Wisconsin's Cooperative Extension

State Annual Report of Accomplishments and Results for the Agricultural Research, Extension and Education Reform Act (AREERA) for FY 2006

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National strategic goal 1: An agricultural system that is highly competitive in the global economy

Executive summary

Situation

Agriculture accounts for more than $50 billion in economic activity each year, provides 420,000 jobs, and generates 10 percent of Wisconsin's total income. At around $20 billion a year, the dairy industry contributes more than a third of that. Yet dairy profitability remains volatile, as marked in 2006 by lower milk prices and less milk produced than dairy processors needed.

As demands grow for milk quality and quantity, much of Wisconsin's dairy farm infrastructure is obsolete. Farmers are looking for affordable ways to increase efficiency and modernize to stay profitable. Wisconsin's $3.5 billion milk sales depend on adequate supplies of high quality forages and grains. As organic dairying grows to meet demand, so does the need for organic best management practices. Consumers demand high quality milk from healthy cows, and more are looking for organic labels. Dairy herds with chronic mastitis and other infections lose out on milk quality premiums, treatment costs, and milk that must be discarded — or cows that must be culled and replaced.

The permanent agricultural workforce is increasingly diverse. Spanish-speaking newcomers work year-round in dairy and horticulture, nurseries, greenhouses, landscaping and urban agriculture. Hmong and other recent immigrants raise fresh market vegetables, selling their produce through farmers' markets and regional cooperatives. Amish and Mennonite growers seek ways to incorporate research-based recommendations into their traditional practices. Farmers with disabilities are referred to UW-Extension for on-farm business planning help.

Extension response

During 2006, Wisconsin's Agriculture and Natural Resources Extension (ANRE) and Community, Natural Resource and Economic Development (CNRED) campus and county faculty and staff continued to address rural community priorities. Through statewide issue teams backed by University of Wisconsin research at Madison, Platteville, River Falls and Stevens Point campuses and agricultural research stations, ANRE and CNRED educators worked with colleagues and community partners in all 72 counties to help farmers and farm support professionals respond quickly to stay in business, safeguard animal health, communicate key concepts to Spanish-speaking dairy workers, counter

unusual weather and market conditions, and anticipate consumer needs in their neighborhood and around the world.

Impacts

A major issue facing Wisconsin agriculture is maintaining farm profitability and viability in a highly competitive global environment. While many statewide teams address this priority, statewide Dairy Team work groups report the following impacts of integrated research and extension education as well as multi-state and joint activities under National strategic goal 1 during FY 2006:

- **Dairy Modernization Work Group** improved productivity, labor efficiency and profitability through research-based education showcasing low-cost systems such as low-cost and retrofit parlors and milking systems, supporting small family farms through three new regional rapid response Dairy Modernization Planning Teams.
- **Dairy Team Cow Care Work Group** improved herd health, milk quality and profitability through the on-farm support of local milk quality teams, and with the statewide Dairy Team Hispanic Labor Work Group and Babcock Institute, improved bilingual dairy worker skills.
- **Hispanic Labor Work Group** improved bilingual Dairy Worker Training for regional and international Spanish-speaking dairy workers to help secure herd health, improve milk quality and production efficiency.

The Dairy Team also delivers statewide and multi-state educational programs working with the Livestock Team, Team Forage and regional grazing networks, Team Grains, Emerging Agricultural Markets Team and the Agriculture Innovation Center (includes the CNRED Entrepreneurship Team and Center for Community Economic Development), Farm and Risk Management Team and the national AgrAbility Program. The Dairy Team Land Use and Livestock Siting Work Group reports impacts with the Nutrient Management Team under National strategic goal 5: “Greater harmony between agriculture and the environment.”

National strategic goal 1 total expenditures FY 2006

(By percent of full-time equivalent and source of funding)

FTEs	Smith-Lever Act	
10.05 Integrated	$1,127,147	
1.80 Multi-State	$189,083	

Key Themes: Agricultural competitiveness, Agricultural profitability, Animal health, Animal production efficiency, Innovative farming techniques, Managing change in agriculture, Niche market, Managing risk, Small farm viability

Rapid response Dairy Modernization Planning Teams help small-scale family farms stay in business, improve productivity and profitability

Situation

Keeping Wisconsin's $20 billion dairy industry profitable and competitive is critical to rural economic development. With only half the farms of 20 years ago, Southwest Wisconsin dairies still fuel two-thirds of the region's economy. Even so, these producers could not provide enough milk for factories to run at capacity in 2006, requiring cheesemakers to buy milk from outside the state. Greater milk volume and quality are needed to maintain rural jobs, infrastructure and supports such as veterinary services, feed services and equipment suppliers.

Unlike western dairies, Wisconsin's are relatively small, owned and managed by up to 3 generations of family members. More than 10,000 Wisconsin dairies still milk in old-fashioned tie stall barns. Smaller family farms wish to maintain a herd size they can handle without off-farm labor. Staying in business means replacing or converting aging buildings. Yet reinvesting hundreds of thousands of dollars in a new parlor, freestall barn and manure handling system remains cost-prohibitive for those with a small herd, or too great a risk for those watching milk prices dip. A viable option for such farmers may be a low cost systems approach to dairy modernization with both low cost housing and milking systems.

Inputs

As farmers struggle to decide between changing their management, infrastructure and herd size or exiting the business, the statewide UW-Extension Dairy Team Modernization Work Group can help them make informed decisions to achieve their personal and business goals. For small-scale dairy and heifer producers who decide to stay in business, the Dairy Team provides educational materials and programs in English and Spanish on farmstead planning, adopting best management practices, assisting cows with calving, improving milking and calf management skills, specializing in a more profitable niche market such as grass-fed with managed rotational grazing, or modernizing the dairy with a more labor efficient system such as a low-cost retrofit milking parlor or freestall barn.

Agricultural and Natural Resources Extension campus and county faculty provide dairy modernization education through on-farm tours and pasture walks, dairy

meetings, one-on-one counseling, and on-line or CD-ROM. Educational Partners include UW-Extension county community resource development educators, UW-Madison departments of Dairy Science; Animal Science, Agricultural and Applied Economics; Biological Systems Engineering, agricultural research stations, Center for Dairy Profitability, Agriculture Innovation Center, Center for Community Economic Development, Babcock Institute for International Dairy Research and Development, Farm and Industry Short Course and School of Veterinary Medicine, UW-River Falls Survey Lab, AgSource Cooperative Services, technical colleges, the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), Wisconsin Department of Commerce, U.S. Department of Agriculture Farm Service Agency, Natural Resource Conservation Service and other farm service professionals. Producers are also referred to UW-Extension by lenders and farming with disability programs.

Southwest Wisconsin: To reverse the trend of declining milk production, in 2005 UW-Extension county agriculture agents Nolan Anderson (Dane), Vance Haugen (Crawford) and Mark Mayer (Green) joined Dairy Team Modernization Work Group leader David Kammel, state agricultural engineering specialist and director of the Center for Dairy Profitability (UW-Madison). Haugen initiated using the existing Dairy Modernization Planning Teams as on-farm rapid response teams to provide personal follow-up support. After farmers attend a daylong educational session on low-cost retrofitting or remodeling a barn into a milking parlor, they take home what they learned to apply to their farm. If they need more information, they can ask for rapid response Dairy Modernization Planning Team help. Two to four educators soon arrive to assess the operation and answer questions so the farmer can make timely decisions and take action.

Northern and Southeast Wisconsin: In 2006, two new rapid response Dairy Modernization Planning teams formed, serving Northern and Southeast Wisconsin producers. Providing decision-making support with local county educators, Kammel visited nearly 200 farms in 31 counties. Many of these consultations resulted from follow up discussions with owners after Dairy meetings held around the state the previous year. These discussions continue with Kammel and county educators as farmers make decisions, plan and proceed with dairy modernization projects.

The transition from a tie stall barn milking system to a labor-efficient freestall housing and parlor milking system hinges around housing options because of the large investment and long-term nature of these choices. In 2006, the UW-Madison Center for Dairy Profitability surveyed producers who expanded their herds at least 25 percent between 2001 and 2005 to learn which production practices they use most, to measure their satisfaction with modernization, and to compare responses with baseline results measured in 2000. This follow-up survey was funded by a grant from the Dairy Industry Revitalization project.

Outputs

The survey shows that in 2001, respondent's average herd size was 135 cows per farm, 240 in 2005 and projected to reach 395 by 2011. More than two-thirds (70%) said they expanded by using a combination of existing and new facilities. Sixteen percent made no modifications, and the rest (14%) built all new facilities. In both baseline and follow-up surveys, desire to increase profitability was listed most often as the reason to modernize. Labor efficiency increased in importance in 2005. Remodeled barns showed the same labor efficiency as completely new facilities — in effect, fewer workers are managing more cows. Farmers expressed most concern over the costs of modernizing. Of the financial incentive programs available from the state, the Dairy 2020 early planning grants were used most, followed by the Wisconsin dairy investment credit program, milk volume premium program, and the Grow Wisconsin Dairy program. The most common advice for others considering expansion was "Visit lots of farms."

Dairy modernization outreach scholarship includes:

Brannstrom, Arlin "Wisconsin Dairy Modernization Survey, 2006", University of Wisconsin, Center for Dairy Profitability, September 2006: http://cdp.wisc.edu

Holmes, Brian "Transitioning in Steps-Cost of Modernization" with David Kammel and Roger Palmer. University of Wisconsin, Biological Systems and Engineering, February 2005.

Kammel, David "Heifer Housing for Custom Raisers," University of Wisconsin, Biological Systems and Engineering, February 2005.

Kammel, David "Remodeled Parlors," University of Wisconsin, Biological Systems and Engineering, 2001.

Kammel, David "Remodeling a Tie Stall Barn for an Interim Milking Parlor," University of Wisconsin, Biological Systems and Engineering, 2003.

After attending an educational session in 2005, farmers with herds less than 200 cows requested rapid response Dairy Modernization Planning Team help in Buffalo, Crawford, Jackson, Price, Richland, Rusk, St. Croix, Sauk, Trempealeau and Vernon counties. In 2006, UW-Extension Green County agriculture Agent Mark Mayer provided area producers ongoing support through rapid response visits to 37 dairies in Green, Grant, Iowa, Lafayette and Richland counties in Wisconsin, and Stephenson County, IL. Mayer also organized a Dairy Modernization Tour of dairy farms that had recently modernized, reaching 115 producers from 12 counties and 2 states, plus a separate farm tour of manure management systems. Producers unfamiliar with new systems were able to visit with host farmers to see first hand how and why they modernized. Many farm visits resulted in farmers proceeding with construction of new and or remodeled designs based on continued input from state agricultural engineering specialist David Kammel and the county agent.

Impacts

Statewide: The UW-Extension Dairy Team Modernization Work Group helped 2,637 dairy producers consider modernization options and management practices during 2006. Improved dairy facilities, management and practices are increasing profitability and easing the backbreaking labor of milking cows. Overall impacts of FY 2006 low-cost dairy modernization educational programs include:

- 4,739 dairy producers attended a modernization program or tour sponsored by Extension.
- 2,637 dairy producers increased their knowledge on modernization options and management practices that may lead to improved profitability or productivity.
- 543 dairy producers determined their business viability.
- 257 dairy producers made a decision on a modernization option based on information and knowledge acquired from Extension, including low-cost parlors, heifer barns, and cow freestall barns.

Southwest Wisconsin: As a result of Dairy Team education and on-farm support:

- Producers saved an average $30,000 per milking parlor by using low cost approaches over buying off the shelf turn key parlors, and continue in the business at a profitable level.
- Producers modernizing in 2005 reported they would have chosen to exit the business had they not been made aware of these low cost alternatives.
- 16 Green County dairy producers modernized their milking and housing systems and expanded their herd size by an average 78 cows. This expansion resulted in 1.63 million pounds more milk produced in the region, helping keep local cheese plants operating during 2006.
- All dairies modernizing were able to increase labor efficiency, cow comfort and herd health, which resulted in higher production per cow, lower somatic cell counts, and premium payments for improved milk quality.

Northeast and Eastern Wisconsin: To link farmers wishing to enter the dairy business with those planning to retire, Manitowoc County dairy agent Scott Gunderson and Tyler Radke, USDA Farm Service Agency, initiated the regional Lakeshore Area Network for Dairy (LAND) Program based on DATCP's statewide Farm-Link program. The first five matches equate to about 400 dairy cows still being milked on farms that otherwise may have left for good. According to UW-Extension researchers, these 400 cows each contribute more than $15,000 per year to the economy —keeping $6 million flowing through the region.

Results are documented from Dairy Herd Improvement Association records and producer testimonials. Both producers and third-party evaluators such as milking equipment installers indicate that they value the work of UW-Extension — from assessing and addressing emerging needs through follow-up on-farm support. In 2006, this model of small-scale dairy farmstead transition to a viable low-cost labor-efficient system reached globally via email and phone contacts with David Kammel from throughout North America and the European Union.

Key Themes: Agricultural profitability, Animal health, Small farm viability; Other: Under-served and under-represented population (Spanish-speaking workers)

Milk quality teams increase profitability throughout the dairy community

Situation

Consumers demand milk produced under the most hygienic standards from healthy cows. Global dairy trade also depends on high quality milk. As consumer demand increasingly guides animal management practices, understanding milk quality is key to meeting evolving consumer expectations. High quality milk appears white, has no objectionable odor, and is free of pesticides, added water or antibiotic & antiseptic residues.

Mastitis infection is the most costly disease of dairy cattle, reducing the amount of protein in milk, cheesemaker yields, shelf life of dairy products, palatability, and dairy farm income. Treating mastitis and discarding the milk — or involuntarily culling the cow from the herd — can cost farmers dearly. In most developed dairy countries, milk quality is measured by the somatic cell count, and the bacterial count (“standard plate count” or SPC) in pre-pasteurized bulk tank milk. Somatic cells are mainly white blood cells that function as early warning signals when bacteria such as those causing mastitis invade the udder.

Producing high quality milk is essential for profitability throughout the dairy business community. Commercial buyers consider milk containing less than 200,000 somatic cells per milliliter (SCC/ml) “good” quality. Cheesemakers get higher yields and processing plants pay an incentive premium for top quality milk from healthy cows. While a specific management prevention plan has been recommended by the National Mastitis Council for three decades, producers find this plan hard to implement without professional on-farm support.

Inputs

The statewide UW-Extension Dairy Team Cow Care Work Group, UW-Madison Dairy Science Department and the Wisconsin Milk Marketing Board help dairy producers establish local milk quality teams, pulling together appropriate professionals to assess and address an individual producer's milk quality problems. The producer often initiates this process through the local UW-Extension office. UW-Extension county dairy and agriculture agents work with producers, veterinarians, nutrition consultants, experts on housing and milking equipment, farm service professionals and others to develop a comprehensive approach to improving milk quality.

The team meets regularly at the dairy farm for 4 months to identify causes of the milk quality problem, consider solutions, recommend preventive management practices and evaluate progress. This process builds on the research and Milk Money Program education of state milk quality specialist and veterinarian Dr. Pamela Ruegg (UW-Madison / Extension). As organic dairy products edge toward 5 percent of the market, Dr. Ruegg and her colleagues are studying how mastitis detection and treatment differs between traditional and organic herds. The researchers are also studying antibiotic-resistant bacteria in cows being treated, what boosts a cow's ability to fight off disease pathogens, and assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

Outputs

UW-Extension Dairy Team educational materials are developed in English and Spanish with translators in the UW-Madison Dairy Science Department and Babcock Institute for International Dairy Research and Development, so more dairy workers can learn preventive best management skills (see the report that follows). The *Dairy Partner/El Companero* newsletter provides ongoing information for dairy employees. Milk Money Program research and bilingual educational materials are available online at: http://www.uwex.edu/milkquality

Outreach scholarship includes:

Hoe, F. G. H., L.K. Fox, W. E. Owens, Y.H. Schukken, and P. L. Ruegg. Relationship between MIC of Staphylococcal isolates obtained from mammary glands of dairy heifers and outcomes of prepartum mastitis treatments. 2005 Proc. NMC, pp 231-232.

Hoe, F.G.H., and P. L. Ruegg. 2005. Relationship between antimicrobial susceptibility of clinical mastitis pathogens and treatment outcomes. *Journal of American Veterinary Medicine Association* 227:1461-1468.

Pol, M. and P.L. Ruegg. 2006. Defined daily dose to estimate antimicrobial usage on dairy farms. 2006 Proc. NMC, pp 246-247.

Pol, M. and P.L. Ruegg. 2006. Relationship between reported antimicrobial usage and phenotypic antimicrobial susceptibility of mastitis pathogens. 2006 Proc. NMC, pp 304-305.

Pol, M., C. Hulland and P.L. Ruegg. Antimicrobial susceptibility of mastitis pathogens isolated from multiparous cows. 2005 Proc. NMC, pp 275-276.

Impacts

Local milk quality teams are building capacity among farm service professionals who provide ongoing support for preventive mastitis management. As a result, producers are adopting best management practices such as performing bulk tank cultures; culturing for clinical mastitis; keeping better treatment records; developing standard, written milking routines; wearing gloves during milking; consulting with dairy professionals and using team management — and they are taking bigger milk checks to the bank. As milk quality improvements continue, the Wisconsin Milk Marketing Board can promote more top quality dairy products worldwide.

Statewide: On average, the 113 dairies working with UW-Extension Milk Money teams each decreased their herd's clinical mastitis cases and improved monthly milk income by more than $1,000 due to increased quality incentive payments. These families received a total $116,730 more per month — about $1.3 million a year if improvements continue. In 2006, impacts of statewide UW-Extension research-based milk quality education included:

- 2,058 dairy producers and farm service professionals learned strategies to better manage their dairy operations.
- 422 dairy producers changed their operation to improve milk quality.
- 294 Spanish-speaking dairy employees improved their knowledge and skills in milking technique, herd health, feed mixing and delivery.
- 276 Spanish-speaking dairy employees now understand the need for better milking hygiene, improved feed bunk management and estrus detection.
- As of year-end 2006, more than 430 farms have participated in the Milk Money team process in Wisconsin.

Central Wisconsin: Marathon County agriculture agent Maria Bendixen is working with local milk quality teams on five dairy farms with mastitis problems. Calculating losses from milk quality premiums, milk production and treatment costs, Bendixen found significant income losses due to mastitis on all five farms.

Identifying the type of mastitis on each farm helped teams develop action plans for preventive best management practices. While three farms are still in process, all herds improved milk quality and two reported improved herd health and profitability in 2006:

- A 150-cow herd completed the Milk Money Program after 4 meetings with somatic cell counts reduced from 430,000 to 205,000 SCC/ml and clinical mastitis cases cut from 20 to 3 per month, netting increased milk price premiums and decreased milk losses valued at $3,428 per month.
- A 175-cow herd reduced somatic cell counts from 400,000 to 230,000 SCC/ml, and cut clinical mastitis cases from 28 to 8 per month. After completing the Milk Money Program, this farm gained an extra $3,302.50 per month in milk quality premiums.

Northern Wisconsin: needing ideas on feed and manure storage; a Burnett County couple and their 3 sons received on-farm dairy modernization counseling from state agricultural engineering specialist David Kammel and area educator Otto Weigand (Spooner Agricultural Research Station). The family built a new feed storage pad and want to expand the herd with new freestall and special needs barns. To help improve milk quality in their 350-cow herd, Wiegand facilitated a Milk Money team through seven meetings, including a session on financial benchmarks. Preliminary results after the first 4 Milk Money meetings show that the family profited over $10,000.

Key Themes: Agricultural profitability, Animal health; Other: Under-served and under-represented population (Spanish-speaking dairy workers and managers)

Bridging the communication gap through bilingual dairy skills trainings

Situation

As dairy producers update their barns and milking facilities and add more cows to their herds, they need consistent, reliable employees trained in modern dairy practices. Many dairy workers on Wisconsin farms are from Mexico and Central America and may not speak much English. A survey conducted by UW-Extension found that 38 percent of dairy farmers hired translators to communicate with their Spanish-speaking workers, 24 percent used Spanish-speaking employees to train new workers, and 19 percent used hand signals to train and communicate with Spanish-speaking workers.

Disease management is a constant challenge for dairy and heifer producers raising calves. Scours and respiratory disease are the two most common causes

of death in wet calves, accounting for more than 80 percent of all deaths. Among producers remodeling facilities to provide housing for wet calves, the impact of air quality and ventilation on calf respiratory disease has become a concern.

Inputs

Led by Outagamie County dairy and livestock agent Zen Miller to help dairy and heifer producers communicate critical management and disease-prevention concepts, the UW-Extension statewide Dairy Team Hispanic Labor Work Group now offers four bilingual training modules in Spanish and English for developing milking, reproductive care, calf management and herdsmanship skills among Wisconsin, Upper Midwest and international dairy workers. The training modules are effective for individual farm trainings or group meetings. Generally, an instructor and a translator provide the training and hands-on activities for small groups on a working dairy farm.

Comprehensive teaching materials include bilingual instructions on how to conduct trainings, digital slide sets with voiceover describing the importance of a specific skill, speaker notes, handouts, certificates of completion, and evaluation forms for participants and employers. The teaching materials are available in print and on CD-ROM and easily tailored to specific training needs. An additional training curriculum, available on DVD, provides a step-by-step approach to conducting fresh-cow exams. Bilingual educational materials are developed with the Babcock Institute for International Dairy Research and Development, UW-Madison School of Veterinary Medicine, and UW-Extension Distance/Education Digital Media staff under a U.S. Department of Agriculture Dairy Industry Revitalization grant.

UW-Extension Sheboygan County agriculture agent Tina Kohlman developed the module design and format, managed the electronic files, and pilot-tested trainings to improve the modules. In 2006, she led the curriculum development team creating Dairy Worker Training Module 3: Calf Management Skills to teach dairy workers ten best management practices for calf care. For this bilingual training, Kohlman wrote a self-playing digital slide presentation with voiceover and companion fact sheets, and designed and developed a set of eighteen laminated, industry approved calf protocol cards to demonstrate and teach the skills dairy workers need to process a newborn calf, identify a sick calf, and conduct daily calf care tasks.

Outputs

Bilingual training modules 1 and 2 were presented at the Four-State Dairy Conference in June 2006, and have been adopted by Illinois, Iowa and Minnesota. Since fall 2005, more than 200 modules in the form of binder or CD

have been sold or distributed to educators and dairy producers in the Midwest and South America. Thirty-two fresh cow exam DVDs have also been sold.

Dairy Worker Training Module 3: Calf Management Skills was launched in October 2006 at World Dairy Expo, and will be shared with 2007 Four-State Dairy Conference participants. Since introduced to the public, 70 bilingual calf management skills training modules have been distributed to dairy producers and educators. Sixty-three sets of calf care protocol cards have been sold, with more distributed to dairy workers at trainings.

With Doug Sutter and Jenny Vanderlin of the UW-Madison Center for Dairy Profitability, Outagamie County dairy and livestock agent Zen Miller compiled a list of other educational resources also available in English and Spanish: http://www.cdp.wisc.edu/PDF/Hispres.pdf

Eastern Wisconsin: As farms grow and employ more workers, dairy and heifer producers are running farms more like businesses, developing standard operating procedures and protocols to assure that the job is getting done right. With financial support from AllTech-Wisconsin, the Eastern District Dairy Team developed an educational program on disease management and prevention for baby calves. The annual meeting “Start ‘Em Right…Raise ‘Em Right” Calf Management Seminar drew 65 attendees in 2006. The 42 post-meeting evaluations returned indicate that participants included 10 custom calf growers raising more than 5,500 heifers; 8 producers milking more than 2,000 cows; 12 dairy workers; and 10 industry professionals.

