Cooking for Life” course last spring, 18-year-old Heaven Neathawk’s culinary expertise was limited to boiling water to make Ramen noodles. Now she knows how to prepare chicken stir-fry, enchiladas and several other dishes including her favorite, homemade macaroni and cheese, which she cooks a few times a month.

In addition to basic cooking skills and recipes, the six-week course covered nutrition and recommended dietary guidelines, as well as shopping for healthy foods on a budget. Heaven and 11 other students from Rutland High School’s Howe Center Campus, an alternative high school for at-risk teens, also gained newfound confidence in their ability to modify recipes and adapt skills learned in class to eat healthier at home.

Cooking for Life is offered through the UVM Extension Expanded Food and Nutrition Education Program (EFNEP) in collaboration with the Vermont Campaign to End Childhood Hunger (VTCECH). The Rutland course was taught by Susan Bodette, a Middlebury-based EFNEP educator, and chef Ben Layden, a graduate of the Rutland school who now works at Charity’s 1887 Saloon and Restaurant in Killington.

“EFNEP’s mission is to assist low-income youth and families with young children to acquire the knowledge and skills necessary to eat healthy on a tight budget,” says Vermont EFNEP program coordinator Amy Davidson. “Cooking for Life teaches people the skills they need to make healthier food choices for life.”

“Since 1999, the relationship between EFNEP and VTCECH has been a natural fit. Both organizations are committed to increasing nutrition and food access for Vermont families,” Rebecca O’Reilly, VTCECH nutrition education coordinator, points out. “EFNEP and VTCECH work together to not only target the same audience but provide participants with the tools they need to sustainably increase food security and nutrition.”

Teaching the Tools for Success

Five of the six classes included a lesson in nutrition and hands-on preparation of a meal including kitchen safety and proper handling of knives and other equipment. At the end of each session the students received a bag of ingredients to duplicate the meal at home for their families. For one class, Bodette took the group to a local grocery store to learn about food labels and menu planning.

“They each got \$10 to prepare a meal for their family using the information from class,” the EFNEP educator explains.



EFNEP educator Susan Bodette expanded the cooking repertoire of 18-year-old Heaven Neathawk during the 2009 “Cooking for Life” course in Rutland.

Heaven made macaroni and cheese and her stepmother’s kielbasa recipe, and had money left over to buy strawberries for another meal. Another student adapted the stir-fry recipe, using venison from a deer he shot instead of chicken, a cost-saving measure.

The course encouraged Heaven to try new foods and search the Internet for recipes, valuable experiences since the teen, who will graduate in June, now has her own apartment. She also made small, but significant, changes in her diet after Bodette’s lessons on fats, calcium and sugar.

“I didn’t know soda had so much sugar,” Heaven admits. “I’ve cut back to one soda a day.” Eating healthier had another benefit. She lost a few pounds.

Personal Instruction, Statewide Scope

EFNEP educators also work one-on-one with individuals and small groups, tailoring the information to the audience. Stacie Staab helped a severely obese woman in Bennington County learn behavior modification with the goal of improving her health. In Chittenden County, Louise Brunelle often works with refugees who are unfamiliar with American foods and grocery stores. Many don’t speak English, another factor that she must consider when planning lessons.

In FY 2009, Vermont EFNEP served 829 youth in groups and 198 adults through individual home visits and small groups. Of the adults who completed both pre- and post-surveys, 80 percent showed improvement in one or more food resource management practices, 76 percent in one or more nutrition practices and 63 percent in at least one food safety practice.

“By changing these behaviors in a positive way, we can reduce the instances of chronic disease and obesity that are negatively impacting our communities and health care systems,” Davidson concludes.



ECONOMIC DEVELOPMENT & QUALITY OF LIFE

More Maple and Jobs Thanks to Sap Spout

by Cheryl Dorschner

It's a simple plastic spout, no bigger than a piece of maple sugar candy. But it promises a huge impact on the maple industry and sweet dividends for Vermont.

An innovative new maple tap spout developed by the University of Vermont Proctor Maple Research Center (PMRC) with funding secured by U.S. Sen. Patrick Leahy could boost maple syrup production and boost the number of jobs and economic development in Vermont.

The new spout can increase sap yields by 50 to 90 percent per tree, Sen. Leahy said during the spout's unveiling Aug. 17 at Progressive Plastics in Williamstown. Progressive Plastics manufactures this "check valve spout" for Leader Evaporator Company of Swanton, which licensed the technology from UVM and will market and sell it.

The senator also announced two more examples of his ongoing support of UVM research: \$188,000 to fund research to further increase sap yields and \$188,000 to develop a non-toxic wood adhesive.

"The funding he secured for the maple spout development will deliver a significant return on investment in our state, at a time when Vermont needs good economic news," said Daniel Mark Fogel, UVM president.

Leader Evaporator received 1.5 million advance orders and projected sales of three million units; that would make the spout its number one selling product. Future sales could be significantly higher as the adapters will need to be replaced annually.

