

The North Central Region-Sustainable Agriculture Research and Education (NCR-SARE) Farmers Forum is an annual event that gives NCR-SARE grant recipients the opportunity to share information about sustainable agriculture practices with a regional audience. The talks focus on research, demonstration, and education projects that promote sustainable farming and ranching. The projects emphasize the three pillars of sustainable agriculture: environmental stewardship, profitability, and social responsibility.

This highlight is a summary of reports and presentations from the NCR-SARE Farmers Forum held at the 2016 Practical Farmers of Iowa Conference in Ames, Iowa. The event featured speakers who received awards from NCR-SARE's grant programs. To read the full reports from these projects, go to the national SARE website at <http://mysare.sare.org/> and use the project number (e.g., FNC10-809) to read more about the project. View videos of these presentations online at <http://tinyurl.com/FarmersForumPFI>.

The next Farmers Forums will be held at the 2016 Kansas Rural Center's winter conference and the 2017 Illinois Specialty Crops, Agritourism and Organic conference.

NCR-SARE is a United States Department of Agriculture-National Institute of Food and Agriculture (USDA-NIFA) program that supports and promotes sustainable farming and ranching by offering competitive grants and educational opportunities for farmers and ranchers, researchers, educators, students, institutions, organizations, and others exploring sustainable agriculture. Visit the NCR-SARE website to see a calendar of events, educational resources, grant opportunities, and more at www.northcentralsare.org.

FNC13-938 Rayville, Missouri - Gary Wenig

Chickens and Trap Crops: An Integration of Sustainable Approaches to Insect Pest Control in Vegetable Production

OBJECTIVE: to integrate a sustainable approach of insect pest control using a combination of trap crops, beneficial insect crops, and chickens in movable pens to kill insect pests.

RESULTS: Squash bugs are major pests affecting cucurbit, squash, and pumpkin growers. For organic or all-natural vegetable producers like Gary Wenig in Rayville, Missouri, controlling the squash bugs on his farm without the use of commercially available pesticides has been a challenge.

Rocky Creek Valley Farm is a 40-acre farm owned and operated by Elizabeth and Gary Wenig. They produce and sell a large variety of heirloom vegetables, free-range eggs, and raw goat's milk.

The Wenigs needed to get a handle on the squash bug problem on their farm, but they didn't want to rely on synthetic chemicals to achieve their goal. They learned that trap crops, especially blue Hubbard squash, could be grown as a control measure to lure pests away from a cash crop. Since the pests are concentrated in high levels in trap crops, they can be treated in a localized area instead of treating the entire field.

In 2013, the Wenigs applied to the NCR-SARE Farmer Rancher Grant Program and were awarded \$6,462 to explore an insect pest control management strategy using a combination of trap crops, beneficial insect crops, and chickens in movable pens. They hoped that the chickens would kill the squash bugs in the trap crop, thus reducing the number of squash bugs in their cash crop without using chemicals. They also wanted to integrate cover crops as a soil management strategy for pest management.

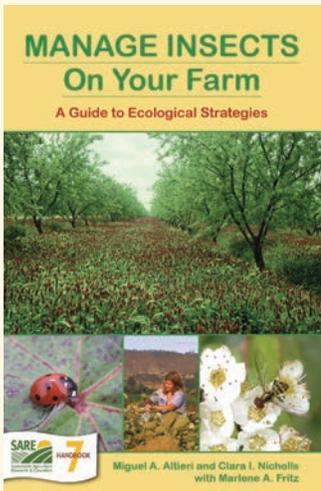
With assistance from Jaime Pinero, assistant professor and state integrated pest management (IPM) specialist at Lincoln University in



Gary Wenig's mobile chicken pen design can accommodate 2 to 4 chickens and a trap crop bed. He plants trap crops to attract insect pests away from his vegetable crops. Photo by Gary Wenig.