Impacts

Increased skills and knowledge: Since 2004, nearly 500 Spanish-speaking dairy workers have attended trainings on milk quality, reproduction, calf care and assisting cows with calving. Evaluation results show that participants made large gains in skill level and knowledge (reported under impacts of local milk quality teams, above). Bilingual trainings help transcend communication barriers to the benefit of both English-speaking employers and Spanish-speaking workers. In the words of one employer:

> “The two gentlemen I sent [to a bilingual training session] came home quite enthused and quoted verbatim all the things that I have been trying to teach them about calves through the years.” — Dairy producer

Pre- and post-test results from six bilingual dairy skills trainings in 2006 show that the 91 respondents increased their knowledge and understanding of 8 best management practices by 1.3 points on a scale of 1 to 5, and ranked the training 8.3 on a scale of 1 to 10. With the success of these trainings, the curriculum development team plans to create bilingual modules on driver and machinery safety and animal handling, a video to compliment the calf management protocol

cards, and a monthly newsletter for Spanish-speaking Dairy Workers on skills and information provided in the trainings.

Regional and international use: Bilingual training modules 1 and 2 are used in the neighboring states of Illinois, Iowa and Minnesota, and in the Czech Republic, Mexico, Nicaragua, Ecuador and Peru. The new bi-lingual Dairy Worker Training Module 3: Calf Management Skills has also been translated into Chinese and Romanian to help train workers in those countries.

Evaluation of the success of multi-state and joint activities

Key Themes: Adding value to new and old agricultural products, Bio-based products, biofuels, New uses for agricultural products, Niche markets

Fostering community support for entrepreneurs and strengthening regional capacity for adding value to agricultural commodities

Situation

From the farmer making goat milk soap for a premium price to a 500-member ethanol cooperative, agricultural producers are venturing into value-added agriculture to increase farm income and diversify their risk. With the record spike in petroleum prices in 2006, many in the agricultural community are taking interest in "bio-based" ventures such as bio-diesel, cellulosic ethanol, anaerobic digestion, biomaterials, and various biotechnologies. While these projects offer hope for the long-term viability of the agricultural industry, moving them forward will require significant capital investment.

Inputs

To help extension partners provide a coordinated effort to support new entrepreneurs, USDA funded a three-state collaboration to train extension educators, agency staff, and consultants on agriculture value-added education. With USDA funding through a joint project with Michigan State University and Ohio State University, UW-Extension and the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) trained 26 agriculture innovation counselors.

The Agriculture Innovation Center (AIC) opened for business in January 2005 with added financial and technical support from the new Wisconsin Entrepreneurs Network (WEN) and Wisconsin Department of Commerce. WEN integrates 50 organizations, including thirteen Small Business Development Centers that support entrepreneurs in starting or expanding a business, developing a product or service, finance and accounting, marketing and more. AIC co-directors Greg Lawless and Greg Wise, community economic development specialists (UW-Madison / Extension) coordinated certification and professional development trainings for the 26 new Agriculture Innovation Counselors, many of whom are statewide Emerging Agricultural Markets Team members. AIC provides access to WEN resources through these certified counselors who understand agriculture and establish trusted relationships with farmers at the local level.

Both Wise and Lawless serve as capacity-building advisors to Badger AgVest's Board of Directors by directing them to qualified legal experts and introducing them to the world of angel investment. With a grant from UW-Extension's Emerging Agricultural Markets Team, Badger AgVest leaders attended an intensive training on angel investing. "Angel Networks" bring together individuals of wealth who share similar investment goals and who combine their knowledge to locate and evaluate promising opportunities.

Outputs

To assess farmer interest and learning needs, in spring 2006 Dr. David Trechter (UW-River Falls) and AIC's Greg Lawless sent a follow-up questionnaire to 788 Wisconsin farmers who had completed the 2004 Agricultural Resource Management Survey (ARMS) administered by the National Agricultural Statistics Service. ARMS gathers detailed production and financial data on a statistically representative cross-section of Wisconsin's farms. The follow-up survey sought information about farmers' recent off-farm investments, their interest in various agriculture-related opportunities, their propensity to invest in such projects, and their educational needs for making sound investment decisions. A draft report of survey results is published online at:
http://aic.uwex.edu/documents/2006FarmerInvestmentSurvey-DraftReport.pdf

With DATCP partners and Badger AgVest, LLC, Lawless developed a one-day conference that offered educational programming with presentations by four companies seeking outside investment in agriculture-related projects. The December 2006 conference drew more than 200 participants, and it appears that Badger AgVest will develop an investment vehicle to facilitate its members' financial participation. Badger AgVest does not recommend these investments, but does provide information so individuals can make their own educated decisions. Led by Greg Wise and Jeff Hoffman, the Entrepreneurship Team and UW-Madison Center for Community Economic Development colleagues are

building statewide capacity to improve the skills of individual entrepreneurs, foster a community environment supportive of entrepreneurs, and develop entrepreneurship indicators.

Outcomes and impacts

Strengthening regional capacity: Badger AgVest has approached UW and DATCP to develop regional programs in 2007. Greg Wise is also serving as liaison to the Extension Community of Practice on Entrepreneurship, and is planning a regional conference with the North Central Rural Development Center and its member states on entrepreneurship as a community economic development strategy.

FY 2006 participation: Greg Wise *** fte and Greg Lawless 0.15 fte

Key themes: Agricultural profitability, Animal health, Biosecurity

New regional dairy steer conference devotes education to raising, managing and marketing Holstein steers

Situation

The Upper Midwest has a large number of Holstein steer feeders and an industry to support this enterprise. Yet a regional conference devoted to raising, managing and marketing dairy steers had not been held since 1991.

Inputs

In late 2005, UW-Extension state beef cattle specialist Jeff Lehmkuhler helped reestablish multi-state dairy steer education. A partnership of the North Central Regional Feedlot Committee, university extension faculty and industry professionals from Wisconsin, Minnesota, Iowa, Illinois and North Dakota developed a conference held in Minnesota in November. About 300 participants attended the conference from 21 states and Canadian provinces. More than thirty educators presented research results and best management practices on wet calf nutrition, health and housing, growing/finishing management, and economic considerations of feeding Holstein steers.

Outputs

A 300-page book of proceedings was edited by Dr. Hugh Chester-Jones (University of Minnesota), and 500 copies were distributed.

Evaluation plan: A follow-up survey was sent to a random sample of conference participants, and results are being analyzed.

Impacts

The new Upper Midwest Dairy Steer Conference allowed 300 attendees to gain information specifically for raising, managing and marketing Holstein steers, which had not been possible through a regional or national forum since 1991.

FY 2006 participation: Jeff Lehmkuhler 0.50 fte

Four state dairy educators adopt bilingual Dairy Worker Training modules 1 and 2— Wisconsin, Minnesota, Iowa and Illinois— concluded another successful programming year, featuring applied dairy nutrition and management research. The focal point of these efforts is the 4-State Applied Dairy Nutrition Conference in Dubuque, Iowa. More than 400 dairy industry and academic professionals attend this professional development offering. Wisconsin state beef cattle specialist Jeff Lehmkuhler re-established the Four-State Dairy Steer Conference (reported above), and the first annual meeting with Wisconsin, Minnesota, Iowa and Illinois was held in 2006.

Impacts

In 2006, Illinois, Iowa and Minnesota adopted Wisconsin's bilingual Dairy Worker Training modules 1 and 2 on milk quality and reproductive care best management practices (see the full report under integrated research and extension, above)

FY 2006 participation: Bob Kaiser 0.70, Jeff Lehmkuhler 0.50 fte, Randy Shaver 0.10 fte. Zen Miller 0.60

Key Themes: Agricultural profitability, Grazing, Organic agriculture, Small farm viability

Regional financial benchmarks help grazing dairy farm families manage their herds and pastures profitably

Situation

Dairy and livestock acres under managed intensive rotational grazing are increasing in the Great Lakes region, and graziers are seeking financial benchmarks for managing their herds and pastures profitably.

Inputs

The Great Lakes Grazing Network Grazing Dairy Data project is an ongoing effort to gather financial data on grazing dairy farms under different management practices. It was initially sponsored by USDA Initiative for Future Agricultural and Food Systems (IFAFS) Grant project #00-52101-9708. Since 2000, data have been collected in 10 states and 1 Canadian province from more than 200 participating dairy farms that obtain 85 percent or more of their gross income from milk sales (or 90 percent from combined dairy livestock and milk sales), harvest more than 30% of seasonal forage by grazing, and provide fresh pasture at least every three days.

Project leaders include Jim Endress (Illinois), Larry Tranel and Robert Tigner (Iowa), Ralph Booker and Ed Heckman (Indiana), Sherrill Nott, Bill Bivens, Phil Taylor and Chris Wolf (Michigan), Margot Rudstrom (Minnesota), Tony Rickard (Missouri) Jim Grace (New York), Thomas Noyes and Clif Little (Ohio), Jack Kyle and John Molenhuis (Ontario, Canada), J. Craig Williams (Pennsylvania), lead author Tom Kriegl and Gary Frank (Wisconsin).

Outputs

Project reports are also based on work supported by Smith Lever funds from the USDA Cooperative State Research, Education and Extension Service. Reports, fact sheets and financial benchmarks are published on the UW-Madison Center for Dairy Profitability web site: http://www.cdp.wisc.edu/Great%20lakes.htm

- A comparison between the more profitable half and the less profitable half of graziers sorted by Net Farm Income from Operations per Hundredweight Equivalent (NFIFO per CWT EQ) shows a large range in financial performance. The ratio between the top half and the bottom half

NFIFO per CWT EQ and NFIFO per cow was greater in the lower profit years (usually with lower milk price) than in the higher profit years.

- The average grazing herd with less than 100 cows had a higher NFIFO per cow and per CWT EQ than the average grazing herd with 100 cows or more. The smallest margin appeared in the 2003 data.
- Non-seasonal calving/milking herds had a large NFIFO per cow and per CWT EQ advantage in 2000 and 2002. The seasonal herds (stop milking at least one day each calendar year) had a large NFIFO per cow and per CWT EQ advantage in 2001 and 2004 and a very small advantage in 2003. Careful examination of the data suggests that achieving a given level of NFIFO per cow or per CWT EQ is more difficult in a seasonal system. The seasonal group had a smaller range of financial performance within a year but experienced more variability of financial performance from year to year. Less than 15 percent of the herds in the data were seasonal.
- The average grazier had a higher NFIFO per cow and NFIFO per CWT EQ than their confinement counterparts in all years in New York and Wisconsin (the only two states with the necessary data for this comparison), except in 2004, when the average New York confinement herd had a slightly higher NFIFO per cow than the average New York grazier.
- The breed of cattle is probably a minor factor among the many variables affecting the profitability of dairy farms. However, because it is an easily recognized variable and one of great producer interest, the profitability of herd by breed was examined. Herds categorized as Holstein had higher levels of NFIFO per cow four consecutive years and NFIFO per CWT EQ three consecutive years than herds of other breeding.
- Relatively consistent differences in financial performance between states have appeared in all years. These differences must be considered when interpreting the data.
- The ranking of major cost items is remarkably similar between grazing and confinement herds.

The study confirms that accounting methodology and financial standards are important—both in the accuracy and standardization of comparison values across large geographic areas involving different combinations of production assets and management skills.

Impacts

Some strengths of this work include standardized data handling and analysis procedures and the combined actual farm data of ten states and one province. This provides financial benchmarks to help farm families and their communities be successful and sustainable. Using the Farm Financial Standards Guidelines (revised December 1997) with Agricultural Financial Advisor (AgFA) software opens the door to standardized multi-state analysis of other enterprises for which data can be collected. Some data have been collected from organic dairy farmers and custom heifer raisers, and project leaders plan to seek additional data and enterprises.

FY 2006 Participation: Tom Kriegl 0.60 fte

Four-state livestock research and education: Wisconsin, Minnesota, Iowa and Illinois initiated regional annual professional development meetings in 2004. Statewide extension specialists and county agents formed beef and swine subteams to share new regulatory information, research results and educational materials, provide educational programming on beef and swine for producers and industry professionals, and plan further work. Program leaders from the four states facilitate planning.

FY 2006 Participation: Rick Klemme 0.15 fte and Jeff Lehmkuhler 0.50 fte

Wisconsin and Minnesota Ag Engineering Newsletter was published quarterly, reaching professional agriculture engineers, county agriculture agents and others. The newsletter has been a successful venture connecting colleagues from both states, saving time and resources.

FY 2006 participation: Brian Holmes 0.50 fte, David Kammel 0.70 fte
Ron Schuler 0.50 fte, Doug Reinemann 0.05 fte

Minnesota Beef School is a distance education program that reaches into Wisconsin. Three Wisconsin agriculture agents advise about 40 Wisconsin participants in the Minnesota Beef Schools correspondence course. UW-Extension Marquette County agriculture agent Keith Vander Velde wrote a chapter for the course on Beef Reproductive Health Management.

FY 2006 participation: Mahlon Peterson 0.25 fte, Rhonda Gildersleeve 0.30 fte, Keith Vander Velde 0.30 fte

Key Theme: Biotechnology

Agricultural biotechnology education: A consortium consisting of Extension and Research faculty and staff in Iowa, North Dakota, South Dakota, Minnesota and Wisconsin are integrating research, extension, and education activities to address economic, social and ethical issues associated with agricultural biotechnology. The research portion of the project examines determinants of product adoption, consumer behavior, industry response, product regulation, intellectual property rights, values influencing consumer and producer decisions, and producer and consumer attitudes toward acceptance or rejection of agricultural biotechnology. Findings are being used in developing extension and educational materials for diverse audiences to help them understand the benefits and risks associated with agricultural biotechnology.

FY 2006 participation: Ken Smith 0.10 fte, Brad Barham 0.10 fte, Tom Zinnen 0.05 fte

National strategic goal 1

Evidence: Campus and county-based faculty and staff report their work against expected outcomes through Cooperative Extension's Planning and Results System (PRS). They also submit more detailed success stories of their work for the PRS database and integrated research reports for USDA's CRIS database.

Dr. Pamela Ruegg (UW-Madison / Extension) has implemented an independent reporting mechanism to monitor the progress and capture the results of local Milk Money teams. These results are entered in Cooperative Extension's Planning and Results System (PRS) and are summarized through various reports: http://www.uwex.edu/milkquality

National strategic goal 2:

Enhanced economic opportunity and quality of life for rural Americans

Executive summary

Situation

Research shows that children and teens engaged in positive youth development do well in school, establish healthy outside interests, develop basic life skills, take responsibility, avoid risky behaviors, and are more likely to become productive adults. Two recent statewide studies measured how participants benefit from UW-Extension 4-H educational programs, and which practices offer most promise for positive individual and social development.

Extension response

In 2006, statewide 4-H education reached 263,800 Wisconsin young people with activities to gain confidence, competence and self-reliance and contribute to their communities. Backed by university research, UW-Extension county 4-H Youth Development educators design experiential, leadership and citizenship programs delivered through 20,000 trained volunteer mentors and advisors. County agents serve as organizers, educators, facilitators and evaluators for 120 community partnerships that expand opportunities for meeting a wider range of youth needs. Educational materials engage these partners in preparing youth to achieve their full potential as successful adults. County 4-H program advisors work with county educators to coordinate 18 Teen Courts supported by UW-Extension.

Local clubs led by youth are at the heart of 4-H youth development education, and are being integrated into new after-school programs. In 2006, 7,250 4-H clubs and groups provided safe, supportive environments for youth of all ages — from kindergarten to high school— to learn through their own accomplishments, practice problem solving and decision-making in real world settings, take leadership in their peer groups and as full partners with adults. Four essential elements vital to positive youth development frame 4-H educational programs:

Mastery — Youth feel competent, develop self-confidence, experience success, act responsibly and teach others what they have learned.

Independence —Youth influence others through decision-making and action, master skills to make positive life choices, solve problems and resolve conflicts.

Belonging — Youth know they are cared for by others, feel connected with a larger community, and contribute effectively to decision-making.

Generosity — Youth feel their lives have meaning and purpose, teach and inspire younger members, and positively influence their communities.

Through community 4-H clubs and new after-school programs, 4-H extends its positive youth development reach all across Wisconsin. This approach supports family, school, home school and community groups in helping youth succeed. Recent statewide evaluations of the UW-Extension 4-H animal science and arts and communication programs found positive results in all four Essential Elements of positive Youth Development. The 4-H focus on mastery encourages youth to pursue projects in depth — developing strong technical know-how, creativity, and communication skills. Arts and communications have the most powerful impacts in Mastery and Independence — especially among experienced teens — and strengthen participants' sense of Belonging and Generosity as they develop relationships with supportive local artists and help younger members.

Impacts

A 2006 study shows that mixed-age participants in 86 4-H arts and communications projects build strong technical know-how, confidence and self-esteem. Younger children use feedback from project leaders and fair judges to improve their work. Experienced youth report they value teaching younger members, working with supportive adults, challenging themselves and trying new things: http://www.uwex.edu/ces/pdande/evaluation/evalstudies.html

For 2006, the Youth Voices in Community Action and Governance Team reports the impacts of 19 UW-Extension-supported Teen Courts, Wisconsin's role in forging the new National Association of Youth Courts, and multi-state evaluation of the national Youth in Governance Initiative. The Building 4-H After-School Programs Team reports the new 150-partner Wisconsin Afterschool Network supporting quality after-school programs for all youth.

National strategic goal 2 total expenditures FY 2006

(By percent of full-time equivalent and source of funding

FTEs	Smith-Lever Act	
0.20 Integrated	$15,670	
0.50 Multi-state	$49, 131	

Key themes: Character ethics, Communication skills, Leadership training and development, Youth and adult workforce preparation, Youth development 4-H

Letting creativity flourish — 4-H Arts and Communication Program

Situation

To “put the culture back in agriculture” during the Great Depression, UW-Madison College of Agriculture Dean Chris Christensen created a rural arts program offering workshops and exhibitions. Now, UW-Extension 4-H youth development educators in all 72 counties offer 86 projects in visual, performing, and communication arts such as photography, drawing, painting, music and acting. This is among the largest areas of 4-H project enrollment, reaching 19,070 youth in 2006.

Research shows that young people in arts courses have better grades and attendance, score higher on the SAT college entrance exam, and are more active in their communities. Other studies show that low-income youth in the arts do better in school and improve their self-confidence, communication and conflict resolution skills. State administrators and county educators wanted to know how participants benefit from 4-H arts and communication projects, and which practices offer most promise for positive individual and social development.

Inputs

At the heart of 4-H, trained volunteer leaders share their expertise with youth in local clubs. Statewide, 4-H arts curricula address the creative interests of elementary, middle and high school youth who choose their own activities and devote the time and effort needed. Children too young for animal projects often enter 4-H through the arts, developing skills by preparing projects for county fairs, displaying their work, and getting feedback from judges. Talented high school artists and performers study with adult advisors and work at an advanced level with the state Arts Team, Press Team, Drama Company or Showcase Singers, teaching and inspiring younger members as well.

In 2006, UW-Extension campus and county educators led by 4-H Arts and Communication state Specialist Tim Talen conducted a statewide study to determine the value of 4-H arts and communications. From a sample of mixed-age youth from 44 counties enrolled in one or more projects for at least 3 years, 743 provided their perspectives by completing a survey. Another 82 youth, parents and 4-H alumni provided insights through interviews.

The 2006 evaluation team included Matthew Calvert, Paula Huff, John Klatt, Robert Matysik, Emma Pohl, Brianna Stapleton, Timothy Talen, Ellen Taylor-Powell, and Peter Welch. The Qualitative Data Collection and Analysis Team included Barb Barker, Carolyn Belczyk, Walter Hitt, Kandi O'Neill, Charles Prissel, Matthew Calvert and Ellen Taylor-Powell. To measure expected program outcomes, evaluators chose the four essential elements of positive youth development — Mastery, Independence, Belonging and Generosity. Research shows that youth engaged in positive youth development do well in school, establish healthy outside interests, develop basic life skills, take responsibility, avoid risky behaviors, and are more likely to become productive adults.

Outputs

The evaluation study shows that 4-H Arts and Communication Program participants build strong technical know-how, confidence and self-esteem. Younger children use feedback from project leaders and fair judges to improve their work. Experienced youth report they value teaching younger members, supportive relationships, challenges and trying new things — letting their creativity flourish.

Findings are published in the *Wisconsin 4-H Youth Development Arts and Communication Program Evaluation Final Report* by Matthew C. Calvert and Ellen Taylor-Powell, University of Wisconsin-Extension Cooperative Extension, Madison, Wis., November 2006: http://www.uwex.edu/ces/pdande/evaluation/evalstudies.html

Impacts

The study shows that the 4-H Arts and Communication Program provides participants a supportive and nurturing environment in which to explore creativity, take risks, and assume leadership. Alumni describe how this environment, along with feedback from mentors and judges, enhanced their skills and career prospects. Participants report positive results in all four Essential Elements of Youth Development. Arts and communications have the most powerful impacts in Mastery and Independence — especially among state team members — and strengthen participants' sense of Belonging and Generosity as they develop relationships with supportive local artists and help younger members.

Mastery — Youth pursue projects in depth — developing strong technical know-how, creativity, and communication skills. As a result of participating:

- 88% of project participants and 91% of state team members responding are comfortable doing creative activities, while 73% in projects and 91% on teams feel confident expressing themselves creatively.

- 83% in projects and 92% on teams increased their technical skills in visual, performing and communication arts.
- 82% in projects and 92% on teams know how to prepare an arts or communication demonstration.
- 77% in projects and 94% on teams are comfortable helping younger or less experienced people with projects, and nearly as many (72% and 88%) are comfortable discussing their work with judges or critics.

Independence — Youth choose their own projects, explore new ideas and pursue their own interests, building autonomy, self-esteem and self-confidence:

- 76% of project participants and 88% of state team members responding to the survey report that they developed motivation to do their best.
- 74% in projects and 94% on teams improved their self-esteem and feel good about themselves.
- 69% in projects and 85% on teams solved problems on their own, and about the same (68% and 88%) feel they can handle difficult situations.

Key themes: Character ethics, Communication skills, Leadership training and development, Youth and adult workforce preparation, Youth development 4-H

Hearing misdemeanor cases of their peers — Teen Court

Situation

ʃʃUp to two-thirds of Wisconsin teenagers who get in trouble with the law become repeat offenders — back in juvenile court again before they become adults. In Wisconsin, UW-Extension county 4-H Youth Development educators, 4-H program advisors and community partners are nurturing Teen Courts so first-time offenders can appear before a jury of their peers. Studies show powerful benefits to both youth and their communities when young people take on meaningful civic roles such as serving in Teen Court.

Inputs

Teen Court is a national program for first time juvenile offenders under 16 years of age. Youth in grades 6 to 12 also participate in the program as jury panel members who determine a fair and restorative sentence or sanction for the youth respondent (offender). Led by UW-Extension Vilas County youth development

educator Nancy Anne Livingston, UW-Extension campus and county 4-H faculty play a major role in promoting and developing new Teen Courts statewide, training youth to serve on jury panels, and supporting them with educational resources. Youth development agents also provide educational programs and materials in dozens of other communities, and more Teen Courts form every year. UW-Extension sponsors 10 of the 42 Teen Courts at work in Wisconsin, and supports another 8. In 2005, the 18 extension-supported Teen Courts reported 560 youth volunteers trained as jurors and 89 adult volunteers trained as supervisors. To successfully engage youth in Teen Court programs, county 4-H youth development educators draw on their knowledge of adolescent, adult, organizational and community development. The county 4-H Youth Development Program Advisor serves as the Teen Court Coordinator.