"It's going to add as much to syrup and sap production as vacuum tubing did," said Leader Evaporator president Gary Gaudette. "I'm confident that this is going to be the thing to use in the future." Gaudette estimates between 50 and 55 million taps in use in North America. Both Leader and Progressive Plastics report they are hiring workers despite the recession.

Stopping Backflow

The check valve consists of a small ball that rolls back and forth in a chamber within the spout to block the flow of sap back into the tree. All tapped sugar maple trees pull sap back into their tap holes as they try to balance the negative pressure established both by natural process and by vacuum systems now



Sally McCay

Director of UVM's Proctor Maple Research Center, Tim Perkins holds his latest invention a maple tap check valve that may change the way sugarmakers do business.

pervasive in the industry. Bacteria in the backflow cause the tree's natural defenses to plug the hole, thus ending a sugar maker's season. By allowing the sap to flow, the spout will extend the sugar-making season by 1½ to 2½ weeks, according to tests conducted at Proctor and confirmed by Leader's field testing. Sugaring season is typically four weeks long.

"It's 80 percent scientific, 10 percent knowledge and 10 percent black magic," Jim Johnson executive vice president of Progressive Plastics told "The Barre Montpelier Times Argus."

The scientific part is the work of Tim Perkins, director of the Proctor Maple Research Center, inventor of the spout adapter.

"Tim Perkins' maple tap innovation is one of several examples of College of Agriculture and Life Sciences' efforts to develop new environmentally friendly products that promote agricultural viability, create jobs for Vermonters and help the local economy," said Michael Vayda, Associate Dean of the College. "This is just the kind of outcome we had hoped for from the Ag. Innovations program: listening to our agricultural stakeholders, having our ingenious faculty develop innovative products to address their need and working with private sector companies in Vermont to produce and market the product."

The tap could also mitigate the effect of global warming on the Vermont maple industry. Warming has shortened the Vermont maple season by 10 percent over the last 40 years, according to research conducted by Perkins.

"It's very gratifying to see federal dollars pay such clear dividends," Sen. Leahy said. "We all look forward to the impact this ingenious new product is going to have on the state's sugar makers and on two important Vermont companies, as well as to the economic spillover effect it will create in our state as a whole."



ECONOMIC DEVELOPMENT & QUALITY OF LIFE

Deployment Impacts Military Families

by Lisa Halvorsen

For most teenagers, getting their driver's license is a rite of passage, a ticket to freedom. But Devon Biggie of St. Johnsbury had an altruistic reason for wanting to take his driving test as soon as he turned 16 in December. With his father currently serving in Afghanistan with the Vermont National Guard, he wanted to be able to help out his family.

This is the second time that Major Kevin Biggie, executive officer of the Mountain Battalion, has been deployed, so Devon knows what to expect. That doesn't make it any easier, however. As the oldest of four brothers, the teen has assumed more responsibility than most kids his age.

"I have to step up to fill my father's shoes," Devon says. "It's up to me to do many of the things around the house that he did. It's easier on my Mom if I can help out a bit."

Increasing Community Awareness

The St. Johnsbury Academy sophomore has also stepped up to help educate Vermonters about deployment and how it impacts families like his through Speak Out for Military Kids (SOMK), the teen-run speakers bureau of Operation: Military Kids (OMK). In Vermont, OMK, a nationwide program that brings community partners together to support military youths, is coordinated by the UVM Extension 4-H Program in collaboration with Army Child, Youth and School Services and USDA National 4-H.

"OMK helps build community connections and capacity to strengthen existing local resources and provide support for Vermont's 5,000 military kids," explains Deb Alden, OMK program coordinator. "The goal is to build resilient kids by teaching skills that will help them cope and come through the deployment stronger." She adds that programs like SOMK allow teens, both military and civilian, to explore deployment issues and develop a message to share through talks, public service announcements and other avenues.

In September, the SOMK group gathered at Camp Johnson in Colchester for a mock deployment. They donned uniforms, filled out paperwork and walked through the pre-deployment process to gain insight into what a soldier needs to do before deployment.



Lisa Halvorsen

Operation: Military Kids program coordinator Deb Alden, right, and Speak Out for Military Kids member Michele Herriman, participate in a mock deployment at Camp Johnson in Colchester.

Leading By Example

Brian Evans, who participated in this exercise, knows how difficult deployment can be for a family. His mother, Lieutenant Colonel Maureen Evans, went to Iraq and Kuwait with the Air National Guard, although she is not among the 1,800 guard members deployed in 2010.

"It was hard for all of us," the 16-year-old Essex Junction teen recalls. "My Dad was overwhelmed. I wanted to get involved with Speak Out for Military Kids, so I could help kids going through this for the first time."

Michele Herriman of Leicester also believes that she can show other kids how to cope. She was only 10 when her father, Staff Sergeant John Herriman, went to Kuwait five years ago.

"I didn't understand," she says. "I was mad at him for leaving. Now I know he is doing something to be proud of." In addition to SOMK, Michele has attended Operation: Purple Camp at Camp Abnaki in North Hero, a free summer camp for military kids.