Jefferson City, Missouri, they constructed two 8x12 ft. mobile pens (sometimes referred to as chicken tractors), which were designed to roll over trap crop plants. The pens were placed so that the pens enclosed the trap crop plots, and then they placed between two and four chickens in each mobile pen. By confining the chickens in pens with the trap crop plants, they kept the chickens away from the cash crop and avoided damage and contamination issues. To make their pest management program even more effective, the Wenigs incorporated several cover crops to provide other soil and pest management related benefits.

"Bottom line - it was a great success," said Wenig. "After a number of issues including the weather and a steep learning curve, we saw that chickens, in combination with a blue Hubbard squash trap crop, can be used to control squash bugs in a vegetable produce business."



Manage Insects on Your Farm

While every farming system is unique, the principles of ecological pest management apply universally. *Manage Insects on Your Farm* highlights ecological strategies that improve your farm's natural defenses and encourage beneficial insects to attack your worst pests. Learn about the principles of ecologically based pest management and the strategies of farmers around the world to address insect problems. Minimize insect damage with wise soil management and identify beneficial insects to put these "good bugs" to work for you. Examples of successful pest management strategies sprinkled throughout the book will stimulate your imagination to develop a more complex, more diverse ecosystem on your farm.

Read it for free online at www.northcentralsare.org/Educational-Resources/Books/Manage-Insects-on-Your-Farm

Management of the Spotted Wing Drosophila Using High Tunnels

OBJECTIVE: to develop procedures to prevent as many spotted wing drosophila as possible from entering the high tunnels and effectively control them using organic methods once they have entered the growing structures.

RESULTS: Scenic Valley Farms is a family owned farm in Rosemount, Minnesota that uses fifteen climate controlled high tunnels to produce organically certified tomatoes, peppers, cucumbers, blackberries, strawberries, herbs, ginger, turmeric, and garlic. They also design and manage high tunnels, computerized climate control systems, and subterranean solar thermal heating systems.

Erik Gundacker helps manage the high tunnels at Scenic Valley and applied for an NCR-SARE Farmer Rancher grant in 2014 to monitor the presence of spotted wing drosophila (SWD). SWD is a small fly that will damage ripe or ripening fruits such as cherries, peaches, plums, raspberries, strawberries, apples, blueberries, and grapes.

In order to prevent SWD population build-up, Gundacker installed insect netting on his high tunnel greenhouses, and placed the same type of netting over field-grown strawberries. Once the SWD were detected, he managed the pest with the application of organically approved insecticides. He made sure that the pollinators within the tunnels had returned to their beehives, and then he removed the beehives prior to insecticide application.

Gundacker elected to use insect netting manufactured by ProtekNet. The dimensions of each roll of netting was 6.5' X 328', with a mesh size opening of 1.00 mm X .60 mm. He chose this size because it was small enough to prevent SWD from entering but large enough to only restrict approximately 20 percent of natural airflow.

With the netting in place, he placed two traps within each tunnel and two traps outside each tunnel. Traps within the tunnels showed no presence of SWD until late July. Once he detected SWD inside the tunnels, he picked the ripe berries, removed the beehives, and then sprayed two consecutive nights with Pyganic,



PHOTO COURTESY OF SARE OUTREACH

Spotted wing drosophila larva feed on healthy, intact, ripening strawberries. Eric Gundacker used a combination of high tunnels, insect netting, and organically approved insecticides to control the pest at Scenic Valley Farms in Minnesota.

followed by a third night with Entrust. Most of the time, this procedure reduced SWD populations to acceptable levels.

Gundacker says this solution prevented sizable numbers of the pest from entering the high tunnels, and the remaining population was much easier to manage due to its low numbers.

"In our opinion, the primary reason we were able to control the SWD outbreak is because of the insect netting," said Gundacker. "It largely prevented new adults from entering the tunnel while we were attempting to control the population already in the tunnel. Without this protective barrier, we would have been forced to apply insecticide throughout the entire harvest season which would have resulted in much higher labor and material costs and a less healthy crop of berries."