Columbia County: After community partners including 4-H youth development educator Karen Nelson laid several years of groundwork, Columbia County Teen Court held it's first training of volunteers in 2004. Throughout 2005 into early 2006, partners developed the court's operational framework, approved by the Columbia County Juvenile Justice Committee. The Portage Police Department received approval to refer juvenile misdemeanor cases directly to Teen Court during 2006, as other police departments plus the county sheriff's office sought approval to offer Teen Court as an option for first time offenders.

With increasing law enforcement interest and community encouragement, the partners developed new components to enhance the Teen Court experience for young people choosing to participate. First, Teen Court respondents who become volunteers are invited to participate in an Association governed by youth volunteers to help facilitate the Teen Court program. As a group, they elect a board of directors and recommend program changes. Association members meet quarterly to review training procedures, sentencing options, rules and guidelines, then recommend program revisions to the Juvenile Justice Committee. Volunteers also participate in annual focus group sessions to provide input to the Columbia County Teen Court program. New program components blend youth volunteers from both sides of the bench:

- Jail tours established by the association help youth understand the consequences of potential actions.
- Community service options such as fund-raising and teen court activities organized by the association allow youth to work side-by-side to help their community.
- Experienced youth volunteers trained by the association provide Teen Court training for inexperienced peers.

Through this train-the-trainer approach, new youth volunteers and former offenders moving into juror roles learn the importance of their role directly from youth already participating. Karen Nelson teaches team building activities and effective questioning for annual trainings, and shares annual reports with the

Columbia County Board of Supervisors Judiciary Committee. At 2006 county budget hearings, finance committee members expressed support for continuing the Teen Court program and for finding money within the budget to support alcohol and other drug abuse (AODA) prevention efforts among youth. In December 2006, Nelson and her colleagues learned that Partnership Grant funding starting in March 2007 will allow Teen Court to continue in Columbia County for at least 3 years, and plans are being developed to ensure sustainability.

Lincoln County: The Teen Court Steering Committee is a coalition of youth from the county's two school districts and adult school staff, the sheriffs department, police departments, court officials, and Health Department staff. The steering committee meets quarterly to oversee the Teen Court Program, review and enhance program effectiveness. Teen Court jurors are trained at a 2-day (5 hours per day) training and hear cases monthly. As Teen Court coordinator, county 4-H Youth Development Program advisor Amanda Kostman reports that she convenes and reports to the steering committee, offers educational experiences at each meeting, keeps the group focused on youth and adult partnership in planning, and advises the group. She also consults county youth development educator Debbie Moellendorf, oversees Teen Court daily operations, facilitates selection of jury panel members, trains panel members, screens youth offenders, coordinates monthly court hearings with panel members, keeps sanction data up-to-date, follows up on all sanctions with youth offenders, offers to help them complete their sanctions successfully, teaches restorative educational sanctions, promotes the program, keeps up on all grant reporting and reports to stakeholders.

Outputs

In 42 Wisconsin counties, teenage taggers and truants appear before a jury of their peers. In Teen Court, trained middle and high school jurors hear cases of other school-age youth cited for first time misdemeanors such as shoplifting, truancy or vandalism. Each volunteer in this youth-led program is required to attend trainings on the Teen Court process to identify and practice questioning techniques that clarify the situation in a respectful and non-confrontational manner, and each is encouraged to attend educational activities to improve personal responsibility and promote civic engagement. The escort welcomes the offender and their parent or guardian, verifies their names and helps them through the process, as well as questioning and deliberating sanctions. The spokesperson explains the session, facilitates questioning, deliberates sanctions, explains the sanctions to the youth offender and parent and answers any questions. The recorder is responsible for questioning; keeping an accurate record of the sanctions and making certain the youth offender and their parent or guardian sign all the proper paperwork.

Where traditional juvenile courts might simply impose a small fine, Teen Courts are empowered to "sentence" offenders with sanctions such as:

- Perform community service.
- Attend classes relevant to their offense.
- Write letters of apology to those they have wronged.

Youth jurors find this such a positive experience that some assign offenders to community service as teen court jurors. Compared with young offenders simply charged a small fine in traditional juvenile court, far fewer of those held accountable by their peers will reappear for later offenses.

Impacts

As youth become community stakeholders and change agents, they bring perspectives, knowledge and relationships that lead to better decisions and more productive actions. In counties where teenage jurors hear first-time misdemeanor cases of their peers and determine the proper sanctions, those "sentenced" perform community service valued at an average of $4,500 per county. Responding to a survey, Wisconsin's 19 extension-supported Teen Courts reported 4,824 hours of community service completed during 2005, and 1,360 hours pending. While about **2 of every 3** youth offenders who appear in traditional juvenile courts become repeat offenders, of those appearing in these 18 Teen Courts only **1 in 25** (4%) were back in court again for later offenses.

Columbia County: Youth development educator Karen Nelson trained seven experienced teen jurors to train new youth volunteers from both inside and outside the juvenile justice system. With Nelson advising, these trained youth developed and taught four sessions in 2006 with 19 total participants. Youth also govern their association, consult with county juvenile justice committee members, operate under a youth-adult partnership when appropriate, lead projects and write grants for funding, and organize community service projects. The training teams encourage former offenders to stay in Teen Court as volunteers after completing their sentence, and half of them do so. Participants complete pre- and post-test evaluations during trainings to measure their understanding of the Teen Court system, and follow-up surveys at six months after sentencing. Tracking of completed cases is regularly updated and reported to stakeholders.

Lincoln County: The new Teen Court herd misdemeanor cases of 15 first-time offenders during 9 court sessions in 2005, and heard cases monthly during 2006. The 16 youth and 13 adults on the steering committee have learned valuable skills working together toward common goals, and opened the door to youth participation in community action. Three youth have co-chaired the Teen Court steering committee. Two youth have taken leadership in securing funding by drafting a letter and preparing a packet sent to community organizations. Other

youth participants meet with the adults, and together they make key decisions directing the Teen Court Program.

Vilas County: Teen Court involved 42 youth during 2006. 4 to 6 trained high school youth serve on the jury panel each month and 31 participate in monthly trainings. This is the first year that all 4 high schools in the county are represented in Teen Court.

National impact: Wisconsin is 1 of 20 states that have a state association or recognized networking group. Vilas County's Nancy Anne Livingston and 3 Wisconsin colleagues were invited by the Office of Juvenile Justice and Delinquency Prevention to work on the national task force to establish a national association. The National Association of Youth Courts is currently waiting for non-profit 501(c)(3) status and holding their first board of directors meeting.

Key themes: Character ethics, Communication skills, Leadership training and development, Youth development 4-H; Other: Under-served and under-represented populations (Low-income school-age children and youth, African American, Hmong and Latino/a school-age children and youth

Wisconsin Afterschool Network- Strengthening partnerships for quality enrichment, recreation and education for all Wisconsin children and youth

Situation

Three-fourths of Wisconsin children (74 percent) live in families with parents working outside the home. The percent of elementary school-age children (ages 6 to 12) with all parents in the workforce far exceeds the national average. Their need for out-of-school-time programs overwhelms the supply. Programs that engage children in positive recreational and academic activities simply do not exist in many areas. Rural communities often lack the private partners, tax base, transportation and staff to create and sustain after-school programs. According to a 2006 Office of Justice Programs report, these are the peak hours when children and youth are most likely to experiment with drugs, alcohol, tobacco, and sexual activity. Also during after-school hours, 16 and 17 year olds are most likely to be in a car crash—the leading cause of death among teens.

Teachers and parents agree that after-school programs provide safe havens and structured time during these critical afternoon hours. Quality after-school programs play a key role – enriching learning by providing supervised settings for exploring interests, gaining lifelong skills such as problem solving, conflict resolution, teamwork and leadership, and building meaningful relationships with adults and peers. Yet many Wisconsin children and youth are missing out. The

major challenge for new programs is funding — 71 percent of principals in schools without after-school programs cite lack of funding as the reason.

Inputs

University of Wisconsin-Extension and the Wisconsin Department of Public Instruction (DPI) have forged a sustainable structure of statewide, regional, local and school-community partnerships to support high quality after-school programs through the Wisconsin Afterschool Network (WAN). Funded by the C.S. Mott Foundation, and generous contributions by partner organizations, this new public/private partnership shares the vision that all Wisconsin school age youth have the opportunity to attend a high-quality after-school program.

In 2006, state 4-H experiential learning specialist Kathi Vos and her DPI colleagues Steven Fernan, Alison Kromm and Doug White created a forum for communicating and disseminating ideas and resources that represent a diversity of interests in supporting high quality after-school programs. Vos convened network meetings and increased WAN membership to 150 partner organizations and nearly 300 individuals from DPI and district education agencies, schools and school districts, Wisconsin Department of Health and Family Services, county and tribal health and human services, the school board association, Wisconsin PTA (Parent-Teacher Association), after-school providers association, community education association, UW-Extension and 4-H clubs, Boys and Girls Clubs, YMCAs, YWCAs and more.

She created an ongoing system for recruiting and orienting new members, facilitated team-building activities and provided rosters to encourage networking. Vos formalized a Governance Structure for the Network that includes a state leadership team and three work groups, each addressing a network partnership, policy or quality goal.

To build capacity and strengthen the network, Vos encouraged partners to seek funding and staff assistance from the Department of Public Instruction, the Wisconsin Afterschool Association, the Wisconsin Community Education Association and the Wisconsin 4-H Afterschool program to co-sponsor joint training events on behalf of the Wisconsin Afterschool Network. She collected input from WAN partners on how they involve youth in their programs and explored ideas on how to best involve youth and families in WAN. She recruited the President of the Wisconsin PTA to serve as the voice of parents on the Leadership Team, and solidified network leadership to include state level leaders from education, youth development, childcare, human services, health, and child advocacy. Vos Coordinated a retreat that empowered the WAN State Leadership Team to take on key leadership roles, initiated planning and development of WAN Regional Networks and identified where they could turn for advice.

UW-Extension regional contacts for WAN members through 2007 are county 4-H youth development educators Deb Jones (Jackson), Deb Moellendorf with program advisor Amanda Kostman (Lincoln), Donna Duerst (Rock), and Annette Bjorklund (Washburn). UW-Extension county educators on the statewide Building 4-H After-School Programs Team work with community partners to mobilize local support and secure funding, introduce or reorganize 4-H clubs, adapt 4-H experiential curricula for enrichment programs, and train after-school staff and volunteers. These models demonstrate best practices for their region:

Jackson County: County 4-H youth development educator Deb Jones began partnering with the Black River Falls school district during the 2004-2005 school year to provide enrichment programming two days a week for their after-school program. Jones planned and facilitated more than 50 learning activities throughout the year for 70 youth in grades 1 to 5. In 2005-2006, 4-H clubs were initiated in this after-school setting. Trained high school students paid with 21st Century Community Learning Center grant funds served as club leaders, planning and providing one hour of 4-H enrichment activities each day. An AmeriCorps position awarded through a DPI service learning grant started September 2006, and another half-time AmeriCorps position was added at the end of 2006. The Lunda charitable trust awarded 4-H $20,000 in 2005 and another $18,705 in 2006, and a portion supports 4-H outreach programs including after school. These funds pay the AmeriCorps cost-share, 4-H curriculum materials, support materials and staff training expenses including 2-day yearly and 2-hour monthly trainings.

Lincoln County: The "After the Bell" program started in November 2004 when 65 percent of Merrill middle school students indicated there was no adult at home after school. The program provides safe, positive after-school homework help, games, crafts, friendships and healthy snacks. Trained youth and adult volunteers provide sign language, nutrition and cooking, yoga, walking club, book club, sewing, knitting, basketry, environmental education, visits from a llama and therapy dogs, and travel experiences in other countries and cultures. The 4-H Ambassadors lead monthly 4-H projects. County 4-H Youth Development educator Debbie Moellendorf facilitated quarterly meetings of the Steering Committee – community agencies, organizations (library, school, law enforcement, child care resource service, social services) and middle school youth – through raising $7,400 for the 2005-2006 program, and reviewing evaluation results for modifying the 2006-2007 program. Moellendorf also coordinates the program, developing weekly schedules, arranging facilities, managing the budget and resolving issues. Responding to input from the 7 middle schoolers on the Steering Committee, an "After the Bell – Summer Edition" was added during 2006 with the summer school coordinator and grant funding. Tutoring was incorporated, creating "After the Bell Plus". A total 110 students participated.

Rock County: In March 2005, the Beloit Out of School Time Coalition formed with UW-Extension county 4-H youth development educator Donna Duerst, the

Beloit School District, Beloit Juvenile Probation, Badger Council of Girl Scouts, Rock County Human Services, Beloit Inner City Council, Merrill Community Center and the Stateline Boys and Girls Club. Through the coalition, Duerst strengthened partnerships among existing After-School programs, and integrated 4-H as part of those programs in late 2005. Grant-funded teachers and 4-H volunteers conduct 4-H learning activities during After-School programs, and UW-Extension staff lead monthly large group team-building activities. Duerst is taking the lead in developing a multi-agency field trip for Beloit youth on environmental education and service learning.

As co-chair during 2006, Duerst worked with coalition members to establish best practice standards, a forum for expressing ideas, a plan for marketing and leveraging resources, networking, and creating partnerships for a sustainable 4-H After School program. The coalition expanded partnerships developed with 21st Century Community Learning Center grant-funded After-School programs, and submitted a proposal for 2007-2012 to include 4-H clubs in the After School programs at McLenegan Elementary School in Beloit and Edison Middle School in Janesville. A total of 100 children are now enrolled in the 4-H After School program at Beloit's Todd Elementary School, and 80 youth participate in 4-H After School programs in the two Beloit middle schools.

Washburn County: Since the 2005-2006 school year, 4-H Youth Development Educator Annette Bjorklund has trained 34 adults on youth protection and behavior management as part of the Spooner area school district's volunteer training program. She also trained 8 after-school volunteers on experiential learning and life skills development using 4-H curricula. Bjorklund worked with the middle school VISTA volunteer and a community volunteer to plan 4-H after-school programs, helping select projects, provide project literature, and elect and train 4-H club officers. A 4-H club leader is on staff at the elementary school and works with their VISTA volunteer to plan after-school programs. In both elementary and middle school programs, trained after-school staff and volunteer leaders conduct educational activities using 4-H age-paced teaching materials adapted for after-school settings. Projects include multi-cultural understanding, gardening, theater, arts and crafts, and knitting.

Outputs

The Wisconsin Afterschool Network is leading the effort to strengthen statewide partnerships around after-school programs. WAN coordinates information about multiple after-school efforts funded and administered through education, youth development, child care, human service and health initiatives, other state and local government agencies and community organizations. Vos and her DPI colleagues launched the WAN web site to share membership, meeting events, governance, guiding principles, training opportunities and other resources: http://dpi.state.wi.us/sspw/wan.html

In February 2006, the Governor's Summit on After-School Programs was attended by more than 200 representatives from business, foundations, education and statewide organizations sharing the importance of after-school programs for keeping children safe and healthy, improving learning and supporting working families. Vos and colleagues planned, promoted and conducted this summit examining 12 models operating in Wisconsin. The diversity and depth of these programs gave participants a sample of programs being provided to youth throughout the state. The Governor, First Lady, State Superintendent of public instruction, national business leaders and philanthropists described best practices in after-school programs for participants to explore, question and replicate.

Each year, 21st Century Community Learning Centers nationwide collect and report data on their after-school programs, including information on student outcomes. Through grades, test scores, and teacher surveys on behavior, community learning centers provide insight into their programs' impact on student success. DPI collects this data statewide and has published an executive summary of the 2004-2005 data. The results suggest that state 21st Century Community Learning Centers are helping to meet Wisconsin's Promise to close the achievement gap between economically disadvantaged students, students of color and their peers.

Outcomes

The Wisconsin Department of Public instruction has identified the following outcomes from quality after-school programs:

Academic Success: A growing body of research suggests that after-school programs can have positive effects on outcomes such as, motivation, engagement in learning, expectations of success, and social competencies. Children who gain these "intermediary" skills do better in school and are more successful as adults. For children from low-income families and children of color, after school programs may help narrow the opportunity and achievement gap.

Keeping Kids Safe: The hours after school are the peak time for children to become victims of a violent crime. According to Office of Justice Programs, children are 140 percent more likely to be victimized between 3 and 4 pm on school days than in the same time period on non-school days.

Support for Working Parents: After school programming provides an important ingredient to parent's employment stability by giving parents peace of mind about what their children are doing after-school, helping them to balance work and family responsibilities.

Today's disparity between the school week and the parent's work week can be as many as 25 hours, which presents working parents with the challenge of

finding someone to care for their children while they are at work. Those parents able to have their children participate in formal after-school programs said they missed less work, which is especially important for low-income parents as their jobs may not offer the flexibility to leave early in order to supervise their children.

A Good Investment: Research clearly demonstrates that after-school programs are a wise public investment. From a cost-benefit perspective,
every $1 invested in positive youth development opportunities and supports **yields a return on investment of $10.51.**

Impacts

Jackson County: Staff trained articulated the value of strong youth-adult partnerships in written evaluations, and demonstrated this in youth-adult teams completing monthly project plans using 4-H after-school curriculum materials. Five 4-H after-school clubs have used the 4-H Public Adventures curriculum to identify community needs, write mission statements, plan service learning activities and act on those plans. Four 4-H after-school project clubs used web-based 4-H after-school curricula to conduct educational activities. Integration of monthly staff trainings resulted in better teen teacher preparation of enrichment activities, a stronger educational focus, improved performance and more highly skilled staff in planning and organizing, group management and discipline, communication, teamwork and leadership. A solid partnership between UW-Extension and the school district continues to strengthen as extension provides resources and education to support after-school programming. UW-Extension benefits as school district programs reach youth often underrepresented in 4-H community clubs.

Lincoln County: Engaging 7 middle school students in the After the Bell Steering Committee improved information and decisions, programs and policies. Youth initiated program ideas, ways to handle behavior issues of their peers, youth-adult partnerships and youth-led projects: The 12 4-H Ambassadors worked together to improve the Lincoln County 4-H program while increasing their leadership skills in following through on the programs they plan. County 4-H Youth Development Program Advisor Amanda Kostman guided the 4-H ambassadors to incorporate more education in programs planned, and to use evaluation tools to improve programming.

Rock County: Beloit Out of School Time Coalition members observe that 4-H provides life skill development that enhances the programs they offer (evaluation to measure life skill development is pending). These partnerships with existing programs are enabling UW-Extension to reach new, diverse audiences. At Todd Elementary, for example, at least 65 of the 100 4-H After-School members live in low-income families, 30 are African American, and 30 are Latino/a.

Washburn County: Continued attendance and participation by students and families indicates that this program is meeting local needs. For the 2006-2007 school year, 67 students grades K to 4 enrolled in the Spooner elementary 4-H Club after school, up from 56 the year before. Twelve students enrolled in the Spooner middle School 4-H club after school, where they are leading meetings and learning parliamentary procedures.

Evaluation of the success of multi-state and joint activities

Key themes: Leadership training and Development, Youth Development / 4-H

National 4-H Youth in Governance Initiative — Helping states create and sustain effective youth-adult partnerships

Situation

Adult leaders and decision-makers are recognizing young people as valuable community resources, involving youth as partners in planning, decision-making and ongoing work. Yet adults who want such partnerships often lack knowledge or experience in engaging youth effectively in community action. Young leaders need strong skill-building experiences, relationships, and emotional supports. Government and community organizations need models and assistance in creating the requisite conditions for youth-adult partnerships, and in supporting youth leadership roles with policies and practices that will sustain them.

Inputs

University of Wisconsin-Extension 4-H Youth Development state specialists have served on the national Youth In Governance Initiative steering committee and research and evaluation team since 2004, helping forge a national strategy. As program evaluator in 2005 and 2006, Wisconsin youth and community development specialist Shep Zeldin and the evaluation team made site visits to collect data in each participating state— Arizona, California, Missouri, Montana, and Wisconsin.

In spring 2007 the team will be conducting site visits to three additional sites, as the initiative has expanded to Maryland, New Hampshire and Wyoming. Zeldin has received a grant from 4-H Council to be the evaluator, supplemented by a grant from the Surdna Foundation.

Outputs

Publications: With Cornell University Cooperative Extension, the national research and evaluation team including Wisconsin's Shep Zeldin and Cailin O'Connor (UW-Madison School of Human Ecology) developed Youth and Adult Leaders for Program Excellence: A practical guide for program assessment and action planning by Linda Camino, Shep Zeldin, and Cailin O'Connnor. Linda Camino is a senior scientist with the department of Human Development and Family Studies, and a long-term collaborator with Wisconsin 4-H Youth Development.

The YALPE Resource Kit was selected as the curriculum of the national Youth in Governance Initiative by the end of 2005, and purchased through Cornell by 30 state 4-H offices and 85 other youth-serving organizations by the end of 2006. The User's Guide, research briefs and YALPE Resource Kit information are available at: http://www.actforyouth.net/?yalpe

In 2006, Shep Zeldin and Julie Petrokubi, a UW-Madison graduate student in the Department of Human Development and Family Studies, drafted a report of the Youth in Governance Initiative titled *Disseminating and implementing youth-adult partnerships through 4-H Youth Development*. The report is in final revision by initiative managers, then bound copies will be distributed to all state university Cooperative Extension Services and published online by National 4-H Council.

Outreach scholarship: Research on these activities has been published in three national journals.

O'Connor, Cailin, and Shepherd Zeldin. Program Assessment and Improvement through Youth-Adult partnership: The YALPE Resource Kit. *Journal of Extension.* October 2005, Vol 43, No. 5: http://www.joe.org/joe/2005october/tt4.shtml

Zeldin, S., Camino, L, & Mook, C. (2005). The adoption of innovation in youth organizations: Creating the conditions for youth-adult partnerships. *Journal of Community Psychology,* 33(1), 121-135.

Zeldin, S., & Petrokubi, J. (2005). Understanding innovation: Youth-adult partnerships in decision making. *The Prevention Researcher,* 13, 1, pp. 11-15.

Outcomes and impacts

National curriculum: Assessment data are essential for action planning, improving program quality, communicating to stakeholders, and training volunteers and community partners. During 4 years of pilot testing with 4-H youth, Extension professionals and groups promoting positive youth development, the YALPE Resource Kit was used to strengthen the governance

and programming of youth-led community clubs, and helped youth-serving coalitions establish a common language and training approach. Thirty state 4-H offices are using the curriculum.

FY 2006 participation: Shep Zeldin 0.5 fte, Julie Petrokubi, 0.20 fte, Matthew Calvert 0.02 fte and Greg Hutchins 0.02 fte

National strategic goal 2

Evidence: Campus and county faculty and staff report their work against expected outcomes through Cooperative Extension's Planning and Results System (PRS). They also submit more detailed success stories of their work for the PRS database. The Wisconsin 4-H Youth Development Arts and Communication Program Evaluation final report November 2006 is published online at: http://www.uwex.edu/ces/pdande/evaluation/evalstudies.html

National strategic goal 3:

A safe and secure food and fiber system

Executive summary

Situation

Foodborne illness remains a serious health concern, especially among pregnant or breastfeeding women, young children, and older adults. Food safety guidelines add more cautions each year, and outbreaks often make the news. Effective education is critical so consumers choose, handle, prepare and store food safely for the entire household, and so food processors are fully trained and able to implement federally mandated food safety programs.

Arsenic is a natural element found throughout the world, and is especially prevalent in Wisconsin. Since the U.S. Environmental Protection Agency (EPA) cut the tolerable amount of arsenic in drinking water, unacceptable levels of naturally occurring arsenic are now found statewide. Long-term exposure to even a little arsenic increases risk of cancer, diabetes and neurological disorders. To ensure safe drinking water, testing groundwater for arsenic and associated toxic metals is a high public health priority and an added cost for Wisconsin's 800,000 well owners. While the Centers for Disease Control and Prevention require testing for arsenic in public wells under the Clean Water Act, private wells are the owners' responsibility as legal custodian of their water system.