Alden adds that "Ready, Set, Go!" workshops have been a phenomenal success in helping adults understand the deployment's realities and impact on families." They cover specific aspects of deployment from military culture and the deployment cycle to how to help younger family members handle their emotions.

"Deb's program fits well with our own youth program," says Major Randall Gates, state family program director for the Vermont Army National Guard. "What kids are getting out of it are opportunities to develop closer ties with others going through the same experiences. Deb piles up success upon success as more kids gravitate to OMK."



DEANS' MESSAGE

Working Toward Common Goals

During one of the toughest economic years in recent history, Vermonters relied more than ever on the research and outreach of the Vermont Agricultural Experiment Station (VT-AES) and University of Vermont Extension in areas of agriculture, environment, nutrition, food safety, health, community and economic development.



Jane Nevins

Doug Lantagne, left, and Tom Vogelmann traveled Vermont together, listening to state leaders and stakeholders, to ever improve the relevance of UVM outreach and research.

During the ongoing dairy crisis, we especially came to the aid of Vermont farmers with research, services and products all aimed at helping both the production and the business sides of agriculture including business planning, enterprise budgets, risk management and overall decision-making options.

As you can see by the stories we've highlighted in this, our annual report, we stepped up our efforts to serve the state. And as you can see by the numbers and charts on this page, we stepped up our resolve to increase funding for our work, even in the face of tightened budgets.

The adjacent charts and our websites report our financial resources during fiscal year 2009 (Oct. 1, 2008 through Sept. 30, 2009). Again this year our numbers demonstrate success that far outperforms our resources.

VT-AES research represents nearly \$12 million in research funding – recovering a drop from the previous year with grants and contracts garnered by our research scientists themselves.

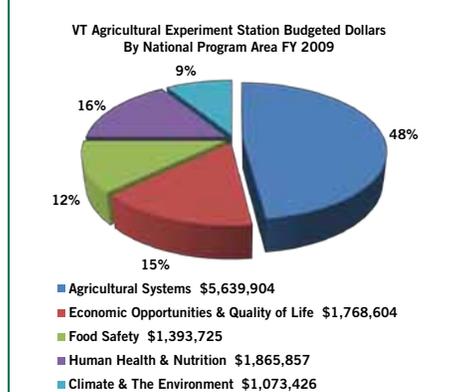
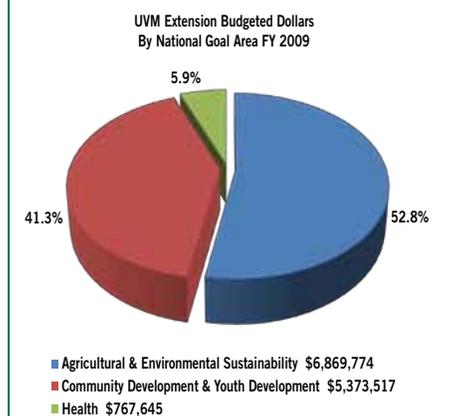
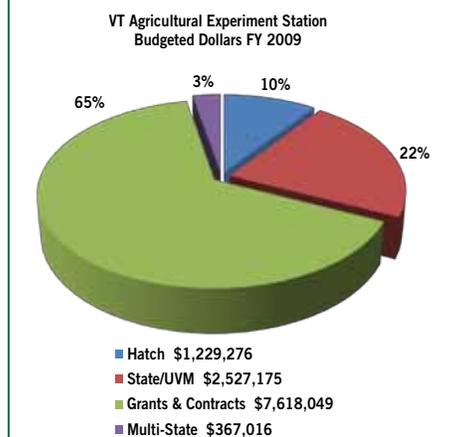
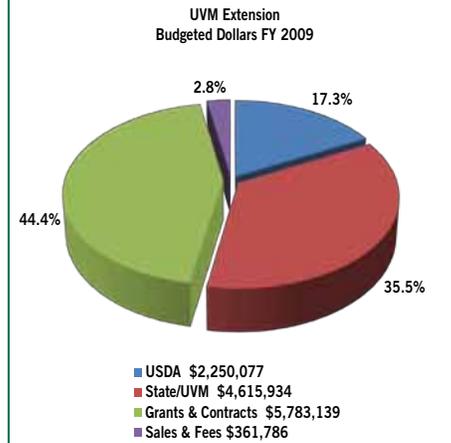
Meanwhile, UVM Extension's budget increased again this year – by nearly \$1 million, to \$13 million, owing to increases in federal funding, grants and contracts.

Our performance clearly demonstrates that we are in an excellent position to build on our strengths and past performance and to take advantage of future federal funding to benefit Vermonters and their communities. Our areas of focus, as listed in this document and the adjacent pie charts, are in alignment with the new emphasis of USDA programs.

Likewise, together we traveled the state this summer, meeting with legislators and other key people. From them we heard loud and clear that the University of Vermont College of Agriculture and Life Sciences (CALS) and UVM Extension play a very important role in helping shape the future of Vermont, through farm viability programs, creation of value-added products and food systems research that builds the economy of communities. More than ever, CALS, VT-AES and UVM Extension are working closely together.

Douglas O. Lantagne
Dean and Director
University of Vermont
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