Finishing Time and Weights of Grass-fed Beef Animals

OBJECTIVE: to move grazing system research and adoption forward by documenting productive forage-based beef operations.

RESULTS: For more than 20 years, Jane Jewett has owned WillowSedge Farm near Palisade, Minnesota. She and her family raise and direct-market pork, poultry, lamb, and grass-fed beef on 113 acres. An increasing interest in grass-fed beef operations led Jewett to make the transition to grass-fed beef in 2008.

Jewett the opportunity to collaborate with three other grass-fed beef operations in Minnesota: Edgar Brown in Willow River, Jake and Lindsay Grass of Grass Meadows Farm in Pine City, and Bill and Bonnie McMillin in Kellogg.

Her interest in applying for an NCR-SARE grant was sparked after reading the scientific journal article titled: “Comparative Life Cycle Environmental Impacts of Three Beef Production Strategies in the Upper Midwestern United States” (2010)*.



PHOTO BY BETSY WEILAND

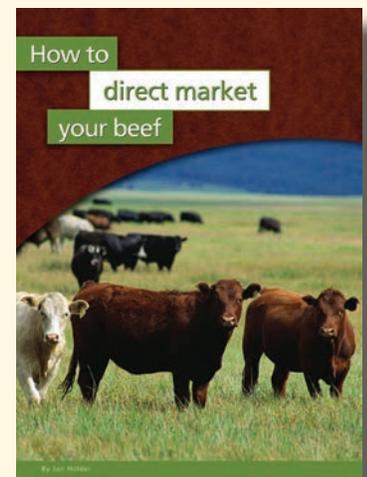
Jane Jewett demonstrated that grass-fed beef could approach feedlot beef in terms of efficiency of production.

Jewett was curious about a passage that assumed 1100 lbs. live weight and 22 months of age at slaughter for grass-fed beef compared to 1,400 lbs. and 17 months for feedlot beef. Jewett was somewhat surprised by these findings because she knew she could produce 1,100 lb. live weight in a lesser amount of time solely on forage. She hypothesized that the long finishing time of grass-fed beef cattle in the study could be due to producers raising heritage breeds of cattle, which tend to grow more slowly and may be smaller-framed animals than modern breeds; or to using an inadequate quality of forage. Jewett felt that modern breeds raised on well-managed grass and forage were not properly represented in the study and wanted to compare the productivity of grass-finished systems with a feedlot beef system in a situation where cattle breeds and level of management of the system were similar.

Jewett found that it was possible to produce an 1,100 lb. live weight (600 lb. carcass weight) in a 15-to-18 month time frame, depending on genetics and feed. She noted that with quality forage and good genetics, grass-fed results could exceed feedlot results—Bill McMillin achieved a 1,387 lb. live weight (749 lb. carcass weight) in 14 months.

“If we can capture the environmental benefits of pushing more acres into perennial forage while sacrificing very little of the beef productivity potential of a feedlot, I think that would be ideal—and I also think that is achievable,” said Jewett.

In 2012, Jewett applied for an NCR-SARE Farmer Rancher Grant and received \$19,829 to study the finishing time and weights of grass-fed beef animals. The funds provided



How to Direct Market Your Beef

How to Direct Market Your Beef portrays how one couple used its family’s ranch to launch a profitable, grass-based beef operation focused on direct market sales. From slaughtering to packaging, through labeling and advertising, Jan and Will Holder transform their real-life experiences to a compelling narrative rich with practical tips.