Extension response

During 2006, the UW-Extension Family Living Programs (FLP) statewide Eating Well and Being Active Team continued to address key food safety and security issues identified with stakeholder partners. Community-based nutrition educators and coordinators continued to reach under-served and under-represented low-income pregnant women, caretakers of infants, children, youth, families and older adults with food safety education. Forty counties teach food safety to children ages 5 to 17 during school time or at summer or after-school enrichment programs. Community nutrition educators made more than 32,000 teaching contacts with older adults at Senior Dining Centers and Senior Housing Sites in 44 counties.

UW-Extension Cooperative Extension food safety and food quality education targets not only consumers and food industry personnel but also allied interests within state and local governments, with the following expected outcomes:

- Communities will encourage and support the safety of food and water for all consumers. UW-Extension county community resource development

educators share this priority for ensuring adequate supplies of safe drinking water, working with state geology and hydrogeology specialists and local planning and elected officials.

- Individuals and families will choose, handle, prepare and store food safely.
- Food processors and food industry personnel will produce safe/high quality food for consumers.

Backed by university research, UW-Extension campus and county faculty and staff work with colleagues and community partners to respond to emerging food safety and food quality needs. Educational materials are reviewed and adapted to address diverse cultural needs in English and Spanish — and maintain food safety recommendations consistent with the national Fight Bac / Combata a Bac campaign of five steps to food safety.

The UW-Extension Wisconsin Nutrition Education Program (WNEP) responds to the diverse needs and resources of officially poor individuals and families through their communities. During 2006, WNEP provided community-based nutrition education programs in partnership with nearly 800 agencies, including public sector or government-funded agencies, private non-profits, schools, private sector agencies and others. With these community partners, WNEP operated as 39 projects in 60 Wisconsin counties. Nutrition educators made 312,742 educational contacts with Food Stamp-eligible individuals and families statewide. Of all learners during 2006:

- 55% were school-age youth 5 to 17 years old.
- 25% were families with young children.
- 12% were adults age 65 or older.
- 6% were adults ages 18 to 64.

More than three-fourths of low-income participants were Caucasian (76%). WNEP educators reached out to culturally diverse individuals and families:

- 12% of learners were African American.
- 11% were Latino/a.
- 4% were American Indian.
- 4% were Asian American.

In rural Northern and Western Wisconsin, UW-Extension nutrition educators and coordinators design and deliver educational programs that meet the needs of isolated learners with little access to community services. In heavily populated urban areas of southern and southeastern Wisconsin, nutrition educators develop programs to help learners navigate and use the variety of community resources available.

Responding to critical need for information and assistance in the Fox River Valley, Cooperative Extension geologists and hydrogeologists initiated basic and applied research to identify arsenic sources, map bedrock and shallow aquifers where arsenic naturally occurs, work with regulators and well drillers to ensure safe drinking water, and support county faculty engaging local officials in protecting water resources. Wisconsin Geological and Natural History Survey (WGNHS) state specialists, the Center for Watershed Science and Education at UW-Stevens Point, county community resource development and basin educators work with local government, public health and state regulatory staff to develop well testing education, help well owners weigh safe drinking water options, and include groundwater in comprehensive land use planning. In 2006, this collaboration extended to lead mining areas of Southwest Wisconsin.

Impacts

The FLP statewide Eating Well and Being Active Team and WNEP Food Stamp Nutrition Education report the following FY 2006 impacts of food safety and food quality integrated research and education as well as multi-state and joint activities (for impact reports on food accessibility, affordability, resource management and security, see the next goal.

With Cooperative Extension geologists and hydrogeologists, the Community, Natural Resource and Economic Development (CNRED) statewide Groundwater Team and Community Planning and Plan Implementation Team report the impacts of integrated research andeducational outreach, interagency and regional collaborations, and collaborative progress and strategies toward assuring safe drinking water for owners of private wells and for sustainable comprehensive planning.

National strategic goal 3 total expenditures FY 2006

(By percent of full-time equivalent and source of funding

	FTEs	Smith-Lever	State match	
Smith-Lever	3.10	$99,610	$341,273	
Integrated	1.50	$159,826		
Multi-state	.80	$81,837		

Key Themes: Food handling, Food safety, Foodborne illness; Other: Under-served and under-represented populations

School and community partnerships reach diverse low-income children and older adults with five simple steps for keeping food safe to eat

Situation

Food safety is important to everyone. Pregnant women, infants and young children, and older adults are especially susceptible to foodborne illness. While proper hand washing can prevent many illnesses, very few individuals or caregivers take time for even this simple preventive measure. UW-Extension has the research-base, expertise, networks of community partnerships, and easy-to-read culturally appropriate educational materials to help low-income children, youth, families and older adults learn the basics of keeping food safe to eat.

Inputs

The UW-Extension Wisconsin Nutrition Education Program (WNEP) responds to the diverse needs and resources of officially poor individuals and families through community-based nutrition education programs with nearly 800 partner agencies. A major portion of WNEP is Food Stamp Nutrition Education— a partnership of the U.S. Department of Agriculture Food and Nutrition Service, Wisconsin Department of Health and Family Services, and University of Wisconsin-Extension. UW-Extension Family Living Programs campus and county faculty and WNEP educators and coordinators teach safe food handling, preparation and storage practices in many community settings so people of all ages can choose, handle, prepare and store food that is safe to eat. Research-based educational programs use safe food handling messages consistent with the national Fight BAC / Combata a bac™ campaign, providing consumers five brief, positive actions to reduce their risk of foodborne illness:

1. Clean: Wash hands and surfaces often.
2. Separate: Prevent cross-contamination.
3. Cook: Cook or reheat foods to proper temperatures.
4. Chill: Keep cold foods cold and cool leftovers promptly.
5. Store: Store food properly to prevent illness.

Easy-to-read food safety educational materials are culturally reviewed and adapted to address the needs of diverse learners, in English and Spanish.

Outputs

Food safety education is an integral part of Food Stamp Nutrition Education. In 2006, the two primary audiences were children ages 5 to 11 at schools where at least half of students are eligible for free or reduced-price School Meal programs including summer and after-school enrichment programs, and adults age 65 and older. Food safety lessons were offered primarily in partnership with schools (K-12), senior meal sites and programs, WIC Women, Infants and Children clinics, public and tribal health clinics, Head Start and community action agencies.

Teaching in Schools and After School Programs. During the 2006 program year, 40 counties provide education to youth 5 to 17 years old either during the school day or at summer or after school programs. There were 143,756 direct teaching contacts with children 5 to 11 years old and 27,299 direct teaching contacts with youth 12 to 17 years old. Educators provided a series of nutrition education lessons for youth at school, at libraries, public health clinics, neighborhood centers, summer feeding sites, Head Start agencies and Community Action Agencies.

Teaching at Senior Dining Sites. Older adults who make healthier choices live longer and better lives. During 2006, WNEP made more than 32,000 teaching contacts with older adults at Senior Dining Centers and Senior Housing Sites in 44 counties. Nutrition educators and coordinators discussed a variety of topics with adults age 65 and older, including storing and handling food safely.

Teaching at Food Pantries. WNEP made nearly 20,000 teaching contacts with diverse learners of all ages — children, youth, families and older adults — at food pantries and emergency feeding programs statewide during 2006.

Impacts

Evaluation results indicate that UW-Extension Food Stamp Nutrition Education was effective in motivating school-age youth to practice food safety. For youth audiences, impact of food safety lessons is measured by changes between self-reported responses to pre- and post-lesson assessment using a set of questions for each lesson's objectives and written for the age of the students. Nutrition educators and coordinators made 143,756 teaching contacts with the primary audience of children ages 5 to 11 at school, after-school enrichment programs, libraries, public and tribal health offices, neighborhood centers, summer feeding sites, Head Start and community action agencies in 40 counties. For youth ages 5 to 11, FY 2006 food safety lessons improved knowledge of proper handwashing, for example. Evaluation shows 56 percent of 2,700 children

identified proper handwashing before the lessons, and 87 percent knew how to wash their hands properly after the lessons.

In 2006, educators collected comments from older adults participating in nutrition education at 47 senior dining centers, and managers from 82 dining centers completed questionnaires: 71 said they had observed or heard evidence that participants at their site had learned something new, and 44 said they had observed or heard evidence of nutrition-related behavior change. Participant comments include:

> "I never wash grapes; I didn't know I was supposed to. Now I will."
>
> "I give the handouts to my children because they cook for me."

After a food safety lesson, learners were asked what they intended to do with what they had learned from the lessons:

- 61% of 858 learners stated that they would start, or more often, properly clean surfaces by washing cutting boards after each use.
- 61% of 283 learners stated that they would start, or more often, properly handle hot leftovers by refrigerating them in shallow containers for quick cooling.

Key Themes: Other: Comprehensive land use planning, Drinking water safety, groundwater quality, Waterborne toxin protection, well water testing

Mapping and regulating groundwater resources for drinking water safety

Situation

Arsenic is a naturally occurring element found throughout the world, and especially prevalent in Wisconsin. The U.S. Environmental Protection Agency (EPA) classifies arsenic as a carcinogen. Prolonged exposure to arsenic increases risk of skin cancer and tumors of the kidney, prostate, bladder, liver and lungs, plus blood vessel damage, hypertension, nerve damage, diabetes, anemia, digestive problems, depression, and changes in skin color and texture.

In 2001, the EPA cut by 80 percent the amount of arsenic allowed in drinking water — from 50 parts per billion (ppb) to 10 ppb — a concentration similar to 10 drops of water in an Olympic-size swimming pool. With less arsenic allowed in drinking water, unsafe levels of naturally occurring arsenic are found in wells statewide, raising concern for Wisconsin's 800,000 private well owners. Wells with unsafe arsenic concentrations commonly contain high levels of iron, sulfate

and other toxic heavy metals such as cobalt, molybdenum, vanadium, cadmium, chromium, copper, and nickel. Health studies found so many contaminated wells in the Fox River Valley that the Wisconsin Department of Natural Resources (DNR) declared the counties of Outagamie and Winnebago through the western half of Brown County as an Arsenic Advisory Area and set protective well construction guidelines.

While public wells are monitored for drinking water safety under EPA rules, private wells are the owners' responsibility as legal custodian of their water system. Three-fourths of well owners responding to a UW-Stevens Point Center for Watershed Science and Education survey reported they had not tested their drinking water in the last 5 years. Water testing labs report that few private well owners are willing to pay the extra cost to test for arsenic and associated toxic metals above the amount to test for bacteria and nitrates. Likewise, well drillers were reluctant to follow voluntary protective well construction guidelines because of the added costs, in particular the rising cost of steel well casing.

Wisconsin DNR had been working with cooperative Extension outreach specialist Madeline Gotkowitz, assistant professor of environmental sciences and hydrogeologist with the Wisconsin Geological and Natural History Survey (WGNHS). She had conducted basic and applied research to identify the source of arsenic contamination and safe drinking water options for a public school in Southeast Wisconsin. DNR sought new research findings to establish more stringent well standards and guidelines for well protection in the Northeast Wisconsin Arsenic Advisory Area. Gotkowitz partnered with county extension resource development educators, health departments, DNR and local well drillers to produce outreach educational materials on air-free well drilling, casing depth, grouting and disinfecting new wells to manage arsenic in Outagamie and Winnebago counties. Subsequently, her UW-Extension colleagues requested her support and research expertise in Southwest Wisconsin.

Inputs

A statewide group of experts formed to study the serious health, economic and regulatory issues of unsafe drinking water, develop strategies to manage arsenic contamination, protect wells and reduce health hazards. Led by the Wisconsin DNR Drinking Water and Groundwater Bureau, this partnership includes UW-Extension Cooperative Extension researchers, campus and county CNRED faculty including WGNHS and the Center for Watershed Science and Education at UW-Stevens Point, Wisconsin DHFS, county and tribal health departments, the National Institutes of Health, U.S. Geological Survey, and the Wisconsin Water Well Association. The joint DNR and UW Groundwater Coordinating Council review educational materials to ensure consistent messages.

With added funding from Wisconsin DNR, Madeline Gotkowitz studied the geologic and geochemical conditions that release natural arsenic into wells. In

her Fox River Valley research with J.A. Simo, professor of geology and geophysics, UW-Madison, and Madeline Schreiber, hydrogeologist and assistant professor of geological sciences at Virginia Tech. Gotkowitz examined drill cores and cuttings, sampled mineralized zones, analyzed for key metals and minerals, recorded their geographic distribution in the St. Peter sandstone, related that information to arsenic distribution in the aquifer, and evaluated regional groundwater geochemistry data for conditions that trigger chemical reactions releasing arsenic.

Gotkowitz found that arsenic levels in drinking water are high where well bore holes allow air in to oxidize sulfide minerals. Overall, high arsenic concentrations cluster from south to north along the Fox River Valley where wells are drilled through sulfide mineral pockets in the St. Peter sandstone bedrock. Although using chlorine to disinfect wells can oxidize iron sulfide in aquifer sediments and release arsenic, chlorination may be critical at limiting arsenic contamination in settings similar to the field study site. In the high arsenic comparison well, Gotkowitz found that microbes introduced through the well bore hole facilitate iron cycling and release arsenic. By ridding the well of active microbiological communities, chlorination may reduce arsenic levels in such settings.

Two distinct geochemical mechanisms appear to contribute low to moderate arsenic concentrations (up to 50 ppb) to well water in this aquifer:

1. Oxidation of sulfide minerals may release arsenic to groundwater in confined portions of the aquifer; oxidation may have occurred in the geologic past, or current levels of oxygen dissolved in groundwater may permit slow oxidation.

2. Under typical domestic water use patterns, increasing water use per person and more private wells in the aquifer contribute to draw-down of the water table that exposes sulfide minerals to oxygen, dissolves iron sulfides and releases arsenic.

Gotkowitz's research shows how conditions releasing arsenic in the Fox River Valley differ sharply from what she found in the sand and gravel aquifer near the Woods School in the glacial deposits of Southeast Wisconsin. In Northeast Wisconsin, arsenic is released when sulfide mineral deposits in St. Peter sandstone outcrops are exposed to oxygen, microbes and weathering. In the relatively old water in Southeast Wisconsin, arsenic is bound to iron hydroxide minerals dispersed throughout the aquifer and released with very little oxygen. She concludes that the only way for a private well owner anywhere in the state to know the arsenic level in their drinking water is to have their well water tested regularly by a certified lab. Gotkowitz has now begun working with Iowa County community resource development educator Paul Ohlrogge on arsenic problems in Southwest Wisconsin.

As Gotkowitz concentrated her research on the geochemical conditions and processes releasing arsenic in wells and aquifers, her WGNHS colleagues Bruce

A. Brown and Tom Hooyer were mapping the bedrock and Quaternary glacial deposits under Outagamie and Winnebago counties. Brown and DNR geologist Dave Johnson confirmed well locations, established elevations and interpreted thousands of geologic records. The resulting geographic information system (GIS) becomes a powerful tool for 3-dimensional planning and analyzing groundwater resources. The GIS was used to generate maps showing depth to the St. Peter sandstone and Cambrian sandstone bedrock layers.

For some rural wells with unsafe arsenic levels, an affordable solution may be a shallow sand and gravel well. To help DNR identify sand and gravel aquifers, critical groundwater recharge areas, and areas unsuitable for certain land use such as land fills, WGNHS quaternary geologists Tom Hooyer and John Attig set out to map the Fox River Valley lowlands — parts of 14 counties once occupied by glacial Lake Oshkosh. Hooyer secured 6 years of research funding from the National Geologic Mapping Program that also funded Brown's bedrock study, and American Association of State Geologists yearly funding to mentor undergraduate field researchers who help map, drill and compile data from aerial photographs, water well records and county soil surveys for each map section. Hooyer and Brown used their geologic mapping to develop a field guide and conduct a geology tour of Outagamie and Winnebago counties with community resource development educator Catherine Neiswender for local and county zoning officials and planning commissioners.

Outputs

When Madeline Gotkowitz presented her research on arsenic in the Fox River Valley, her findings along with the maps created by Brown and colleagues provided the science supporting new well construction requirements and methods for the Arsenic Advisory Area. Gotkowitz helped DNR staff write the new rules and also reviewed them. DNR's Mark Putra reports that based on WGNHS research, bedrock maps and discussions with Gotkowitz and Brown, the DNR Drinking Water and Groundwater Bureau focused the Arsenic Advisory Area into a special well casing depth area. For Outagamie and Winnebago counties, the new rules guide well drillers to safe drinking water, regulate depth of casing below arsenic bearing St. Peter sandstone and require protective drilling methods that do not use air.

Gotkowitz partnered with county extension resource development educators, county health departments, DNR and local well drillers to produce outreach educational materials on well casing to manage arsenic in Outagamie and Winnebago counties. Subsequently, her UW-Extension colleagues requested her support and research expertise in Southwest Wisconsin.

Gotkowitz co-authored *Special Well Casing Area in Outagamie and Winnebago Counties: Arsenic in Drinking Water* with Catherine Neiswender of UW-Extension Winnebago County, Dave Muench of UW-Extension Outagamie County (retired),

Dave Johnson and Tom Riewe, Wisconsin DNR, Jeff Phillips of Outagamie County Public Health Division, Doug Gieryn of Winnebago County Public Health Department, Kevin Masarik, UW-Extension Groundwater Center, Tom Van de Yacht, Bill Van de Yacht Water Well Inc. (UW-Madison/Extension Environmental Resources Center, 2005). This easy-to-read 8-page resource for home buyers, new home builders, well drillers, and communities explains the risk of consuming water with arsenic, outlines the new well casing depth area regulations, answers frequently asked questions and directs readers to more information. A section on advantages and disadvantages of water treatment and protection options compares costs for individuals and communities. This publication is published online at: http://winnebago.uwex.edu/cnred/NaturalResources.html

These wells are already very expensive. With the rising price of steel and greater depth to groundwater, well costs nearly double for both drillers and owners. Wells that had been — $5,000 to $7,000 become $10,000 to $1,000. As a consequence, the specific well construction guidelines for each quarter section mapped allow for a smaller well casing area concentrated along the densely populated U.S. Highway 41 corridor from southwest of Oshkosh to just west of Green Bay. From new well construction records, researchers and regulators review and reevaluate mapping efforts and adjust for accuracy to accommodate aggressive development. They hope to lessen economic burdens by reviewing reports, keeping maps up to date, and funding replacement wells for income-eligible well owners.

Private well owners may choose to form community water systems, group wells or neighborhood cluster wells, and developers are urged to provide cluster wells. Local health departments provide educational outreach. Hooyer projects map completion in 2007. WGNHS has released his preliminary maps and those of Brown as open-file reports. Outreach scholarship includes:

Brown, B.A. 2005. Preliminary Bedrock Geologic Map of Outagamie County, Wisconsin. WGNHS Open-File Report 2005-02.

Brown, B.A., and M.L. Czechanski, 2005. Arsenic Special Casing Area in the Fox Valley: An Example of Data Integration and Interagency Cooperation from Initial Research to Rule Development. Proceedings of WLIA Annual Meeting, Green Bay, p. 8.

Brown, B.A., M.L. Czechanski and D.M. Johnson, 2005. Arsenic Special Casing Area in the Fox Valley: An Example of Data Integration and Interagency Cooperation from Initial Research to Rule Development. Proceedings of Wisconsin Section AWRA Annual Meeting, Delavan, p. 15.

Gotkowitz, M.B., Schreiber, M.S. and J.A.Simo, 2004. Effects of water use on arsenic release to well water in a confined aquifer. *Ground Water*, 42(4): 568-575.

Hooyer, T.S., J.W. Attig and Lee Clayton, 2004. Preliminary Quaternary Geologic Map of the Central Fox River Lowlands, Wisconsin. WGNHS Open-File Report 2004-04.

Root, T., Bahr, J.M. and Gotkowitz, M.B., 2005. Controls on arsenic Concentrations in *Groundwater* near Lake Geneva, Wisconsin. In: P.A.ODay (Editor), *Advances in Arsenic Research*, American Chemical Society Symposium Series 915, pp. 161-174.

Schreiber, M.E., Gotkowitz, M.B., Simo, J.A. and Freiberg, P.G., 2003. Mechanisms of Arsenic Release to Ground Water from Naturally Occurring Sources, Eastern Wisconsin. In: A.H. Welch, and K.G. Stollenwerk (Editors), *Arsenic in Ground Water: Geochemistry and Occurrence*. Kluwer Academic Publishers, Norwell, Massachusetts, pp. 259-280.

Impacts

UW-Extension work by hydrogeologist Madeline Gotkowitz with her campus and county colleagues integrates basic and applied research, inter-agency and interdisciplinary cooperation and new GIS-based geologic mapping into educational outreach to government officials, regulators, planning commissions, educators, and citizen groups. Local governments, developers and rural homeowners are learning how land use decisions affect public health, what special well-casing depth area rules mean for new development, and how to work cooperatively across county lines to reduce public health risks and ensure drinking water safety.

Fox River Valley: WGNHS geologists Bruce Brown and Tom Hooyer partnered with county community resource development educator Catherine Neiswender to develop an educational tour of geologic resources, a field guide explaining mapped features, and discussion questions prompting participants to consider land use actions on vulnerable water resources. The 25 participants included government officials, public health, planning and zoning departments, educators, consultants and resource managers. Neiswender also coordinated educational programs on DNR special well casing depth area rules for the Wisconsin Towns Association in Winnebago and Outagamie Counties, and WGNHS hydrogeologist Madeline Gotkowitz presented her arsenic research findings that explain and prescribe the new well construction requirements. As a result of these efforts, local governments and decision-makers are more aware of the connection between land use and local geology, and new well construction regulations.

Incorporating groundwater into the comprehensive land use plan provides evidence that County Departments have raised their awareness of and made a decision to address drinking water safety. In June 2005, the Winnebago County Planning and Zoning Committee held a formal public hearing on the comprehensive land use plan. The County Planning Department spent the next

several months incorporating comments and finalizing the plan, which the committee approved in November 2005. The comprehensive plan next went to the County Board for a public hearing and vote. At their March 2006 meeting, the Winnebago County Board of Supervisors voted to approve the ordinance to adopt the Winnebago County Comprehensive Plan, effective January 1, 2007: http://winnebago.uwex.edu/wcplanning/index.html

Southwest Wisconsin: Traditional lead mining in this area gave Wisconsin its "badger state" nickname, and associated toxic metals including arsenic show up in drinking water. Groundwater meets all water supply needs in Iowa County. Rural residents and farmers rely on private wells for their water supply. Iowa County completed a four-year comprehensive planning process, during which local planning commissions continually discussed groundwater as a criterion for siting new development, and regularly requested more groundwater data. The Iowa County Board of Supervisors turned to UW-Extension with funding for assistance with groundwater research.

Iowa County began a two year research project on groundwater with the Wisconsin Geological and Natural History Survey (WGNHS) to inventory groundwater resources. Citizen participation was identified as critical for a successful educational program. A county-wide groundwater advisory committee formed to provide assistance and guidance to the two year study group. Iowa County community resource development educator Paul Ohlrogge chairs this committee with representatives from all 14 towns. As committee chair, Ohlrogge designed a series of educational sessions on county groundwater data and published results in English and Spanish. Ohlrogge also co-authored with Kevin Masarik and David Mechenich, Center for Watershed Science and Education at UW-Stevens Point, the 32-page *Groundwater in Iowa County – A Citizens Guide. These and other educational resources are* published on the UW-Extension county web site: http://iowa.uwex.edu/cnred/water.html

Groundwater advisory committee members learned about groundwater flow, the groundwater cycle, how geology affects water quality, and why some aquifers are more susceptible to contamination from land use. The advisory committee has been an asset to WGNHS state specialists, locating historic springs and abandoned wells for monitoring, and identifying landowners who allow WGNHS mapping teams to enter their property and conduct specific research for the 2-year project.