Read it for free online at www.northcentralsare.org/Educational-Resources/Books/How-to-Direct-Market-Your-Beef

* Nathan Pelletier, Rich Pirog, and Rebecca Rasmussen. 2010. Comparative life cycle environmental impacts of three beef production strategies in the Upper Midwestern United States. *Agricultural Systems*. 103(6):380-389. <http://www.sciencedirect.com/science/article/pii/S0308521X10000399>

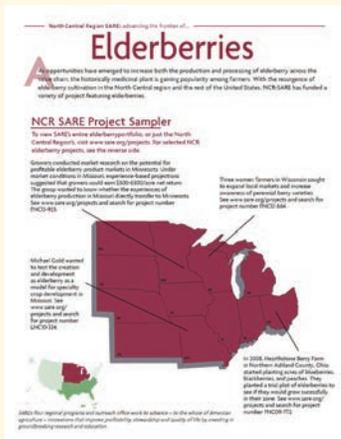


PHOTO BY DEREK JENSEN

Elderberries and NCR-SARE

Sambucus canadensis, the American black elderberry, is a species of elderberry native to a large area of North America east of the Rocky Mountains, including part of the North Central region. As opportunities have emerged to increase both the production and processing of elderberries, the historically medicinal plant has been gaining popularity among farmers. With the resurgence of elderberry cultivation in the North Central region and the rest of the United States, NCR-SARE has funded a variety of projects featuring elderberries.

Read a topical brief sheet about the research that NCR-SARE has funded on elderberries for free online at www.northcentralsare.org/Educational-Resources/Regional-Program-Materials/NCR-SARE-Brief-Sheets-by-Topic/Elderberries



Developing Commercial Elderberry Production in Minnesota

OBJECTIVE: to determine whether small sustainable/organic farmers can further diversify their businesses by profitably growing and processing elderberries in Minnesota.

RESULTS: Elderberries are a rapidly growing specialty crop in the Midwest. They have multiple functions in a cropping system because they are perennial, ornamental, a wildlife food source, and they can be planted in low-lying wet areas as a buffer. They can be used to produce value-added products like jams, jellies, wines, and juices.

projections suggested that growers could earn anywhere between \$500-6,500/acre net return. The group wanted to know whether the experiences of elderberry production in Missouri could transfer to Minnesota.

Over the course of the project the group held several meetings with CDS about their market and feasibility study, discussed grower education and outreach, and discussed membership structure and benefits for the Minnesota Elderberry Cooperative. The feasibility study was completed in 2013, and it favorably assessed the potential profitability of elderberry cultivation, processing, and marketing in Minnesota.

“Not only can elderberry provide an additional income stream to farmers, but can help land owners manage land and water resources, and provide support for pollinators and wildlife diversity,” said Patton. “Local food, beverage, and health supplement companies will benefit from locally sourced, higher quality elderberry ingredients to replace European imports. The public benefits from increased access to a traditionally used wild berry with a reputation of delivering a high level of health benefits.”

In 2014, Minnesota Elderberry Cooperative members produced, processed, and sold over 1,000 lbs. of frozen and fresh elderberries as well as dozens of pounds of flowers. Minnesota Elderberry Cooperative members also conducted successful training in proper harvest and processing methods and began development of quality control.



PHOTO BY PAUL OTTEN

Christopher Patton and the Minnesota Elderberry Cooperative help potential growers evaluate elderberries as a hobby or business crop.

Christopher Patton is the founder of the Minnesota Elderberry Cooperative, which intends to function as a dependable, primary connection between the independent elderberry grower and the marketplace in Minnesota.

In 2013, Christopher Patton, Dan Moe, Loren Nickelson, and Paul Otten (the four producers that formed the Minnesota Elderberry Cooperative) applied for an NCR-SARE Farmer Rancher grant to contract with Cooperative Development Services (CDS) to conduct market research on the potential for profitable elderberry product markets in Minnesota. Under market conditions in Missouri, experience-based

Comparison of Annual Forages for Grazing Lambs on Previously Cropped Ground

OBJECTIVE: to compare the suitability of summer annual forages for lamb grazing as well as the economics of grazing growing lambs on spring, summer, and winter annual forage crops as compared to average returns from corn and soybean production on these acres.

RESULTS: Michael Seipel, his wife, and three children raise livestock on pasture in northeast Missouri. Michael also teaches agricultural business and sustainable agriculture courses at Truman State University.