Evaluation of the success of multi-state and joint activities

Key Themes: Food handling, Food quality, Food safety, Foodborne pathogen protection, HACCP

Multi-state food industry training and applied research

UW-Extension faculty integrated within the College of Agricultural & Life Sciences at the University of Wisconsin-Madison provide training and conduct applied research that meets the needs of food processors across the state, North Central region, and the country.

Training programs: Food processors must continually improve their knowledge of food safety and related topics to ensure the safety and quality of their products and meet changing regulatory requirements. UW-Extension faculty play a key role in providing needed information to meet these needs. A sampling of training programs attended by students from around the region and country include:

- Better Process Control School, a course for supervisors working in canning plants, that is mandated by the U.S. Food & Drug Adminstration (FDA).
- Meat and Poultry HACCP training to meet U.S. Department of Agriculture (USDA) requirements
- Seafood HACCP training to meet FDA requirements
- Milk pasteurization short course, designed to assure compliance with FDA's Pasteurized Milk Ordinance and meet state of Wisconsin licensing requirements
- Master Cheesemaker short course series

UW-Madison/Extension faculty also trained Illinois food regulators and Minnesota meat processors in steps necessary to attain mandated lethality against pathogenic bacteria in manufacturing of beef jerky and related products.

Applied research programs: Integrated UW-Extension faculty also conduct "problem-solving" applied research that assists food processors in ensuring product quality and safety. In many cases, these efforts are in collaboration with colleagues in other states. For example, Dr. Steve Ingham has collaborated with Dr. Dana Hanson at North Carolina State University, Dr. Kelly Getty and Dr. Liz Boyle at Kansas State University and Dr. Jane Boles at Montana State in performing problem-solving meat safety research that will assist small and very small processors in complying with government HACCP (Hazard Analysis Critical

Control Point) regulations. Dr. Scott Rankin has collaborated with Dr. Mary Anne Drake at North Carolina State University and Dr. Jeff Broadbent at Utah State University, as well as colleagues in Latin America, to gain insights needed to consistently produce high-value cheese and whey products.

Case study in applied research: the Center for Meat Process Validation

One example of the value of this type of applied research is the work of the Center for Meat Process Validation. This center was created in 2003 by Extension Specialists Dennis Buege, Barbara Ingham, and Steve Ingham to address small and very small meat and poultry processors' needs for scientifically validated information to support components of their mandated HACCP systems. Nearly 7,300 small and very small meat and poultry plants play an important role in the meat industry in the United States. Under the mandated HACCP system, small and very small plant operators are being asked to scientifically validate critical limits used in their HACCP plans to control pathogenic bacteria such as Escherichia coli O157:H7, Salmonella serovars, and Staphylococcus aureus. For most critical limits, little government guidance is available for validation and the onus of validation is on the processor. The center has attracted multiple grants from USDA-CSREES and USDA-FSIS to assist small and very small processors in this validation process. Accomplishments in 2006 include:

- Development of validated procedures for achieving sufficient lethality during the processing of whole-muscle beef jerky. Results of this work are typically shared with processors in 6 - 10 different states each month. In addition, the work is available on the Center's website. In 2005-2007, Dr. Steve Ingham has trained processors in safe jerky-making in Wisconsin, Texas, Ohio, Minnesota, and Kansas.
- Guidelines for the maximum water activity in beef jerky and related products have also been established, posted on our website, and published in a peer-reviewed journal.
- Model HACCP packets were developed in 2006 by Dr. Steve Ingham in collaboration with the Wisconsin Department of Agriculture, Trade & Consumer Protection. These model packets meet current regulatory requirements and cite much of the Center's work as supporting documentation for processing steps such as tempering/thawing of frozen meat, handling of raw meat products, drying, fermentation, and thermal processing.
- Development of a computer-based tool for predicting pathogen growth in raw meats and poultry during situations of short-term temperature abuse or slow-cooking. The initial version of this tool is on our website and is undergoing development to make it more user-friendly. However, it has

already been used to help processors across the country deal with situations such as processing bottlenecks and cooler failures.

In most cases, work conducted by the Center is published in peer-reviewed scientific journals. Such publication establishes the legitimacy of the research in the eyes of food safety regulators. Several recent publications highlight the breadth of Center activities:

Burnham, G.M., D.J. Hanson, C.M. Koshick, and S.C. Ingham. 2007. Death of Salmonella serovars, Escherichia coli O157:H7, Staphylococcus aureus, and Listeria monocytogenes during the drying of meat: a case study using biltong and droëwors. *Journal of Food Safety.* In Press.

Ingham, S.C., M.A. Fanslau, G.M. Burnham, B.H. Ingham, J.P. Norback, and D.W. Schaffner. 2007. Predicting pathogen growth during short-term temperature abuse of raw pork, beef and poultry products: use of an isothermal-based predictive tool. *Journal of Food Protection.* In Press.

Ingham, S.C., G. Searls, S. Mohanan, and D.R. Buege. 2006. Survival of Staphylococcus aureus and Listeria monocytogenes on vacuum-packaged beef jerky and related products stored at 21°C. *Journal of Food Protection.* 69: 2263-2267.

Buege, D.R., G. Searls, and S.C. Ingham. 2006. Lethality of commercial whole-muscle beef jerky manufacturing processes against Salmonella serovars and Escherichia coli O157:H7. *Journal of Food Protection.* 69: 2091-2099.

Ingham, S.C., G. Searls, and D.R. Buege. 2006. Inhibition of Salmonella serovars, Escherichia coli O157:H7, and Listeria monocytogenes during dry-curing and drying of meat: a case study with Basturma. *Journal of Food Safety.* 26:160-172.

Burnham, G.M., M.A. Fanslau, and S.C. Ingham. 2006. Evaluating microbial safety of slow partial-cooking processes for bacon: use of a predictive tool based on small-scale isothermal meat inoculation studies. *Journal of Food Protection.* 69:602-608.

Ingham, S.C., M.D. DeVita, R.K. Wadhera, M.A. Fanslau, and D.R. Buege. 2005. Evaluation of small-scale hot-water post-packaging pasteurization treatments for destruction of Listeria monocytogenes on ready-to-eat beef snack sticks and natural-casing wieners. *Journal of Food Protection.* 68: 2059-2067.

Ingham, S.C., R.A. Engel, M.A. Fanslau, E.L. Schoeller, G. Searls, D. R. Buege, and J. Zhu. 2005. Fate of Staphylococcus aureus on vacuum-packaged ready-to-eat meat products stored at 21°C. *Journal of Food Protection* 68: 1911-1915.

Ingham, S.C., R.K. Wadhera, M.A. Fanslau, and D.R. Buege. 2005. Growth of Salmonella serovars, Escherichia coli O157:H7, and Staphylococcus aureus

during thawing of whole chicken and retail ground beef portions at 22 and 30°C. *Journal of Food Protection* 68: 1457-1461.

Ingham, S.C., J.A. Losinski, K.L. Becker, and D.R. Buege. 2004. Growth of Escherichia coli O157:H7 and Salmonella serovars on raw beef, pork, chicken, bratwurst, and cured corned beef: implications for HACCP plan critical limits. *Journal of Food Safety* 24: 246-256.

Ingham, S.C., D.R. Buege, B.K. Dropp, and J.A. Losinski. 2004. Survival of Listeria monocytogenes during storage of ready-to-eat meat products processed by drying, fermentation, and/or smoking. *Journal of Food Protection.* 67: 2698-2702.

Scientific journal articles, however, are not the most appropriate medium for communicating research findings to meat processors. Dr. Barbara Ingham has directed the creation of the Center's website which provides short, reader-friendly summaries of research for processors to use, as well as links to government information and other background material: Wisconsin FIRST: http://www.wisc.edu/foodsafety/

Next steps: Applied research efforts are currently underway at the Center to develop safe, simple microbiological techniques for processors to use in validating beef carcass intervention treatments and the production of safe ground-and-formed beef jerky. The concept we are studying is the use of Generally Recognized As Safe (GRAS) lactic acid bacterial starter cultures as surrogates for target pathogens in these two processing situations. Our goal is to identify GRAS cultures that processors legally add to beef carcasses or jerky batter in their plants and then subjected to either the intervention treatment (carcass) or cooking/drying process (jerky). Extension specialists would teach processors how to add the culture, take product samples before and after processing, submit the samples to a laboratory for testing, interpret the results, and thereby determine whether their intervention treatment or jerky-making process is adequate under USDA requirements.

FY 2006 participation: Steve Ingham .5 fte, Scott Rankin .25 fte and Barbara Ingham .05 fte

National strategic goal 3

Evidence: Campus and county faculty and staff report their work against expected outcomes through Cooperative Extension's Planning and Results System (PRS). They also submit more detailed success stories of their work for the PRS database and integrated research reports for USDA's CRIS database. Wisconsin Food Stamp Nutrition Education (FSNE) annual reports are available at: http://www.uwex.edu/ces/wnep

National strategic goal 4: A healthy, well-nourished population

Executive summary

Situation

Wisconsin adults make choices about nutrition and lifestyle behaviors in an environment that promotes overeating and facilitates inactivity. Obesity has reached epidemic proportions nationwide, and increased statewide from 13 percent in 1991 to 22 percent in 2001. As of 2004, 10.7 percent of Wisconsin residents and 14 percent of Wisconsin children lived in poverty, up from 8.7 and 10.8 percent in the 2000 U.S. Census. In many more households, incomes are above the official poverty line, but still low enough to qualify families for government programs such as food stamps. In 2005, more than half a million Wisconsin residents participated in the Food Stamp Program — 10.3 percent of the population. Use of emergency food sources is also at an all-time high.

Low-income women are most at risk of obesity, their children are most at risk of being overweight or of becoming overweight. This in turn puts these families most at risk of diabetes and chronic diseases. Likewise, hunger is disproportionately high among officially poor Wisconsin families. Statewide, more than half a million people live in households that are food insecure — they do not always have access to enough food for an active healthy life. Low-income families have alarmingly high rates of food insecurity and hunger — the most severe form of food insecurity. Research shows that regular physical activity and healthy eating can model positive life-long behaviors for these families.

Extension response

The UW-Extension statewide Eating Well and Being Active Team and Poverty and Food Insecurity Team include faculty with research and extension appointments, drawing on the expertise of the College of Agricultural and Life Sciences, School of Human Ecology, and Center for Biotechnology. Wisconsin's goals for working toward a healthy, well-nourished population include:

- Communities will promote healthy food, physical activity and lifestyle choices.
- Individuals/families will achieve optimal health throughout their lifespan by choosing and preparing nutritious meals and snacks and balancing the food they eat with physical activity.

- Communities will ensure that all people at all times have physical and economic access to sufficient acceptable food to meet their dietary needs for a productive and healthy life.
- Individuals/families will manage their resources so they are healthy and well nourished.

UW-Extension campus and county educators collaborate closely with colleagues and health professionals to reach shared audiences, work carefully with local advisory committees, and take initiative to reach under-served audiences (see the previous goal for more details on these relationships). Audiences for nutrition, physical activity, poverty and food security education include parents and caregivers of young children, limited resource families, culturally and ethnically diverse individuals and families, under-served and under-represented populations, youth and older adults — and those who serve them.

With nearly 800 community partners, Wisconsin Nutrition Education Program (WNEP) community-based nutrition educators and coordinators work with diverse individuals, families and communities affected by poverty, tailoring messages to Food Stamp recipients and those eligible for the Food Stamp program (Food Stamp Nutrition Education, FSNE), as well as Expanded Food and Nutrition Education Program EFNEP) families in 60 counties. Easy-to-read nutrition and money management educational materials are culturally reviewed and adapted in English, Spanish and Hmong. WNEP also engages community partners in understanding food security issues through poverty simulations.

Impacts

Promoting healthy nutrition, physical activity and lifestyle behaviors for a healthy, well-nourished population through Family Living Programs, Food Stamp Nutrition Education and 4-H Youth Development, the statewide Eating Well and Being Active Team and Poverty and Food Insecurity Team report the following FY 2006 impacts of nutrition, physical activity, poverty and food security education.

National strategic goal 4 total expenditures FY 2006

(By percent of full-time equivalent and source of funding

	FTEs	Smith-Lever	State match	FSNE match
Smith-Lever	1.50	$50,033	$270,908	
WNEP	123.08	$1,683,987	$6,480,878	$6,480,878
Integrated	2.00	$220,875		

Key themes: Human health, Human nutrition; Other: Food resource management, Under-served and under-represented populations

Helping low-income individuals and families make healthier food and lifestyle choices, supporting parents in raising healthy eaters

Situation

An average person now eats more than one-third of their food away from home, making choices in an environment that encourages overeating. Compared with food prepared at home, food obtained away from home tends to be higher in fat, saturated fat, sodium and sugar, and lower in calcium and fiber. Obesity and Type 2 diabetes have reached epidemic proportions. Rates are disproportionately high among low-income Latinas, American Indian and African American women and youth.

According to research, three-fourths of children ages 2 to 5 years old have poor diets (76%). In Wisconsin, one-fourth of 2- to 5-year-olds are either overweight or at risk of being overweight (25%). Poor eating habits and limited physical activity are modifiable factors that contribute to overweight. Preventing obesity later in life requires early interventions including both the child and family, yet few effective interventions link parenting and nutrition education. Providing parents with knowledge can promote success in feeding and healthy eating behaviors. UW-Extension Family Living educators with experience in both parenting and nutrition are in the ideal position to conduct this education in their counties.

Inputs

As need grows for promoting healthier diets and more active lifestyles, UW-Extension has the research base, culturally appropriate educational materials, networks and expertise to help Food Stamp-eligible children, youth, families and older adults make healthier food choices. Wisconsin Nutrition Education Program (WNEP) educators and coordinators respond With their county family living and 4-H colleagues to meet the diverse needs of low-income children, families and older adults through nutrition education programs in a variety of community settings using group sessions, learn-while-you-wait, lessons for individuals and other strategies. Bi-lingual nutrition educators help reach underserved families using culturally reviewed and adapted educational materials in English, Spanish and Hmong. WNEP operates as 39 programs in 60 counties with nearly 800 community partner agencies (see “National strategic goal 3: A safe and secure food and fiber system” for details on these relationships).

To support parents in raising healthy eaters, Family Living Programs state staff submitted a grant proposal in 2005 and received funding from the Centers for Disease Controland Prevention. State nutrition Specialists Gayle Coleman and Heather Harvey adapted an existing Michigan curriculum for use with parents of 2 to 5-year-olds in a small group setting based on facilitated dialogue techniques. The Raising Healthy Eaters curriculum addresses child development, parenting skills, nutrition, and age appropriate feeding behaviors. Raising Healthy Eaters consists of eight user-friendly lessons that include a variety of recipes, group discussion questions, skills-based activities and goal setting. Since the initial introduction of the curriculum, further statewide training of UW-Extension educators has occurred. Plans are underway to offer the learner-centered program in at least 15 additional counties. Adaptation for a Latino audience and additional evaluation and follow up are underway.

Outputs

Raising Healthy Eaters: Six UW-Extension county Family Living educators pilot-tested the revised Raising Healthy Eaters curriculum. Twenty-four participants completed all the lessons. Participant retention was 79 percent. Eighty percent of the participants used at least one social assistance program for low-income individuals or families, and most participants (93%) had at least one child age 2 to 5 years old. Participants were 74 percent white, 22 percent Latino/a, and 4 percent American Indian. Following the program, a survey adapted from Michigan State University was used to assess parents' knowledge, confidence and behaviors related to feeding their child. In addition, parents were asked to participate in a 24-hour recall of what their child ate the previous day and what they (the parents) ate at one meal that they shared with the child. Surveys and 24-hour dietary recalls were collected at lessons one, six and nine. In addition, at lesson six and nine participants commented on the lesson format, what they learned and what they are now doing differently.

Strengthening educational partnerships: WNEP is a major partner in the Wisconsin Nutrition Education Network, a statewide alliance of agencies working collaboratively so that low-income residents receive consistent, relevant, accurate and effective nutrition messages. During 2006, the Network sponsored the second year of a nutrition education campaign in 53 counties and the Great Lakes Intertribal Council. The campaign, "Stepping Up to a Healthy Lifestyle" reached 25,867 adults and children through group lessons, interactive displays and demonstrations encouraging good nutrition and daily physical activity, consistent with the Dietary Guidelines for Americans for Wisconsin FoodShare recipients and applicants. In addition to direct contacts, more than 136,675 adults and children were reached via handouts, posters, newsletters, newspaper articles and radio programs during 2006. Network partners include UW-Extension Food Stamp Nutrition Education (FSNE), WIC — Women, Infants and Children Program, Elderly Nutrition Program, Maternal and Child Health (MCH), Head

Start Collaboration Project, Hunger Task Force of Milwaukee, Madison Area Technical College, and UW-Madison Department of Nutritional Sciences. Partners completing the first-year evaluation reported that the campaign strengthened their partnering relationships even when these relationships were already established.

Choosing Healthful Food. Over 73 percent (223,001) of all WNEP educational contacts focused on helping people choose more healthful food for themselves and their families. Learners were taught at job centers, WIC, food pantries, in group homes and schools. Whole grains are recommended because they are associated with a lower risk for coronary heart disease and type 2 diabetes. Diets rich in fruits and vegetables are associated with lower risk for stroke, type 2 diabetes, and certain cancers. Gaining knowledge and awareness related to key dietary recommendations is an important step to choosing more healthful food.

Managing Food Dollars. A major goal of WNEP is to help limited resource families become more food secure by teaching them to track spending, manage food dollars and plan nutritious meals. Teaching on food resource management took place at WIC and other public health clinics, job training centers and Food Stamp offices, food pantries, family resource centers and senior meal sites.

Impacts

Raising Healthy Eaters: UW-Extension state nutrition education specialists Heather Harvey and Gayle Coleman administered 24-hour recalls to participants at the commencement of the lessons. Final evaluations were collected in February 2006. After each lesson, Coleman and Harvey also collected feedback from the 6 family living educators pilot-testing this curriculum, through observation of lessons, individual conversations and group discussions. Evaluators measured changes that indicate an improvement in feeding practices that will lead to healthier children and lower rates of overweight children. At the conclusion of the lesson series:

- Participants increased their knowledge of age appropriate feeding practices.
- Participants gained confidence in their ability to get their child to:
  - — try new foods and vegetables.
  - — drink water instead of sweetened beverages.
- Diet recalls indicated that the TV was off more often during meals and that there was a trend towards children eating more fruit.

Teaching at Food Stamp Offices and Job Centers. During the 2006 program year, 30 counties provided education at Job Centers, FoodShare offices and

publicly funded job training sites. Over 4000 educational contacts were made with learners at these types of sites. Money for Food lessons and evaluation tools were used to teach over 3000 learners. Over 80% of the learners reported that they had learned something or would do something differently after the lessons.

- After an activity on developing a family spending plan, 95% of 555 learners reported that they intended to try to use a spending plan for their families.
- After a lesson on using food stamps and other programs to put together a food budget, 80% of 201 learners reported that they had learned something that would make it easier for them to get enough food or money for food.
- After playing a learning game on the benefits of meal planning, 76% of 1,191 participants indicated they would do more planning ahead for their meals.

The first annual Financial Wellness Conference was taught at Keshena on the Menominee Reservation on Saturday, April 1, 2006. County educator Joe Stellato team-taught a three-hour session for teens age 14 and up. The Juggling Act: Real Life Financial Simulation program was attended by eight teens, age freshman to junior in high school. Four students were boys, four were girls. Six were Native American, two were White. Topics taught were developing a household budget for a simulated family, how to make wise decisions when shopping, looking for work, child care expenses and more.

Teaching in Schools and After-School Programs. During the 2006 program year, 40 counties provided education to youths 5 to 17 years old either during the school day or at summer or after school programs. Nutrition educators and coordinators made 143,756 direct teaching contacts with children 5 to 11 years old and 27,299 direct teaching contacts with youth 12 to 17 years old. Educators provided a series of nutrition education lessons for youth at school, after-school enrichment programs, libraries, public and tribal health clinics, neighborhood centers, summer feeding sites, Head Start and Community Action Agencies. Key lessons covered Choosing a healthful diet, especially eating plenty of fruits, vegetables and whole grains; Balancing food eaten with physical activity; and Planning meals and choosing snacks, especially those with less fat and sugar. Children were asked a question before, and again after, the lesson to determine what they had learned.

- 66% of 1,200 students knew how many servings daily from the milk group before lessons, and 89% knew the number of daily servings after the lessons.

- 62% of 2,400 students identified the healthiest fast food choice before, and
  88% knew the healthiest choice after the lessons.
- 56% of 2,700 students identified proper handwashing before the lessons, and
  87% knew how to wash their hands properly after the lessons.
- 44% of 2400 students chose the best daily variety of vegetables before, and
  52% knew how to get the best variety of vegetables in a day after the lessons.
- 45% of 850 students chose the best daily variety of fruits before lessons, and
  62% knew how to get the best variety of fruits in a day after the lessons.

A major emphasis was to teach children in kindergarten through fifth grade about fruits and vegetables. After the lessons, WNEP educators sent surveys to about 2000 parents and primary caregivers of these children. 409 parents and primary caregivers returned completed surveys.

- 58% of the parents/primary caregivers reported that their children were more willing to taste new foods or foods that he or she usually doesn't eat.
- 54% of the parents/primary caregivers reported that their children have been eating more fruit; 41% reported that their children have been eating more vegetables.

Teaching at Senior Dining Sites. Older adults who make healthier choices live longer and better lives. However older adults consume inadequate amounts of key nutrients, and low-income older adults tend to have poorer diets than their higher-income peers. During 2006, WNEP made over 32,000 teaching contacts with older adults at Senior Dining Centers and Senior Housing Sites in 44 counties. Nutrition educators discussed a variety of topics with seniors, including eating more fruits and vegetables, storing and handling food safely, paying attention to portion sizes, choosing healthy snacks, and balancing food with physical activity.

In 2006, educators collected comments from older adults participating in nutrition education at 47 dining centers, and dining center managers from 82 dining centers completed questionnaires. 71 of the dining center managers said they had observed or heard evidence that participants at their site had learned something new; 44 of the managers said they had observed or heard evidence of nutrition-related behavior change. Participant comments include: "I learned so much today. I thought I knew all about whole grains," "I use canola oil and olive oil for baking and cooking, now. I used to use only butter," "I never wash grapes; I didn't know I was supposed to. Now I will," "I give the handouts to my children

because they cook for me, they need to know how to cook without adding fat meat to vegetables."

Teaching at Food Pantries. During 2006, WNEP made nearly 20,000 teaching contacts with learners at food pantries and emergency feeding programs across the state. Food pantries serve learners of all ages: children, youth, adults and seniors. Educators shared a display, recipes, preparation tips and samples of new or unfamiliar foods with food pantry clients. Foods included powdered milk, squash, apples, figs, canned cranberries, canned green beans or peas, whole grains, dried garbanzo beans, canned salmon and canned sweet potatoes.

In 2006, 10 Wisconsin counties participated in evaluating WNEP education at food pantries. Educators staffed displays at food pantries, which focused on encouraging food pantry clients to choose, and use, healthy foods that were new or unfamiliar to them. A total of 610 learners participated in the evaluation project. After the brief lesson, clients were asked if they would choose, and use, the food item if it was available for them to eat or prepare at home — and responses (yes/no/unsure) were recorded. The percentage of learners responding 'yes' to the educator's question ranged from 64% to 93%, depending on the food item presented.