In 2013, Michael Seipel received an NCR-SARE Farmer Rancher grant to look at the economics of grazing lambs on spring, summer, and winter annual forage crops as compared to average returns from corn and soybean production. With the grant, Seipel sowed seventeen acres of previously cropped ground with oats, and then strip-grazed the oats with Katahdin hair sheep ewes and lambs in April, May, and early June. Seipel wanted to document the economic returns of grazing annual forages on marginal cropland versus raising annual row-crops on those acres.



Michael Seipel learned that oats provided an early-spring forage option for his sheep and lambs on his farm in Callao, Missouri.

Oats were planted (with no-till drill) in April 2013 on the 17 acres. In May, the group of lambs and adult sheep (85 lambs, 67 adults) began grazing 9 acres of oats. Electric fencing was used to strip graze the sheep on these 9 acres, with the animals moved to fresh ground every 1 to 3 days.

Forage clippings were taken at three different points to estimate total forage dry matter available. Careful measurements were used to document utilization of dry matter by grazing sheep. The oats during their grazing period provided 25.55 Animal Unit Months (AUMs) of grazing, or 2.84 AUM/acre. This calculation was based on a 35-day grazing period (1.17 months) in which 21.9 AUs grazed on 9 acres of forage.

According to his figures, Seipel's lambs gained a total of 1,382 lbs on oats during a 35-day grazing period. Valuing this gain at \$1.50 per lb, that amounted to \$2,073, or \$230.33 in gross revenue per acre. Expenses per acre, including cash rent and forage establishment costs, were \$194.84, leaving a marginal net return of \$35.49/acre. For the

oats that were harvested as hay, the net was a loss of \$10.59/acre after mowing, raking, and baling costs were considered.

Seipel learned that annual forage crops (in this case, oats) could be used successfully and economically as a nutrient source for grazing lambs. He also learned that utilization of annual forage crops has risks and is highly weather-dependent and time-sensitive.

“The lessons learned from the grant have generated continued interest from me in finding ways to strategically utilize annual forages,” said Seipel. “Annual forages can play a key role in filling gaps in energy and protein availability left by cool-season perennial pastures. The economic value of livestock weight gains on these forages, while not comparable to returns from annual cash crops during the time the project was completed, are substantial enough that grazing merits consideration, especially with the drop in corn and soybean prices (and returns) that occurred in 2014.”

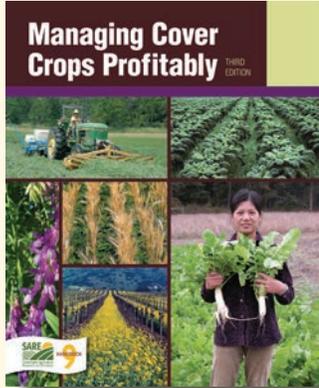


Sustainable Control of Internal Parasites in Small Ruminant Production

Sheep and goat production is a growing enterprise for small and limited resource farmers. Small ruminants (sheep and goats) are adaptable to many different production systems and can be raised with relatively few inputs, but they face production challenges. Control of internal parasites is a primary concern for many sheep and goat producers and is particularly challenging in humid regions. The “Sustainable Control of Internal Parasites in Small Ruminant Production” fact sheet provides basic information on several methods of sustainable gastrointestinal nematode parasite control, and cites resources for training and further information.

Read it for free online at www.northcentralsare.org/Educational-Resources/Fact-Sheets/Sustainable-Control-of-Internal-Parasites-in-Small-Ruminant-Production

PHOTO BY MICHAEL SEIPEL



Managing Cover Crops Profitably

Managing Cover Crops Profitably explores how and why cover crops work, and provides all the information needed to build cover crops into any farming operation. Along with detailed management information on the most commonly used species—including grasses, grains, brassicas and mustards, and legumes—*Managing Cover Crops Profitably* offers chapters on the role of cover crops in broader topics such as crop rotations, pests, and conservation tillage. It also has appendices on seed suppliers and regional experts.