Teaching at WIC — Women, infants and Children clinics. During 2006, 46 WNEP counties provided educational programming at WIC clinics reaching 27,818 WIC participants with brief lessons in the waiting area. After a lesson, the participant was asked one or two questions to assess either knowledge gain or participant intent to change their behavior as a result of the lesson. After a WIC clinic nutrition lesson:

- 92% of 350 learners said they would try to eat more vegetables each day.
- 77% of 500 learners said they would try to eat more fruit each day.
- 72% of 550 learners could state a good reason for including a variety of vegetables in their food choices each day. One participant said, "Vegetables help us to stay healthy and fight disease; they are important for the whole family.
- 66% of 400 learners could state a good reason for including fruit in their food choices each day.

Educators taught over 140 WIC participants how to use WIC foods in their family meals and snacks. After the lesson, 92% of the participants said that they had learned something that would make it easier to use WIC foods in meals and snacks. Participants said, "I can use WIC beans to make soup like bean or pea soup" and "I like the idea of using a crock pot to cook WIC beans so a meal is ready at suppertime with little fuss."

Key Themes: Human health, Human nutrition; Other: Food accessibility and affordability; Food recovery and gleaning, Food security; Under-served and under-represented populations (American Indian)

Food security and poverty education increase community capacity to lessen hunger among low-income individuals and families

Situation

The family next door or down the street may live in poverty, but neighbors may not know. Third world hunger images obscure what exists in our back yard. As of 2004, 10.7 percent of Wisconsin residents and 14 percent of Wisconsin children lived in poverty, up from 8.7 and 10.8 percent in the 2000 U.S. Census. In many more households, incomes are above the official poverty line, but are still low enough to qualify families for government programs such as food stamps. In 2005, more than half a million Wisconsin residents (10.3%) participated in the Food Stamp Program, now called FoodShare in Wisconsin. Statewide unemployment rates continue to rise and use of emergency food sources, such as food pantries, is at an all time high.

Hunger is disproportionately high among officially poor Wisconsin families — many do not have enough food to meet their needs. Statewide, more than half a million people live in households that are food insecure — they do not always have access to enough food for an active healthy life. Low-income families have alarmingly high rates of food insecurity and hunger — the most severe form of food insecurity. Wisconsin continues to rank at the bottom nationally for School Breakfast program participation. Less than half (47 percent) of Wisconsin schools that offer free or reduced-price lunch programs also offer breakfast programs. Only a quarter (25 percent) of low-income students who receive subsidized school lunch also receive school breakfast.

Inputs

The UW-Extension statewide Poverty and Food Insecurity Team and Wisconsin Nutrition Education Program (WNEP) provide poverty and hunger awareness education programs to help communities better understand the scope of the problems, underlying causes and potential solutions. Directly and through nearly 800 community partners, WNEP research-based education programs reduce barriers to food security and help communities improve food access for low-income individuals and families at risk.

Since 2005, UW-Extension Food Security Specialist Kadi Row has provided leadership for the Wisconsin Food Security Consortium, a group of public and private sector representatives dedicated to eliminating food insecurity. During 2006, the Consortium engaged local hunger coalitions in a statewide planning process. They identified, collected and shared information about local coalitions and effective hunger prevention practices. The Consortium also welcomed representatives of local coalitions as members of the Consortium, opening Consortium meetings to all interested coalition members; sharing minutes; coordinating a statewide teleconference; and surveying local coalition representatives. The consortium's most significant achievements during 2006 included developing the first steps of an Action Plan to Reduce Hunger in Wisconsin, planning for a statewide Hunger Summit in fall 2007, and planning for subsequent regional forums in 2008.

Outputs

In early 2006, state food security specialist Kadi Row worked with the UW-Madison Applied Population laboratory, Cooperative Extension Publications and Family Living Programs staff to update **Hunger Close to Home**, a hunger awareness publication series with local demographic data for each of Wisconsin's 72 counties to help local educators and stakeholder partners share research-based information about hunger and poverty in their own community. The following county examples illustrate how family living and 4-H youth development educators, WNEP educators and coordinators used these materials to conduct Hunger Close to Home programs as part of local hunger awareness and poverty simulation. This series is published with companion publications at: http://www.uwex.edu/ces/flp/demographics

- **Green Lake County:** UW-Extension Family Living Educator Molly Haak shared Hunger Close to Home materials with a local HCE (Home and Community Education) club during April 2006, reinforcing the importance of club efforts to raise money for a local food pantry.
- **Iowa County:** For Poverty Simulations, county educators Ruth Schriefer and Donna Peterson routinely present local demographics from Hunger Close to Home to help participants understand their community's connection to the more general simulation. Schriefer and Peterson have facilitated Poverty Simulations for regional leadership and school groups, public officials, educators, business owners, college students, health care providers, clergy and others. With 4-H youth development educator Debra Ivey, they also adapted the program to provide poverty education and awareness training for reproductive health care professionals, Head Start and school staff.
- **Marinette County:** During March 2006, the Marinette County Association for Home and Community Education sponsored a Hunger Close to Home

presentation for the public. As a result, county family living educator Nancy Crevier was asked by a local congregation to present Hunger Close to Home for a public forum that included local interfaith leaders.

- **Statewide:** Sawyer County family living educator Trinke McNurlin reports

The Waukesha County Nutrition Coalition (WCNC) is a network of more than 30 member agencies dedicated to ending hunger. Formed in 1995, the coalition represents food pantries, meal sites, shelters, congregations, community and government programs. Goals of the Coalition include educating the community about the extent of hunger in Waukesha County, showing citizens how and where to find emergency food, developing recommendations for nutrition programs and policies, and increasing access to food in the community. For 10 years, the WCNC has met regularly to network and take action to address hunger, engaged in a strategic planning process, conducted two significant research studies of hunger in Waukesha, and provided leadership for several principal anti-hunger activities.

In 2005, Coalition leaders expressed interest in documenting accomplishments and assessing needs for the future. To achieve this, Coalition leaders worked with evaluators to design and conduct an evaluation and needs assessment. Kadi Row took leadership for designing and conducting this evaluation, with assistance from an outside consultant and consultation from state evaluation specialist Ellen Taylor-Powell. The evaluators used three main methods to collect data for the project: focus groups with current and past coalition members, interviews with community stakeholders, and a review of Coalition documents. Findings revealed that the accomplishments of the Waukesha County Nutrition Coalition have been significant over the past 10 years, both in terms of process and projects. These were compiled into a report and presented to WCNC members and community stakeholders.

The final section of the evaluation report provided a series of recommendations for the Coalition to consider. For example, evaluation results suggested that the WCNC has a marketing opportunity --to improve understanding of the Coalition, its activities, accomplishments and goals among members, stakeholders, and external partners. Further, the Coalition is well placed to work on (or to continue working on) many of the projects it is currently engaged in. The results suggested it would be very useful to re-assess the strategic plan and get buy-in to the existing or revised strategic plan by of all members and stakeholders.

Outcomes and impacts

Under the leadership of UW-Extension food security specialist Kadi Row, the Wisconsin Food Security Consortium developed the first steps of an Action Plan

to Reduce Hunger in Wisconsin, and planned a statewide Hunger Summit for 2007 with follow-up regional forums in 2008. By developing an Action Plan to Reduce Hunger, the consortium is creating the necessary infrastructure and undertaking essential planning for a focused, sustained effort to reduce hunger and food insecurity in Wisconsin. The overall outcome will be dissemination of an Action Plan that offers a menu of specific steps that state and local leaders from the public and private sectors can take to help minimize hunger and food insecurity.

Waukesha County Nutrition Coalition: Row reports that overall, the 2006 evaluation found the Waukesha County Nutrition Coalition (WCNC) highly regarded by members (current, past, active and inactive) and by community stakeholders. The Coalition is perceived as highly functional, with very effective leadership. The WCNC has shown great flexibility and responsiveness to changing needs and membership over the years. Coalition accomplishments were found to be significant and varied, and generally in line with WCNC's mission and goals. Participants were clear that hunger still exists as a need in Waukesha County, and that the WCNC is well placed to address hunger issues. Because the value of networking emerged as a strong benefit and accomplishment of the WCNC, evaluation results confirm the importance of monthly Coalition meetings and the recommendation for continuing them.

Hunger prevention coalitions: WNEP staff play key roles in cultivating new coalitions, providing on going consultation and support, documenting coalition activities and successes, and facilitating communication. Through community partnerships, WNEP educators and coordinators enhance access to fresh fruits and vegetables through community gardens or farmers markets. For example:

> **Ashland and Bayfield counties:** The Nutrition Coalition of the Chequamegon Region created a Mobile farmers' Market to reach rural areas where no markets existed for older adults and WIC participants to use farmers' market vouchers. Educational partners include the area community action agency, Northwest Wisconsin Community Services Agency including the food shelf, Retired Senior Volunteer Program, homeless and transitional housing programs, Aging Units for both counties, Human Services for both counties, New Day Shelter, North Country Independent Living, interfaith communities and Community Gardens. Producers also benefit from this new outlet for their crops.
>
> **Program impacts:** County educator Betty Tarabek reports that 2006 marked the third full season as the mobile market expanded to 24 visits to 9 sites from August through October, and 387 people participated in the markets held in rural communities with WIC or senior meal sites. FEAST also conducted an apple gleaning at a Bayfield County orchard and distributed the apples to the food shelf, WIC the food pantry and aging unit sites. The Green Thumb community garden dedicated a garden plot to

grow produce for the food shelf, and gardeners at the community garden also donated produce.

Statewide: Poverty and food insecurity are closely linked. UW-Extension provides poverty awareness education and training on strategies for working with low-income audiences. As a result of UW-Extension education during 2006:

- 1,645 individuals and agency partners participated in UW-Extension Bridges out of Poverty workshops. For example, during 2006:
  - — Bridges out of Poverty was presented as a breakout session for a regional economic development conference.
  - — **Green County:** The Bridges Out of Poverty workshop reached teachers, counselors, the principal and superintendent of a small rural school district.
  - — **Green Lake County:** The training reached two Habitat for Humanity board members, a food pantry volunteer, a university student, interfaith pastor and youth minister, county board member, early childhood educator, service league member, health care provider, county government employee, TRIAD member, and elementary school teachers. —
  - — **Northeast Wisconsin:** The Lac du Flambeau Head Start director requested a training, attended by staff from Head Start, tribal education and youth departments. Ho Chunk Head Start staff attended another.
  - — **Northwest Wisconsin:** All Family Forum/Head Start staff participated from their five county service area — Ashland, Bayfield, Douglas, Iron and Price counties.
- 1,207 individuals participated in poverty simulations, and 473 individuals participated in other educational activities raising awareness of poverty issues. For example:
  - — 48 home visitors from around the state attended workshops that include skills for working with families living in poverty. They will use the information to support positive change for families living in poverty. This group of attendees provides direct support to families living in poverty who have children under the age of five. Home visitors often work with families to set personal and family goals.
  - — Supervisors of home visitors attended a one-day discussion of how to work more effectively with families living in poverty who may also be facing issues of substance abuse.
- 752 individuals participated in educational activities raising awareness of food security.

- 500 families were reached directly by in-person outreach efforts or through community partners.
- 48 home visitors from around the state attended workshops that include skills for working with families living in poverty. They will use the information to support positive change for families living in poverty. This group of attendees provides direct support to families living in poverty who have children under the age of five. Home visitors often work with families to set personal and family goals. Supervisors of home visitors attended a one-day discussion of how to work more effectively with families living in poverty who may also be facing issues of substance abuse.

UW-Extension leads professional development programs to improve skills for working with families in poverty. By 2006, more than 200 campus and county faculty and community partners had been trained to conduct educational programs that help participants understand the effect of economic class on behaviors and mindsets. During 2006:

- 33 UW-Extension colleagues certified to use Bridges out of Poverty training materials participated in a dialogue sharing information, teaching strategies and evaluation of these materials.
- 8 UW-Extension educators from around the state met regularly with the Bridges out of Poverty Steering Committee to review, evaluate and plan next steps to support hunger prevention and poverty awareness trainings.
- Trainers reported significant increases in participant knowledge and understanding of issues of generational poverty, as well as identification of skills needed to work more effectively with families in poverty.

By 2006, UW-Extension educators had conducted more than 90 poverty simulations for about 5,000 participants, and reported medium-term impacts:

- Program evaluations document striking increases in understanding among participants, and improvements in interactions with low-income clients.
- Participants report greater understanding of the financial pressures faced by low-income families in meeting basic needs.

Communities are reporting long-term impacts of hunger prevention and poverty awareness trainings. During 2006:

- 45 agency partners reported making changes that reduced poverty in their communities.
- 3 new hunger prevention coalitions or networks were established to address locally identified food security issues.

- A coalition of business, banking, education, interfaith and service groups banded together to research and pilot-test a Waupaca County VITA site and help up to 100 limited-resource families secure tax refunds that benefit personal and community income.

Evaluation of the success of multi-state and joint activities

Key Themes: Human health, Human nutrition; Other: Food accessibility and affordability; Food security; Under-served and under-represented populations

Collaborative food security survey increases community capacity to reduce hunger among low-income school-age children and youth

Situation

Nationally, research shows that households with children are more likely than others to experience food insecurity — they do not have assured access to enough food for a healthy, active life. Food insecurity is linked to greater risk of negative outcomes among children including frequent health problems, anxiety and hyperactivity, and poor school achievement such as absenteeism, low test scores and dropout. Multi-state research collaboration followed with local partnerships is increasing community capacity to identify school-age children most at risk and improve food security in their families.

Extension response

During 2004,Wisconsin food security specialist Judith Bartfeld, Department of Consumer Sciences, UW-Madison / Extension, collaborated with colleague Rachel Dunifon, Cornell Cooperative Extension, on the School-Based Food Insecurity Project developing and testing self-administered surveys to assess food security among households with elementary school children in Wisconsin and New York. The Wisconsin portion of this collaboration was funded by a Hatch grant as well as a USDA grant administered through the Institute for Research on Poverty.

The self-assessment consists of a 25-question survey that takes only 5 to 10 minutes to complete. Answers to six of those questions allow researchers to identify families that fit the U.S. Department of Agriculture's definitions of those who are food secure, are food insecure without hunger, and are food insecure

with hunger. In Wisconsin, Bartfeld works with coalitions of elementary school staff, administrators, public and tribal health professionals, and UW-Extension county faculty, nutrition educators and coordinators to identify and develop strategies to meet local needs.

Outcomes and impacts

Central Wisconsin: In January 2005, Adams, Columbia and Sauk County Nutrition Education Program coordinators used the food security self-assessment developed by Judy Bartfeld to survey elementary school parents in Wisconsin Dells where residents work low-wage full-time jobs or multiple part-time jobs inherent to the tourism industry. The survey showed that 40% of the children are in families living below or near the federal poverty level, $19,500 for a family of 4. These families live on the edge of self-sufficiency and are food insecure — they do not know if they will have enough healthy food to feed their household, and may skip meals or eat less to stretch food supplies.

Statewide, one of twelve families is food insecure; in Wisconsin Dells, one in five families is food insecure. Of the families identified as food insecure, 79% have at least one employed worker and 86% have at least one full-time, year-around worker, yet one in ten have experienced hunger in the last year. Following the survey, a meeting was held to identify strategies to raise awareness and to address hunger prevention. Nutrition education coordinators Becky Gutzman (Columbia County), Danielle Varney (Sauk County), and Theresa Danielson Wimann (Adams County) presented an educational program on food security to 148 Wisconsin Dells School District teachers and administrators in August 2006, and a 30 minute program at the beginning of the school year providing background information on food security using UW-Extension Hunger Close to Home materials. Varney and Gutzman also shared survey results and food assistance resources with the Sauk County Department of Health .

Program impacts: School teachers and administrators increased their awareness of family resources to improve food security among students.

Southeast Wisconsin: In 2004, the household food security survey was conducted with Burlington Area School District families of children kindergarten through grade four. To continue the work on this project, the quad-county Food Security and Hunger Prevention Coordinator position was created in spring 2006, with Rory Klick as Coordinator. Follow-up was needed to determine how survey results could help guide food service policy and programs for the district. Survey data indicate that one-fifth of families are food insecure, with higher incidence among low-income and single-parent families. While only 18 percent of children receive free or reduced-price lunches, another 12 percent qualify. The most striking finding was that nearly one-fourth of children (23%) skip breakfast at least once a week. Rory Klick worked with the school district food service director to research program feasibility and held further discussions with school staff. In

January 2007, two schools implemented the pilot phase of the “Morning Grab and Go” snack program. Family Living Educator Bev Baker worked with the PTSO president, two other parents and five students to develop a video to educate students on the process and encourage participation in the program.

Program impacts: Dyer Intermediate School and Waller Elementary School are pilot testing the morning snack program for the spring semester, and the district may expand the program to more schools in fall 2007. Klick reviewed the district’s Wellness Policy to be implemented per federal requirement in the 2006-2007 school year, compared it with a model policy guide published by the Center for Ecoliteracy, Slow Food USA and the Chez Panisse Foundation, and drafted a report suggesting improvements to the policy and ways to meet the district’s annual expansion goals.

Key themes: Human health, Human nutrition

Stages of change in fruit-vegetable behaviors among low-income young adults

Dr. Susan Nitzke, UW-Madison / Extension Department of Nutritional Sciences, continues her leadership for research affiliated with a five-year multi-state Hatch and Extension project on Stages of Change and fruit/vegetable behaviors of young adults. She is the principle investigator for a complementary multi-state IFAFS project that applies Stages of Change and other constructs of the Transtheoretical Model to a set of tailored newsletter-based interventions that is being extensively evaluated to determine the effectiveness of this approach in reaching economically disadvantaged young adults.

For this study, Wisconsin maintained a password protected website for the team of investigators to share grant-based information. Wisconsin researchers worked with the multi-state research team to assess the effectiveness of an internet-based system for presenting messages from this group's IFAFS-funded successful intervention in a more practical format for widespread use at the community level, and shared results through the October 2005 NC219 annual meeting in Madison.

Program impacts: Stage-tailored, individualized intervention materials provided to young adults were found to improve consumption of fruit and vegetables. The more extensive intervention with a combination of tailored mailed materials and two educational phone calls over a 6-month period were more effective than the shorter web-based system in terms of fruit and vegetable intakes, but both modes of intervention were found to have advantages in terms of demands on educators and participants. These findings will enable nutrition educators to provide more effective programs to promote nutrition-related lifestyle behaviors.

The internet-based program was submitted to the Food Stamp Connections national web-based system for review and distribution. Outreach scholarship:

Chang, M.W., Baumann L.C., Nitzke S., Brown R. Predictors of fat intake behavior differ between normal weight and obese WIC mothers. *American Journal of Health Promotion* 2005;19(4):269-277.

Ruud J.S., Betts N.M., Kritsch K., Nitzke S., Lohse B., Boecker L. Acceptability of stage-tailored newsletters about fruits and vegetables by young adults. *Journal of The American Dietetic Association* 2005;105:1774-1778.

FY 2006 participation: Susan Nitzke .25 fte

Dr. Sherry Tanumihardjo(UW-Madison / Extension Department of Nutritional Sciences) is project director for a USDA-NRI funded research and extension integrated project through 2008 titled, "Promotion of high vegetable consumption as a weight-loss strategy and general well-being." The research component was completed during 2006 and a comprehensive extension component with evaluation materials is being developed for widespread use .

FY 2006 participation: Sherry Tanumihardjo 0.55 FTE

National strategic goal 4

Evidence: Campus and county faculty and staff report their work against expected outcomes through Cooperative Extension's Planning and Results System (PRS). They also submit more detailed success stories for the PRS database and integrated research reports for USDA's CRIS database. Wisconsin Food Stamp Nutrition Education (FSNE) annual reports are published on the Wisconsin Nutrition Education Program web site: http://www.uwex.edu/ces/wnep

National strategic goal 5:

Greater harmony between agriculture and the environment

Executive summary

Situation

Maintaining farm profitability while protecting the natural environment continues to focus priority concerns statewide. Agriculture and real estate development compete for the same land. Farmers and communities must plan for sustainable land use, drinking water supplies and water quality. Clean, clear lakes are a major reason Wisconsin generates more than $8 billion annually from recreation and tourism. Controversy flares when manure spills or heavy rains and sudden snowmelt wash unsafe amounts of nitrogen, phosphorus and bacteria from cropland into private wells or popular fishing areas. Nearly 66,000 farmers who handle animal waste and face tightening regulations must create their own nutrient management plans and use conservation best practices to control erosion and non-point sources of pollution — and stay profitable.

Extension response

UW-Extension Agriculture and Natural Resources Extension (ANRE) and Community, Natural Resource and Economic Development (CNRED) campus and county educators work with partners such as farmers, farm support businesses, county, tribal, state and federal conservation and regulatory agencies and their citizen advisors to develop research-based educational programs that meet local needs and help rural communities become better stewards of the land and watersheds. Campus and county colleagues collaborate across disciplines with support from the Local Government Center and research scientists of the University of Wisconsin Madison, Platteville, River Falls and Stevens Point campuses and agricultural research stations statewide, from university extension services nationwide and around the world.

To encourage constructive dialog and curb conflict, the Wisconsin Legislature enacted the Livestock Facilities Siting Law, enabled in 2006 by technical standards published in the administrative code. The law is designed to protect public health and safety by establishing measurable standards and procedures for issuing licenses for new and expanded livestock and manure storage facilities. For this law to apply, counties must create or revise ordinances consistent with state rules, and the Dairy Team Livestock Siting and Land Use Work Group is building community capacity to do so.

New research based education introduces management tools so farmers can credit manure and legume nitrogen in soils, apply only as much fertilizer as their crops can use, and adjust livestock rations to reduce the amount of excess phosphorus their animals excrete. Team Grains soil scientists revised economical nutrient application rate guidelines given the rising cost of fertilizer against stagnant corn prices. The Nutrient Management Team incorporated these changes and more into the latest Nutrient Management Farmer Education curriculum, and grazers helped develop nutrient management guidelines for pasture-based livestock operations. Multi-Agency Land and Water Education Grants (have helped at-risk farmers develop nutrient management plans and funded more than 100 multi-year nutrient management projects, investing around $10 million in areas with the most need and greatest potential for benefits. Discovery Farms applied research examines best practices with both economic and environmental benefits, such as controlling soil erosion, maintaining top yields, and managing nutrients, mainly nitrogen and phosphorus from manure. As a result, producers save money while helping improve water quality.

Guided by their UW-Extension Cooperative Extension ANRE and CNRED advisors, the growing Professional Nutrient Applicators Association of Wisconsin established certification trainings, a code of ethics and standards of conduct, and enforcement procedures for custom applicators. Certification trainings are improving professional practices, reducing environmental risks and liability costs, and have been adopted by neighboring states — building regional capacity to contain and clean up catastrophic manure spills .

Impacts

While many UW-Extension statewide ANRE and CNRED teams address environmental concerns, the Dairy Team Livestock Siting and Land Use Work Group, Local Government Center, Team Grains, Nutrient Management Team, Custom Applicator Subcommittee and Discovery Farms, Basin Education Program and Wisconsin Buffer Initiative report the following impacts for FY 2006.

National strategic goal 5 total expenditures FY 2006

(By percent of full-time equivalent and source of funding

FTEs	Smith-Lever Act	State match
7.10 Integrated	$612,198	$
1.65 Multi-state	$123,043	
9.40 Other	$621,269	

Key Themes: Land use, Land management

Livestock facilities siting education: Building capacity among local officials for making decisions consistent with state rules

Situation

Suburbs and subdivisions are springing up on land once the exclusive domain of agriculture, dairy and livestock producers are expanding their operations, and rural residents are debating the economics and equity of public policy. The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), urges farmers to know local land use rules when making investment decisions and to work with their neighbors to protect the environment when modernizing. To encourage constructive dialogue and curb conflict, the Wisconsin legislature enacted the Livestock Facilities Siting Law — Wisconsin Act 235, implemented in 2006 through the science-based technical standards defined in Wisconsin Administrative Code Chapter ATCP 51.

While this law covers the entire state, it can only be applied where communities choose to adopt zoning ordinances for siting large dairy or livestock operations with 500 or more animal units. Also to comply with state law, counties and towns need to modify zoning regulations that require conditional use permits for siting dairy or livestock operations smaller than 500 animal units. Either one feeder beef weighing 1,000 pounds — or 5 feeder pigs each weighing 200 pounds — would count as 1 animal unit (AU); an adult Holstein cow weighing 1,400 pounds equals 1.4 AU.

Inputs

A panel of experts identified predictable performance standards for local ordinances on siting livestock operations. Their recommendations were deliberated at public hearings statewide and submitted to the Legislature through the DATCP board. As soon as Assembly Bill 868 cleared the Senate in 2004, the Dairy Team Livestock Siting and Land Use Work Group —UW-Extension county dairy and livestock agents Greg Blonde (Waupaca), Tom Cadwallader (Lincoln and Marathon), and Scott Gunderson (Manitowoc), community resource development educator Mary Kohrell (Calumet) and others — began developing research-based educational materials and programs that would help community leaders, farmers and their nonfarm neighbors make local decisions consistent with state regulations.

A unique educational partnership —UW-Extension and DATCP colleagues, Wisconsin Farm Bureau; Wisconsin Towns Association; Wisconsin County's Association; Wisconsin Federation of Cooperatives; Professional Dairy Producers of Wisconsin and Dairy Business Association staff —developed educational materials for a series of six workshops during 2005 to help county and municipal officials understand the new law and local policy implications.

In February 2006, measurable performance standards were finalized and made available through Wisconsin Administrative Code Chapter ATCP 51 for towns and counties choosing to adopt or modify local livestock siting rules.

Northeast Wisconsin: Counties needed public policy education as well as facilitated discussions among planning officials, farmers and their nonfarm neighbors. The partnership again developed educational materials and programs to guide local decision-making in accordance with ATCP 51. CRD educator Mary Kohrell worked with the curriculum and design team, provided guidance to assure that trainings addressed the needs of local officials, facilitated workshops and taught sessions on local decision-making options.

South-Central Wisconsin: While revising a manure storage ordinance, the Dane County Board of Supervisors approached UW-Extension through the Land Conservation Department, requesting a training class that would allow waiving the costly permit fee for agricultural producers attending.

County crops and soils agent David Fischer and dairy and livestock agent Nolan Andersen developed a 2-day training, drawing on the expertise of Wisconsin agricultural engineers David Kammel and Brian Holmes, soil scientist Carrie Laboski, Nutrient and Pest Management staff (UW-Madison / Extension), and John Roach, Roach & Associates; plus regional colleagues Richard Stowell, Ohio State Extension; Joe Zulovick, Missouri Extension; Don Jones, Purdue University; with input from Steve Ottelien and Pat Sutter, Dane County Land Conservation Department.

Andersen and Fischer developed key educational materials with help from Roach and Ottelien, including creating the manure structure planning wheel that looks at all steps needed to construct and operate the structure, showing what needs to be done in relation to other actions in the process. Titled *Concepts*, this color-coded wheel incorporates livestock siting and land use regulations, planning steps and federal cost-share funding sources in one simple handout. The producer learns from using the wheel that they can begin at any time, but may need to back up and forfeit funding opportunities. Agricultural producers, crop consultants and farm support service providers attending trainings received a binder containing all instructional materials, the *Concepts* planning wheel, permit application forms, and information on building and maintaining a manure storage structure. The final ordinance includes the training and fee waiver option making it the first ordinance with an educational component allowing a fee waiver.

Outputs

More than 500 elected and appointed officials from 47 counties — town and county supervisors, zoning administrators, planning commissioners, assessors, conservationists and other officials — learned about the state's new Livestock Facilities Siting Law through the 2005 workshops. In 2006, ANRE Dairy Team and CNRED educators worked with DATCP staff to develop a local workshop series to help county and municipal officials weigh considerations for adopting the new standards. Pilot programs were held in Waupaca County; Manitowoc, Calumet and Kewaunee counties; and Fond du Lac County.

Calumet County: CRD educator Mary Kohrell provided ongoing technical assistance and teaching for the County Conservationist, Planning Director and their county board committees. Calumet County staff recommended using a countywide licensing ordinance that would cover several unzoned counties, developing technical standards more stringent than those in ATCP 51 to protect groundwater, and delaying the process to allow for thoughtful completion of groundwater protection technical standards consistent with the Task Force on Livestock Operations recommendations. Kohrell presented a case study of Calumet County's response to ATCP 51 at the 2006 statewide conference on livestock siting coordinated by the Wisconsin Counties Association.

Manitowoc County: Dairy agent Scott Gunderson worked with Calumet County community resource development educator Mary Kohrell, other Northeast Wisconsin UW-Extension and agency colleagues, the Agriculture and Environmental Task forces, and the Manitowoc County UW-Discovery Farms Program to develop an ordinance for licensing livestock and waste storage facilities with more than 750 AUs. Gunderson served as the Chairperson and facilitated local government capacity-building during 2006, gathering stakeholder input, ranking pros and cons by priority, and conducting workshops for Town and County officials, farmers, consultants and the public. Gunderson also provided an update on the impact of ATCP51 on local units of government to more than 60 members of the Wisconsin Association of County Extension Committees at their 2006 State Convention, reaching representatives of more than 30 counties.

Waupaca County: Dairy and livestock agent Greg Blonde worked with community resource development Educator Mike Koles to present the two-part pilot program. Blonde also worked with Waupaca County Land Conservationist Bruce Bushweiler and Land Information Department Technician Ian Grasshoff to develop a county map showing dairy farm locations and estimated size, prime agricultural soils and irrigated farmland, surface water and manure setback areas, municipalities, rural sanitary districts and residential lots.

Statewide: The 2006 pilot presentation and materials were shared with Extension colleagues around the state through joint training programs with DATCP staff. Separate update training sessions were held with the Wisconsin towns and counties associations.

State local government specialist James H. Schneider, UW-Madison / Extension Local Government Center, conducted January and November Wisline trainings on livestock siting with DATCP staff, reaching more than 75 participants statewide. Schneider co-authored *Wisconsin Town Officers' Handbook* (Second Edition), which town officials rely on because it covers all the laws applicable to their government, including planning and land use laws.

Impacts

UW-Extension Program Development and Evaluation staff helped the workgroup measure the program's short- and medium-term impacts. Of 306 workshop participants responding to the 2005 survey:

- 80% said what they learned would help them make better decisions when weighing the interests of farmers with those of their non-farm neighbors.
- 71% said they gained understanding of the relationships between local and state government in dealing with siting issues.
- 69% agreed that they learned to identify resources for managing conflicts about land use and agricultural issues.
- 68% said they would take local action concerning the adoption of the livestock facility siting law.

Based on a 2006 survey of all UW-Extension ANRE and CNRED county faculty, the 22 educators who participated in one or more of the training programs:

- Provided information to more than 300 farmers, 200 elected or appointed officials, and 100 local staff employees.
- Reported that 9 towns or counties have adopted the new Wisconsin Livestock Facility Siting Law, and 6 towns or counties are considering adoption.

Dane County: The Dane County Board of Supervisors passed a new manure storage ordinance that includes a fee waiver for agricultural producers attending UW-Extension trainings conducted by county dairy agent Nolan Andersen, crops and soils agent David Fischer and colleagues — creating the first ordinance with an educational component allowing a fee waiver. During 2006, 29 farmers and farm service professionals participated in the two trainings:

- 16 trained agricultural producers received a certificate that will allow them to waive the $750 manure storage permit fee if they apply for a permit before September 20, 2008. Their UW-Extension training certificate could save these producers $12,000.

- 2 trained crop advisors earned 5.5 hours of continuing education units toward their professional certification requirements.

Responding to a request following the first class, Fischer and Andersen worked with Steve Ottelien of the Land Conservation Department to provide a one-page list of all potential permits required, when each permit is required, where to apply, permit application time constraints, and a contact phone number for each permit.

Manitowoc County: Based on DATCP dairy licenses, Scott Gunderson and colleagues identified about 60 dairy farms that would be impacted by the 500 AU threshold. Gunderson met with staff from the Soil & Water Conservation Department, Planning and Parks Department, the Manitowoc County Corporation Counsel and County Executive to draft an ordinance that would regulate new and expanding farms above 750 AUs, then held an informational meeting and Land Conservation Committee public hearing on the proposed rule. The Chapter 28 Manitowoc County Livestock Facility Licensing Ordinance was passed unanimously (23 to 0) by the Manitowoc County Board of Supervisors on November 21, 2006, and took effect January 1, 2007. The ordinance is published on the UW-Extension Manitowoc County web site: http://www.uwex.edu/ces/cty/manitowoc/ag/documents/Chapter28Current.pdf

Waupaca County: The ad hoc county planning committee used information from the 2006 training to recommend adopting the new state law with conditional use permits through county zoning as part of the Waupaca County Comprehensive Land Use Plan. Their recommendation includes establishing a quarter- or half-mile exclusionary zone for livestock operations with more than 500 AUs around all cities, villages and rural sanitary districts. To receive county permit approval, any new operation of 500 AUs — or any existing operation that large expanding by 20 percent or more —would need to comply with the Livestock Facilities Siting Law's new administrative standards.

Statewide: By working with educational partners to engage public participation in achieving a measurable, agreed-on regulatory process, UW-Extension educators address the needs of both farmers and rural communities, build local capacity to meet these needs, and support community strategies and actions. The Dairy Team Livestock Siting / Land Use Work Group continues to assess research-based best management practices and performance standards required when siting new or expanding livestock operations, develop educational materials, coordinate and evaluate educational activities, and help small producers (with up to 200 cows) evaluate and complete livestock facility siting application worksheets. As a result of the 11 joint public policy trainings held during 2006:

- 1,575 farmers, non-farmers and elected officials increased their knowledge and understanding of local land use planning and livestock facilities siting legislation.
- 342 farmers, non-farmers and elected officials increased their knowledge and understanding of best management practices and performance

standards required by the state when siting a new or expanding livestock facility.

- 223 farmers and elected officials developed or modified local siting plans or land use policy as a result of UW-Extension educational programs and collaborations during 2006, and another 181 during 2005.

Key Themes: Agricultural waste management, Land use, Natural resources management, Nutrient management, Soil erosion, Soil quality, Water quality

Nutrient Management Farmer Education: Testing and teaching new nutrient management guidelines, introducing a module specific to grazing

Situation

Wisconsin farmers face increasing public and regulatory scrutiny over non-point sources of pollution under state and federal laws, Government cost-sharing and incentive programs, state animal feeding operation permits, local zoning and ordinances for siting manure storage and livestock facilities, and more. All of these require farmers to follow a nutrient management plan — a written document describing the balance of nutrients added to the land from fertilizer, plants and manure minus the nutrients that crops take in, notably nitrogen and phosphorus for growth, photosynthesis, and protein formation.

Regulations aside, improving nutrient management practices on farms has great potential for improving profitability and reducing the detrimental impact of nitrogen and phosphorus on water quality. Most farmers are natural stewards of the land, and an array of research-tested best management practices can help them achieve these ends. UW-Extension provides the technical information and educational delivery expertise for navigating the regulatory maze, improving farm practices and monitoring the results.

Inputs

The University of Wisconsin Discovery Farms Program conducts applied research through a statewide network of diverse owner-operated commercial farms, drawing on the expertise of state specialists from UW-Madison, UW-Platteville, UW-River Falls and UW-Stevens Point, as well as the U.S. Geological Survey (USGS) as an independent science-based partner. USGS staff help design the research projects, install monitoring equipment and work with

Discovery Farms to collect and analyze water quality data, bringing farmer and community interests together by using study results for education.

To create research-based nutrient management education and help farmers comply with regulatory requirements, University of Wisconsin Discovery Farms co-director Dennis Frame and Paul Kivlin, Nutrient and Pest Management (NPM) regional specialist, worked with 25 farmers in hilly Trempealeau County. Following pilot testing and further applied research, a working group of the statewide Nutrient Management Team —UW Discovery Farms co-director Kevan Klingberg, Scott Sturgul, Richard Proost and Roger Schmidt (NPM), soil scientists Larry Bundy and Keith Kelling (UW-Madison) — revised this successful model for statewide application, developing the prototype Nutrient Management Farmer Education (NMFE) curriculum. In 2006, Nutrient Management Team members revised and expanded the NMFE curriculum — Dennis Frame, Kevan Klingberg, Eric Cooley and Nancy Drummy (Discovery Farms), Paul Kivlin and Scott Sturgul (NPM), county crops and soils educators Matt Hanson (Dodge) and Nick Schneider (Clark), and agriculture agent Don Genrich (Adams).

The 2006 revisions include expanded instructional, educational and resource materials arranged in core and “optional” training Modules. Core Modules contain the trainings required for certification of farmers writing their own nutrient management plans —: Introduction to Nutrient Management Planning; Nitrogen Management (basic and advanced), Phosphorus, Potassium & pH Management (basic and advanced), and manure management. “Optional” training modules answer specific geographic or production questions and address the needs of specialized farmers — Nutrient Management Planning in Wisconsin: Rules, Regulations, and the 590 Standard; Dietary Phosphorus and Nitrogen Management; Karst and Tile Line Concerns; and Nutrient Management for Grazers. Clark County crops and soils agent Nick Schneider wrote the new training module to help grazers develop pasture nutrient management plans, detailed later in this report. The 2006 revisions are based on regulatory and legislative changes such as the Livestock Facilities Siting Law described earlier in this report, and on university and on-farm research. For example:

More economical N rates: Under the leadership of Team Grains, the maximum return to nitrogen (MRTN) rates for corn were updated to address the soaring cost of fertilizer. Although corn yield response to nitrogen (N) has not changed, N rates had to change for maximum economic return at prevailing corn and nitrogen prices. State soil scientists Carrie Laboski and Larry Bundy (UW-Madison / Extension) worked with their colleagues in Minnesota, Iowa and Illinois to develop a uniform framework for revising N fertilizer recommendations, then used this multi-state standard to analyze thousands of field trials. The new N fertilizer rate guidelines adjust for the current N to corn price ratio, soil type, and previous crop, providing producers flexibility in determining N fertilizer application rates that fit their farm operation and maintain profitability. Fond du Lac County crops and soils agent Mike Rankin developed the Nitrogen Rate of Return Calculator— a computer spreadsheet for producers to achieve their best N rate

at current N fertilizer and corn prices, and revised N return calculations for the 2005 and 2006 growing seasons based on the new N recommendations.

Economical N rates are being strengthened through corn N response experiments to evaluate the performance of MRTN N rate guidelines in a range of corn production environments. Chippewa County crops and soils agent Jerry Clark reports that 13 Nutrient Management Team members are conducting 2-year MRTN research trials with participating farmers on 22 plots with very high, high, and medium soil yield potentials along with non-irrigated and loamy sands. The Nutrient Management Team also supports this on-farm research by covering the costs of routine soil tests for phosphorus, potassium, pH and organic matter, and the required pre-plant nitrogen tests. Results will be published with proceedings of the 2007 Wisconsin Fertilizer, Aglime, and Pest Management Conference: http://www.soils.wisc.edu/extension/wfapmc

SNAP RUSLE2 Phosphorus Index: Wisconsin Phosphorus Index (PI) ranks fields on their potential to deliver phosphorus to lakes and streams, where algae growth is limited by the amount of phosphorus in the water. SNAP-Plus nutrient management and soil loss assessment software compares field data to identify areas of critical need with the most potential for improvement using best management practices. SNAP-Plus calculates:

- Crop nutrient recommendations for all fields on a farm, taking into account legume nitrogen and manure nutrient credits consistent with University of Wisconsin recommendations.
- A RUSLE2-based soil loss assessment for determining whether fields applied with fertilizer or manure meet tolerable soil loss (T) requirements. Phosphorus Index equations use the annual erosion rate of a field and the P concentration in eroded sediment. Erosion rate is calculated using the latest version of the **Revised Universal Soil Loss Equation, RUSLE2.** Sediment P is estimated using routine soil test P and organic matter.
- A rotational Phosphorus Index value for all fields as required for soil phosphorus (P) management.
- A four-year P balance as required for using soil test P for phosphorus management.

Since 2000, UW-Madison & Extension soil science researchers, educators and computer programmers have developed and refined the SNAP-Plus software. Development team members include Laura Ward Good, Larry Bundy, Paul Kaarakka, Wes Jarrell, Bill Pearson and Kevin Erb, conservation professional development and training coordinator. Information on both the SNAP Plus software and the phosphorus index can be found at: http://www.snapplus.net

Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin: Soil scientists Carrie Laboski, John Peters, and Larry Bundy revised extension publication A2809 to include both new research and nutrient

management tools, along with making the publication easier to use when writing nutrient management plans. The Wisconsin NRCS 590 nutrient management standard requires that growers follow the application rates outlined in A2809. Elements of the revision include clarifying how to complete soil sampling and obtain the best fertilizer recommendations that meet regulatory criteria; updating lime recommendations to reflect an environmentally friendly buffer pH method that cuts hazardous wastes; adding the new MRTN tool for fine-tuning corn N rate guidelines; adding nitrogen management guidelines, including soil nitrogen tests; updating phosphorus and potassium recommendations based on revised crop removal values and clarifying mechanics of calculating P or K recommendations; micronutrient application guidelines; updating manure nutrient crediting values;, and using starter fertilizer as another management tool. By the end of 2006, more than 1,000 copies were distributed to farmers, county extension agents, crop advisors, nutrient management planners, and regulatory professionals. Extension publications are available at: http://learningstore.uwex.edu

Outputs

Three key programs — on-farm research, trainings and grant funding — intertwine to reach both farmers who seek out research-based education as well as those who lack the means to do so and can benefit the most by adopting best management practices. This report covers work during 2006 on NMFE trainings and field trials, followed by the companion report on the Multi-Agency Land and Water Education Grant program (MALWEG), which enables on-farm research, curriculum development and trainings.

The revised NMFE curriculum was released in October 2006 on CD-ROM, containing a user's guide, companion publications and worksheets, workshop presentations, speaker notes, and a revised program evaluation procedure. The evaluation plan includes pre- and post-workshop assessments as well as comprehensive, long-term assessment — the Farm Practices Inventory (FPI) for measuring management changes of farmers participating in NMFE and other nutrient management education. Statewide FPI results and trends are reported by UW-Madison / Extension Environmental Resources Center evaluation staff: http://www.uwex.edu/ces/erc

The complete training combines 20 hours of classroom instruction, individual consultation, and on-farm field trials to examine effective methods for improving nutrient management practices from both economic and environmental perspectives. The next step engages farmers in small groups and one-on-one to develop their own nutrient management plans based on the Wisconsin NRCS 590 Standard and Wisconsin Conservation Planning Technical Note WI-1. Together, these guidelines outline nutrient management plan components, requirements for soil erosion control, maximum nutrient applications and field

hazards requiring special management considerations. Each participating farmer receives on-farm assistance to evaluate livestock manure practices, soil & water conservation, soil fertility & crop nutrition, annual on-farm conservationist help adjusting plans to meet changing needs and regulations and a modest grant to enable participation if needed, for hiring replacement labor during trainings or a consultant to help write the plan, for example.

Educational partnerships include endorsement of the curriculum by the Wisconsin Department of Agriculture Trade and Consumer Protection (DATCP) as the only way to certify farmers to write their own nutrient management plans. NMFE is funded at the county level with resources from the interagency Multi-agency Land and Water Education Grant Program (MALWEG), U.S. Department of Agriculture Natural Resources Conservation Service Environmental Quality Improvement Program (NRCS EQIP) and the Wisconsin Milk Marketing Board. Local collaborations deliver the trainings, instructors drawn from UW-Extension county and NPM educators, DATCP, county or tribal Land Conservation Department and NRCS Technical Service Providers (TSPs) EQIP conservationists, technical colleges, crop consultants and agronomists.

In December 2006, 50 UW-Extension county agents, technical college instructors, Land Conservation Department and NRCS professionals attended two NMFE train-the-trainer workshops on using the new curriculum. Participants received overviews of the core and optional training modules and advice on conducting successful workshops, preparing acceptable nutrient management plans, and planning Successful program evaluations. Counties that implemented the NMFE curriculum during 2006 included Calumet, Chippewa, Clark, Dane, Dodge, Eau Claire, Fond du Lac, Grant, Iowa, Lafayette, Langlade, Manitowoc, St. Croix, Taylor and Washington.

Chippewa County: Farmers who needed a nutrient management plan were identified by the local NRCS and Land Conservation Department. These farmers wanted to know how such a plan is put together and how to write one for their own farm. To help them accomplish this, UW-Extension county crops and soils agent Jerry Clark and NPM regional specialist Paul Kivlin used the NMFE curriculum to teach the basics of nutrient crediting, crop nutrient need, manure spreader calibration, and environmentally sensitive areas. Learning to write their own nutrient management plan allows these farmers to meet criteria for cost sharing through federal, state, and local programs.

Impacts

Statewide: As a result of participating in local NMFE trainings, more than 190 farmers in 15 Wisconsin counties increased their knowledge of nutrient management practices in 2006. An estimated 80% of these farmers developed or helped develop a nutrient management plan for their operation. Approximately

64,000 acres of Wisconsin cropland were planned with the major agricultural enterprise being dairy.

- 450 agricultural and agency professionals were trained on nutrient management issues.
- 347 producers were trained on nutrient management issues.
- 331 farmers developed nutrient management plans covering 110,080 acres.
- 230 farmers and agricultural professionals successfully evaluated the feasibility of a variety of manure collection, handling, treatment, storage and application practices during training sessions.
- 214 producers and crop consultants implemented new NRCS 590 standards when writing or updating nutrient management plans.
- 94 agricultural professionals were successfully trained in using P loss risk assessment and P-based nutrient management tools.
- 61 nutrient management planners received training on using SNAPPlus software to prepare nutrient management plans through new uniform trainings developed by the UW-Extension conservation professional development and training coordinator.
- 48 farmers implemented manure handling and processing practices to prevent loss of nutrients.
- 22 farmers sought agency or private sector assistance in adopting economical and environmentally responsible manure management systems.
- Farmers who implemented nutrient management practices saved an estimated $333,000.
- From 2000 to 2006 as a result of local NMFE trainings, more than 1,600 producers farming over 490,000 acres in 40 counties have received in-depth education on nutrient management planning.

Chippewa County: Based on pre- and post-program evaluation, all 8 farmers who completed the NMFE nitrogen, phosphorous and potassium workshops increased their knowledge and understanding of the components of a nutrient management plan, factors affecting nutrient planning such as crop removal rates, yield goals, tillage, soil type and soil testing, and environmental conditions affecting soil erosion. Most participants (87%) increased their knowledge and understanding of nutrient crediting for legumes and manure. Manure spreaders were calibrated on all farms to accurately determine application rates, and completed nutrient management plans were examined and certified.