Read it for free online at www.northcentralsare.org/Educational-Resources/Books/Managing-Cover-Crops-Profitably-3rd-Edition

Evaluating the Roller-Crimper for Cover Crops in Corn and Soybean Terraced Ground

OBJECTIVE: to address questions or problems regarding the operation of a roller-crimper on hilly, terraced, and irregularly shaped ground.

RESULTS: In northwest Missouri, a practice known as terracing is used to prevent ditches. Michael Willis, a beginning farmer in northwest Missouri, says that cover crops can reduce the need for terraces, but terraces still prove to be important to prevent ditch formation during the transitional phase from traditional no-till to no-till with cover crops.

PHOTO COURTESY OF MICHAEL WILLIS.



Cover crops have helped to improve erosion problems, soil health, and yields on Michael Willis' terraced farm in northwest Missouri.

Willis owns and farms 64 acres, farms another 1000 acres of row crops with his parents and brother, and helps run his family's 120-head cattle herd. He had information about the Rodale Institute's cover crop roller-crimper, but Willis wanted to know how effective it could be on irregular or terraced areas. In 2013, Willis received an NCR-SARE Farmer Rancher grant to evaluate the effectiveness of the Rodale roller-crimper on hilly, terraced, and irregularly shaped fields. With a 15.5' wide roller-crimper hooked onto a LaForge front-mounted three-point hitch and 25 acres, Willis commenced his experiment.

Willis' Key Findings for Rolling-Crimping on Terraced or Irregularly-Shaped Fields

- The roller-crimper was able to handle gentle curves, but if it looked like a curve would be too sharp, it was best to be safe and treat it like a corner. Turning too sharply bent the arms of the front-mounted three-point hitch, though they sprung back into place

once the roller-crimper was lifted. However, doing this too frequently could break them or leave them permanently bent.

- Irregularly shaped fields could be planted while rolling and crimping, but sharper curves needed to be treated like corners. Wide grass borders around the field could make these areas easier to maneuver around, giving ample room to turn around for another pass.
- Rolling and crimping while planting on terraces was easiest on straight terraces. Cover crops near the terrace riser were harder to reach due to the concern of hitting the riser with the roller-crimper.
- Cover crop mixes made rolling and crimping more difficult. When certain species of cover crops were ready to crimp, others still needed time to mature. Having a pure stand of one cover crop made it much easier to manage. Planting soybeans into cereal rye was the easiest to manage.
- The roller-crimper did a better job controlling cereal rye that had higher fertility. Rye in lower fertility areas was shorter and had tougher stems, causing them to spring back up after the roller-crimper rolled over the rye. However, Willis was able to do his pre-emergence application of herbicides even in less-than-ideal field conditions because of the large amount of cover crop biomass—the sprayer didn't cut ruts in the field or pick up much mud on the tires.

Willis has noticed improvements in soil structure since he started using cover crops. He took a soil active carbon test in 2013 on a field where he planted soybeans into rolled and crimped cereal rye, and it tested .79 grams of active carbon per kilogram of soil. He took a test from the same area in 2014 and it tested .82 grams of active carbon per kilogram of soil.

Adapting Cover Crops to Northern Climate Conventional Cropping Systems

OBJECTIVE: to demonstrate to the agricultural industry in northeast Minnesota how cover crops can be utilized in the area, and to reduce the need for costly stored feeds in cattle production in the region.

RESULTS: Cover crops offer a potential way to reduce feed costs by increasing forage production and extending the grazing season into the fall. They can also help diversify crop rotations and add ground cover for soil and water quality benefits.