Grant County: Eight to twelve farms have annually enrolled in county nutrient management trainings taught by crops and soils agent Ted Bay with Karen Talarczyk (NPM) in partnership with the Land and Water Conservation Department and Southwest Wisconsin Vocational and Technical College. A survey of past participants found that as a result of following the plans they developed in the workshop, each saved an average $2,000 a year in fertilizer costs. A 2006 participant enrolled 344 acres in the Conservation Security Program, receiving qualifying points for completing his own soil testing and for following the nutrient management plan he developed in the training. This qualified him for a payment of $12,847 a year for the next 10 years.

Key Themes: Agricultural waste management, Land use, Natural resources management, Nutrient management, Riparian management, Soil erosion, Soil quality, Water quality; Other: Grazing, Pasture management, Under-served and under-represented population (low-income farmers at risk)

Interagency conservation partnerships support Nutrient Management Farmer Education, develop pasture nutrient management guidelines

Situation

Nutrient management remains at the forefront of environmental priorities for Wisconsin dairy, livestock and crop producers and rural communities. University of Wisconsin soil scientists have recently revised guidelines to help farmers prevent loss of nitrogen and phosphorus from fertilizers and manure to groundwater, lakes and streams — and stay profitable. Local conservationists are identifying farmers who could benefit by learning nutrient crediting and basic requirements of the nutrient management standard. For best on-farm impact, minimal duplication of efforts, and public fiscal accountability, interagency and local collaborations have formed to deliver Nutrient Management Farmer Education training and secure funding for those most in need of nutrient management planning.

Dairy and livestock producers adopting managed intensive rotational grazing could also use such guidance. A recent needs assessment among Clark County dairy farmers found that nutrient management is their top educational priority within the crops and soils area. Regular discussions between UW-Extension educators and area grazers revealed little understanding of nutrient management and few grazers with any type of nutrient management plan. Some grazers voiced concern that their pasture production was beginning to lag when compared with past records. While grazing practices are widely recognized for their soil erosion control benefit, these same practices leave manure on the soil

surface rather than incorporating it. Grazers wanted to know how to properly distribute manure to maximize nutrient credits and minimize runoff, and needed help writing a nutrient management plan for pastures.

Inputs

The Multi-Agency Land and Water Education Grant Program (MALWEG) encourages integration of educational programming into local conservation efforts, targeting Nutrient management education. Local projects seek competitive grants to deliver training. Interagency program support and funding come from USDA's Natural Resources Conservation Service Environmental quality Improvement program (NRCS EQIP) and Farmer Service Agency, (FSA), Wisconsin's Department of Natural Resources (DNR) and Department of Agriculture, Trade and Consumer Protection (DATCP), the Wisconsin Milk Marketing Board and University of Wisconsin-Extension.

The Wisconsin MALWEG program provided nearly $200,000 for 16 local projects active through 2006, and $170,000 to another 11 new projects for training through 2007. UW-Extension Discovery Farms co-director Kevan Klingberg and basin educator Andy Yencha provide statewide leadership and assistance for local projects led by collaborations among UW-Extension county educators and Nutrient and Pest Management (NPM) state specialists, Discovery Farms and agricultural research stations, county and tribal land conservation departments, and NRCS and Wisconsin Technical College System staff. Trainers use the Nutrient Management Farmer Education (NMFE) curriculum of research-based soil fertility, crop nutrition, soil testing and nutrient crediting materials revised in 2006 and detailed in the report above.

Through the Discovery Farms, agriculture actively partners with industry peers, universities, state agencies, environmental groups and local communities to measure the real impact of agriculture on water quality through on-farm research and to implement necessary environmental management practices. The Basin Education Program works with the Wisconsin Department of Natural Resources and USDA's Natural Resources Conservation Service to provide watershed-based natural resources education. Basin educators collaborate with federal, state, local and private partners to develop land and water resource management plans for each county and tribal government within a river basin. The UW-Madison / Extension Environmental Resources Center (ERC) supports basin educators with community needs assessment surveys, water outreach best education practices for target audiences, and long-term evaluation strategies through its evaluation unit.

Based on statewide needs assessments, agriculture and non-point sources of pollution are a top educational priority. Key audiences include citizen advisors to government agencies, and through them, policy makers and legislators. Since 2003, UW-Madison rural sociologist Peter Nowak has coordinated the Wisconsin

Buffer Initiative. This civic coalition of farmers, conservation staff, government regulators, researchers and environmental groups convened at DNR request to develop science-based agricultural buffer standards, to report on the role of buffers in redesigning nonpoint source pollution control (NR 151), and to recommend efficient and cost-effective strategies for improving water quality statewide.

Buffers are strips of vegetation along rivers and streams that filter out sediment and pollutants from runoff before it reaches the waterway. To show policymakers where buffers are most needed, UW-Madison limnologist Jake Vander Zanden and others completed a statewide matrix of 1,600 hydrological zones for identifying and ranking watersheds most suited for riparian controls — degraded water that will respond positively to buffer improvements, and exceptional water that cannot remain so without buffers. Nowak presented the 100-page Wisconsin Buffer Initiative report and poster ranking priority areas to the DNR Natural Resources Board in December 2005 and reports results on an interactive map: http://www.drs.wisc.edu/wbi

Outputs

MALWEG-funded projects are delivering nutrient management training to about 270 Wisconsin farmers, each with an average 300 acres. A mix of classroom and on-farm activities helps participants develop their own nutrient management plan based on NRCS standard 590 guidelines. The farmer receives 20 hours of instruction including workshops on crop nutrition, soil fertility, nutrient crediting and environmental regulations; plus on-farm assistance to evaluate livestock manure practices, soil & water conservation, soil tests and a session to finalize the nutrient management plan. A key point in this process is that producers voluntarily participate in small group and one-on-one activities, using their own information and management goals to actively develop their own nutrient management plan. The end product is a plan the farmer can understand and follow as a result of participating. During 2006, nutrient management training projects were conducted in Barron, Burnett, Calumet, Clark, Dane, Eau Claire, Fond du Lac, Langlade, Manitowoc, Marinette, Oconto, Outagamie, Portage, Rock, St. Croix, Sauk, Taylor, Waushara, Washburn and Washington counties, as well as through Western Wisconsin Technical College.

Manitowoc County: The UW-Discovery Farms Project has a unique process of working with people – stakeholders interested in profitable agriculture, as well as environmental stewardship. It is within this realm that Manitowoc County dairy producers Julie Maurer and Karl Klessig, along with Russ Tooley from Centerville Cares, and Kevan Klingberg from Discovery Farms, presented information about the Manitowoc County Discovery Farms Project Area at the 28th Annual Wisconsin Lakes Convention, April 2006. The conference focused on local civic engagement based on interested people contributing ideas, energy and action,

as well as listening to and respecting each other. Along with generating important water quality information associated with agricultural management, this project has improved community relationships. Through a cooperative effort, the Manitowoc County Discovery Farms Project has helped build community trust through personal relationships. Working together, the community now knows that their interest in lakes, water quality and environmental management on agricultural land is proactively shared by dairy farmers and citizen groups in Manitowoc County. Farmers, rural residents, community leaders, and environmental advocates now sit at the same table for routine meetings. They listen, communicate, understand, and respect each other.

Clark County: Manure handling on grazing farms is very different than on conventional farms. To teach nutrient management for pastures, county crops and soils agent Nick Schneider worked with land conservation department and NRCS staff to prepare a MALWEG proposal. When accepted into the program in 2005, the partnership recruited 10 grazing farms, and tested soils that fall. Pre-plan soil sampling revealed both the benefits and challenges grazers face in managing nutrients for pastures — 58 percent of soil samples showed potassium (K) deficiency, which could limit yield. Some farmers who realized their land was deficient applied commercial fertilizer and noted that yields improved. Grazing appeared to manage phosphorus (P) in a way that limits buildup; only 10 percent of soil samples tested greater than 50 ppm. The 10 grazers recruited plus another two attended nutrient management trainings in January and February 2006. Pre-plan Farm Practices Inventories demonstrated little to no nutrient management on these farms. A post-plan Farm Practices Inventory will be conducted in 2007 to document plan implementation.

Educational materials developed for these trainings included a detailed nutrient management presentation tailored to the needs of grazers. Grazing farmers use a combination of winter manure storage practices such as liquid pits, bedding packs, outwintering, composting and daily hauling. To cover these nutrient distribution patterns, Schneider adapted the NMFE curriculum and added a training module on nutrient management for pastures. He also developed a special spreadsheet for allocating manure nutrient credits from grazing cows, and a grazing manure nitrogen calculator to use with the SNAP Plus nutrient management planning software. Schneider's presentation and training module are included in the newly revised NMFE curriculum released on CD-ROM by the UW-Extension Nutrient Management Team in October 2006, detailed above.

Manitowoc County: Incorporating both a grazing and a traditional free-stall dairy operation, a new research project seeks to uncover the sources of sediment, nutrients, and other non-point sources of pollutants that may impair surface water. Designed to evaluate and improve Best Management Practices, a major focus will be the nutrient management challenges of farming the dense clay soils and effects of the tile lines buried several feet below to drain surplus water into streams or ditches so farmers can plow, cultivate, plant, and harvest their crops. Without functioning tile lines, many Northeast Wisconsin fields would be

unavailable for profitable farming, especially during wet years. Best management practices for conservation to reduce water pollution include establishing buffer strips along streams, grassed waterways, trees and shrubs, and decommissioning abandoned wells.

The UW-Discovery Farms Program and Manitowoc County developed a special project initiated by Discovery Farms co-director Dennis Frame and county dairy agent Scott Gunderson as a proactive and unique collaboration of citizens with agricultural, conservation, and environmental interests. Two Manitowoc County dairies volunteered for a multi-year on-farm research project, monitoring effects of agricultural practices on water quality. Using expertise of the US Geological Survey, surface water runoff and tile line water is continuously sampled and analyzed for nutrients and sediment on both dairies located within a couple miles from Lake Michigan: http://www.uwdiscoveryfarms.org/special/manitowoc

Impacts

Through this process, 95 percent of participating farmers followed through to develop nutrient management plans, resulting in 255 plans on about 76,500 acres during 2006. Since 2000, more than 85 percent of farmers trained have developed nutrient management plans, resulting in 1,083 plans covering 324,900 acres. Many projects have had such success with this training delivery mechanism that they re-apply and have been accepted in multiple MALWEG Program granting cycles. In 2006, as a result of local MALWEG-supported projects:

- 270 farmers in 20 Wisconsin counties increased their knowledge and understanding of nutrient management practices.
- About 57,500 acres of cropland were planned, of which the major agricultural enterprise is dairy.

North-central Wisconsin surveys show that participating producers:

- Reduced N rates by an average of 54 pounds per acre, which translates to a savings of $20 per acre.
- Reduced Papplications by an average of 11 pounds per acre.
- Developed nutrient management plans that meet all Federal, State and local regulations.

Calumet County: Shallow bedrock makes groundwater vulnerable to runoff from farm fields. Since 2004, county agriculture agent Matt Glewen has collaborated with the Land Conservation Department to secure yearly MALWEG funding for nutrient management education and plan development, providing the agronomic expertise and farmer relationships to make these projects successful. With

MALWEG support, 26 producers have developed nutrient management plans covering more than 6,000 acres. These producers increased their awareness of the potential for groundwater contamination in shallow bedrock areas, learned to mark field maps to show features such as sinkholes and very shallow soil areas to stay back from when applying manure, and improved their skills in nutrient management planning and plan preparation. Pre- and post-program evaluation shows that farmers are more aware of groundwater contamination from manure application, are applying manure to fields most in need of nutrients, and are saving $10 to $15 per acre on fertilizer costs.

Clark County: Farmers who participated in NMFE trainings adapted for grazers increased their knowledge and understanding of soil fertility and manure management for pastures, and saved money on plan preparation. Pre-class and post-class testing of the nitrogen, phosphorus, and potassium workshops revealed participants increased scores from 13 correct answers to 28. Eleven of the 12 farmers trained developed their own nutrient management plan and nutrient allocation balance sheet, saving the average county cost of $1,300 per farm for hiring a consultant to write their plan.

Outagamie County: Crops and soils agent Kevin Jarek walked the fields, tested soils and used the results with SNAP Plus software to help a grazing farmer develop and implement a Nutrient Management Plan for expanding his herd. The grazer reduced the amount of phosphorous and potash he was applying to fields that were testing high, and reallocated that money to purchase a late summer application of nitrogen to increase yields. While his savings may seem small at about $400, because he is getting quicker recovery and higher pasture yields he is quite satisfied with the outcome.

Evaluation of the success of multi-state and joint activities

Key Themes: Agricultural waste management, Water quality

Training for catastrophic manure spills, fostering professional practices, ethics and conduct among custom applicators

Situation

When a valve failure released up to 750,000 gallons of manure from farm storage into a dry streambed of Northeast Wisconsin’s heavy clay soil, the Department of Natural Resources conservation warden requested emergency assistance from a professional manure applicator trained through the UW-Extension certification

program. This applicator helped contain and clean up the spill before the manure could enter the Manitowoc River. And a catastrophic event was averted through a trusted interagency-industry partnership fostered by UW-Extension advisors. Dairy, livestock and poultry producers face increasing regulatory pressures to reduce such non-point sources of pollution — to keep agricultural nutrients such as phosphorus (P) from washing into streams and lakes, organic nitrates and ammonia (N) from seeping into groundwater. Custom manure applicators are key partners in regulatory compliance, writing their own environmental management system plans to gain full certification.

Inputs

DNR has identified more than 100 streams and river segments in Wisconsin impaired by nutrients or pathogens (303d waters), for many of which manure may contribute to the problem. A rash of manure spills and runoff several years ago led the DNR and Department of Agriculture, Trade and Consumer Protection (DATCP) to form a task force to address the issue. One recommendation from that task force was that farmers implement manure spill response plans, This challenge was taken up by the statewide Nutrient Management Team Custom Applicator Subcommittee— CNRED state specialist Kevin Erb, conservation professional development and training coordinator (UW-Madison Environmental Resources Center), county crops and soils agents Jerry Clark (Chippewa) Ted Bay (Grant), Carla Heiman (Green Lake), and ANRE state specialist Ron Schuler (UW-Madison Biological Systems Engineering), farm law specialist Phillip Harris (UW-Madison Agricultural and Applied Economics), and Kevan Klingberg, (Discovery Farms) — The subcommittee developed a three-prong approach:

1. Identify resources in Wisconsin and neighboring states to deal with large-scale manure spills of 250,000 gallons or more.

In January 2006. State regulatory staff responsible for both animal waste and spill response convened in Madison from Iowa, Illinois, Indiana, Minnesota and Wisconsin. Each state shared strategies for dealing with small and large-scale releases. A follow up meeting and summary of these strategies is planned for 2007. The subcommittee developed a fact sheet outlining online resources for weather forecasting to help landowners and manure applicators make better spreading decisions. This fact sheet has been adapted by Ohio EPA for use by their livestock industry.

2. Expand the field training for spill response.

A DNR/UW-Extension partnership conducted three field trainings to demonstrate proper manure spill response techniques. More than 200 agency staff, farmers, custom manure haulers and local emergency government contacts attended one of three sessions in Jackson, Manitowoc and Winnebago Counties. More field trainings are planned over the next several years.

3. Work with UW-Extension colleagues, county and tribal land conservation department and emergency government staff to develop county spill response plans.

Manitowoc County dairy agent Scott Gunderson worked with area land conservation departments to establish this county plan concept, and helped expand the approach statewide. Six counties that need to develop manure spill response plans attended a December 2006 workshop in Outagamie County. As a result of participating, Fond du Lac, Shawano, Waupaca and Winnebago counties are already developing plans, and Oconto County is revising their plan based on workshop input. Two more workshops are planned for 2007.

Due to catastrophic manure runoff in 2005, crops and soils agent Carla Heiman is developing a Manure Spill Response Guide for Green Lake County. Heiman also wrote an article on developing a manure spill response plan to inform people about proper procedures for handling a manure runoff event or spill, published statewide. She maintains the subcommittee's new manure management web site: http://www.wimanuremgt.org

Outputs

Wisconsin for-hire manure applicators manage about 4 billion gallons of dairy manure each year, making them major partners in regulatory compliance. UW-Extension responded to their request for professional development with a multi-state interagency-industry collaboration to train new and existing firms. The industry now enforces professional standards under the guidance of UW-Extension campus and county ANRE and CNRED faculty, regulators and trained applicators are building mutual trust, and certified firms save on insurance.

When the Professional Nutrient Applicators Association of Wisconsin (PNAAW) asked their UW-Extension advisors for help improving professionalism among their members, the statewide Nutrient Management Team responded with an interagency-industry collaboration to train and certify member firms. With partner regulators and manure applicators, UW-Extension developed three levels of training. Firms must complete level 1 employee training and testing on regulations, spill response, cleanup, safety and common sense techniques to gain level 2, and crew supervisors and owners must complete 6 to 8 hours of level 2 training to reach level 3. For level 3 certification, business owners need an Environmental Management System (EMS) plan. Insurance auditors evaluate each firm's EMS to ensure compliance, then award up to 50 percent off environmental liability premiums and 10 to 40 percent off all other insurance except health and Workers Compensation. Firms completing level 3 certification save an average of $4,600 per year on insurance premiums.

The Custom Applicator Subcommittee added train-the-trainer education for startup firms to prepare crews and "hit the ground running," bolstering similar

efforts in Illinois, Iowa, Michigan, Minnesota, Pennsylvania and Ohio. UW-Extension provided the guiding principles for PNAAW to craft their professional code of ethics, standards of conduct and enforcement procedures. Phillip Harris state farm law specialist (UW-Madison Agricultural and Applied Economics) reviewed these documents to assure that each will guide professional conduct, work practices, and investigation of misconduct complaints.

Outagamie County: Liquid manure, when applied to dry, fine-textured soils, migrates downward enough to seep into the vast underground array of manmade tile lines and eventually into ground or surface waters. UW-Extension conservation professional development and training coordinator Kevin Erb and county crops and soils agent Kevin Jarek developed an educational program with Frank Gibbs, Ohio NRCS, who has conducted a number of trials and studies that looked at this very issue. In June 2006, 55 people attended the tile smoking /soil quality field day on the Bunnell family farm. Gibbs provided best practice recommendations such as waiting until it rains a little when hauling manure in summer so manure does not move as quickly as it would if soils were dry. The educators ran smoke through tile lines and watched it come up through the ground, revealing the many paths manure acting like water could take.

Impacts

The UW Extension Nutrient Management Team and PNAAW developed a 16-page insert for a weekly farm newspaper, covering how to handle a manure spill, a comprehensive nutrient management plan (CNMP), agreements between livestock and cash grain farmers for exchanging manure, and steps for reducing winter runoff. By adopting certification trainings and professional practices, PNAAW is working to reduce environmental risks of manure management. This in turn improves public and agency regard for PNAAW member firms and the Wisconsin farmers who hire them. DNR animal waste management and spill response staff measure growing mutual trust through increased reporting of manure spills and compliance with reporting regulations by custom applicators, increasd efforts by applicators to minimize damage from their own spills, and increased DNR use of trained applicators on spills by others.

This growing trust extends to member firms sharing equipment, ideas, techniques, innovations and even employees during bad weather to meet client needs. Trained applicators serve on statewide committees revising nutrient management guidelines and investigating road weights. Equipment manufacturers and suppliers now invest in PNAAW as associate members, and contribute to field day demonstrations. As a result of 2006 custom applicator trainings:

- 231 custom manure applicator employees completed level 1 certification training.

- 65 custom manure applicator firms completed level 1 training to offer to employees.
- 67 custom manure applicator employees are taking level 2 certification courses.
- 45 custom applicator firms became members of the Wisconsin professional association.
- 13 custom manure applicator firms are reviewing or revising their level 3 certification.
- 5 custom manure applicator firms completed their first EMS level 3 plan.
- Since 2003, more than 600 custom applicators, farmers and agency staff from 7 states attending 6 classroom and field trainings increased their knowledge and understanding of proper practices for containing and cleaning up manure “spills” using actual manure.

FY 2006 participation: Kevin A. Erb 0.40 fte, Ted Bay 0.05 fte, Jerry Clark 0.05 fte, Carla Heiman 0.05 fte, Phil Harris 0.05 fte, Kevan Klingberg 0.025 fte, Ron Schuler 0.10 fte

FY 2006 participation: Kevin A. Erb 0.05 fte, Kevan Klingberg 0.10 fte, Scott Sturgul 0.20 fte, Rebecca Power 0.30 fte, Richard Proost 0.10 fte

National strategic goal 5

Evidence: Campus and county faculty and staff report their work against expected outcomes through Cooperative Extension’s Planning and Results System (PRS). They also submit more detailed success stories of their work for the PRS database and integrated research reports for USDA’s CRIS database.

For trained custom manure applicators, the insurance companies providing incentive discounts on vehicle and environmental liability premiums annually audit all certified firms to ensure compliance.

2. Stakeholder input process

1. Actions taken to seek stakeholder input and encourage their participation:

Multiple approaches to seek stakeholder input include formal surveys, focus groups, key informants, advisory councils (collaborating groups, agencies, schools, service providers, organizations) and combinations of these approaches. Efforts are made to ensure stakeholders represent the whole community in terms of diversity, geographic location, family status, income level, age, gender, disability, and both users and nonusers of UW-Extension educational programs.

2. Process used to identify individuals and groups who are stakeholders and to collect input from them:

A ninety-four page booklet " Guidelines for Program Priority Setting," an eighty-six page booklet "Trends Analysis," and a video tape "Planning for Our Future" were developed by a statewide committee of county-based faculty/staff and campus faculty with research and extension appointments. The materials were used to train Cooperative Extension county-based faculty/staff and campus-based faculty with research and extension appointments. The materials were also used with county government oversight committees and advisory committees to help them better understand the importance of seeking a broad base of stakeholder input at the community level. The materials were distributed in print form and are also available on the UW-Extension Cooperative Extension Program Development and Evaluation website: http://www.uwex.edu/ces/pdande/ProgramPlanning/statewide.html.

3. How was collected input considered?

Input from local stakeholders was used to identify community issues and concerns. Local issues and concerns were gathered statewide and made available for review by all county-based faculty and staff and campus faculty with research and extension appointments. The county "issues and concerns" and "Trends Analysis" documents noted above served as the foundation for creating nearly 50 statewide programming teams of campus and county faculty and staff and their community partners. Each team prepared a plan of work that identified the community need, the extension response, educational resources and partners. Team plans of work and resources are dynamic documents that change

and evolve as additional stakeholder input is gathered. At the county level, stakeholder-identified "issues and concerns, statewide team plans of work and resources serve as the basis for identifying specific county educational needs and priorities. These priorities are adapted as additional county stakeholder input is received.

Stakeholder input is sought formally and rigorously at both county and state levels as in the coming 2007-2008 statewide program planning process. Stakeholder input is also gathered continually, using many of the approaches identified in item 1 above. Continuous input is analyzed at the county level and provided to the statewide teams via each team's web site. Input is also gathered from participants at team meetings, seminars, audio conferences, and through print and electronic newsletters. Stakeholder input continuously shapes UW-Extension plans of work and the program priorities .

The stakeholder input process is very helpful in refocusing and reaffirming priorities on an ongoing basis. The process is also critical in identifying emerging issues. However, some stakeholder groups have had difficulty seeing beyond the critical issues they face today. As a consequence, the "Trends Analysis" document prepared by county-based faculty/staff and campus-based faculty with research and extension appointments has been very important in helping stakeholders see beyond their immediate crisis and strategically plan for the future.

3. Program review process: Merit review

Program review and Merit review remain the same as previously submitted and are being revised through 2007-2008 statewide program planning.

4. Evaluation of the success of multi-state and joint activities

A section on evaluations of multi-state and joint activities is included under each goal above.

5. Actual expenditures of federal funding for multi-state extension and integrated activities

See the attached email form: AREERA_Wisconsin_FY0607_signature.doc