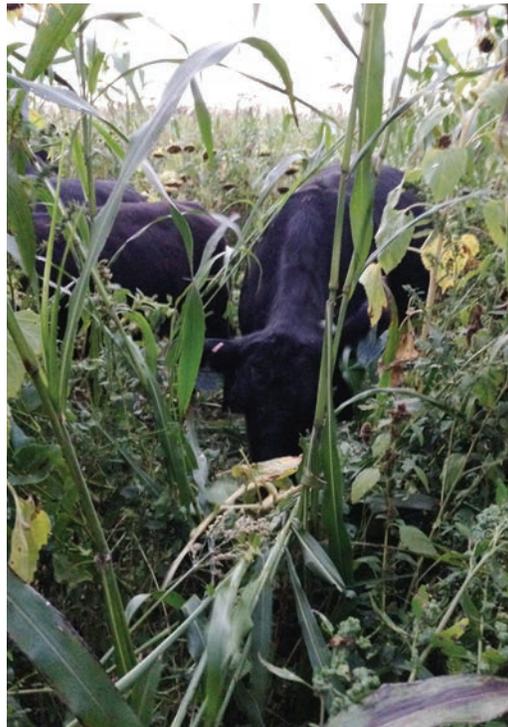
northeast Minnesota. He also manages 1,800 acres of soybeans, corn, forage and pasture.

With support from a 2014 NCR-SARE Farmer Rancher grant, Salzer and Mach conducted cover crop demonstrations on three farms in three different adjacent counties in northeast Minnesota including Salzer's farm in Barnum, Mach's farm in Sturgeon Lake, and Scott Peterson's farm in Floodwood. Sites were strategically selected along a north/south gradient in three different counties. Each of the farms dedicated ten acres to the study. Over the two year period of the grant, a variety of crops were grown (wheat, peas/oats, corn) and were harvested in a variety of manners (grazed, baled, combined). After the first crop was harvested, cool season cover crops were inter-seeded into the stubble. Cover crop samples were evaluated for yield and feed quality.

Over the period of the 2 year study, they determined that cover crops could extend the growing season in northeast Minnesota while maintaining soil cover and providing opportunities to improve soil health for cropping systems. They also concluded that cover crops (specifically winter rye and turnips) could produce the quality of feed necessary to adequately finish beef with grass/forage due to the levels of crude protein and digestible dry matter.

"Winter Rye and turnip emergence was very good," said Mach. "Lack of vigorous growth suggests fertility issues. I go back in my mind to the common thread through all of this research: fertility, fertility, fertility! We can't build soil health and composition in a timely fashion without the nutrients! If we import the nutrients at the beginning and in a form that won't leach and is available, we can capitalize on recycling these nutrients through forage growth, and subsequent livestock utilization and trampling impact."

As part of their project, they developed a list of suggested management techniques to improve the success of implementing cover crops including; selecting cold tolerant cover crop seeds, planting as early as possible, addressing soil fertility issues, selecting fields conducive to productive grazing, and utilizing high quality forage.



Cows graze a mix of cover crops during a September field day on Abe Mach's farm in northeast Minnesota.

Northeast Minnesota is home to a large beef cow-calf sector, several dairy farms, and an increasing amount of cash grain farming. In each of these types of operations, annual cultivation of corn, soybeans, oats, and barley is common. Annual cultivation of these crops can lead to high rates of nutrient leaching and soil erosion, decreased crop diversity, decreased soil aggregate stability, decreased soil organic matter, and reduced soil biology and overall soil health. The utilization of cover crops has been shown in many cases to alleviate these problems.

Troy Salzer farms 900 acres of cropland and pastureland in northeast Minnesota, where he grows forage, soybeans, corn, and vegetables, and raises approximately 190 beef cow-calf pairs. Abe Mach operates Mach Angus, a cow-calf operation with 110 cow-calf pairs, in

PHOTO BY TROY SALZER.



Troy Salzer planted winter rye and turnips in August and grazed them in November on his farm in northeast Minnesota.

Cover Crops and Northeast Minnesota

This handout shows how Troy Salzer and Abe Mach used cover crops to increase forage production and extend the grazing season into the fall, while diversifying crop rotations and adding ground cover for soil and water quality benefits in northeast Minnesota.

Read it online for free at www.northcentralsare.org/Educational-Resources/SARE-Project-Products/Adapting-Cover-Cropping-Techniques-to-Northern-Climate-Conventional-Cropping-Systems



Farmers Forum Videos on YouTube

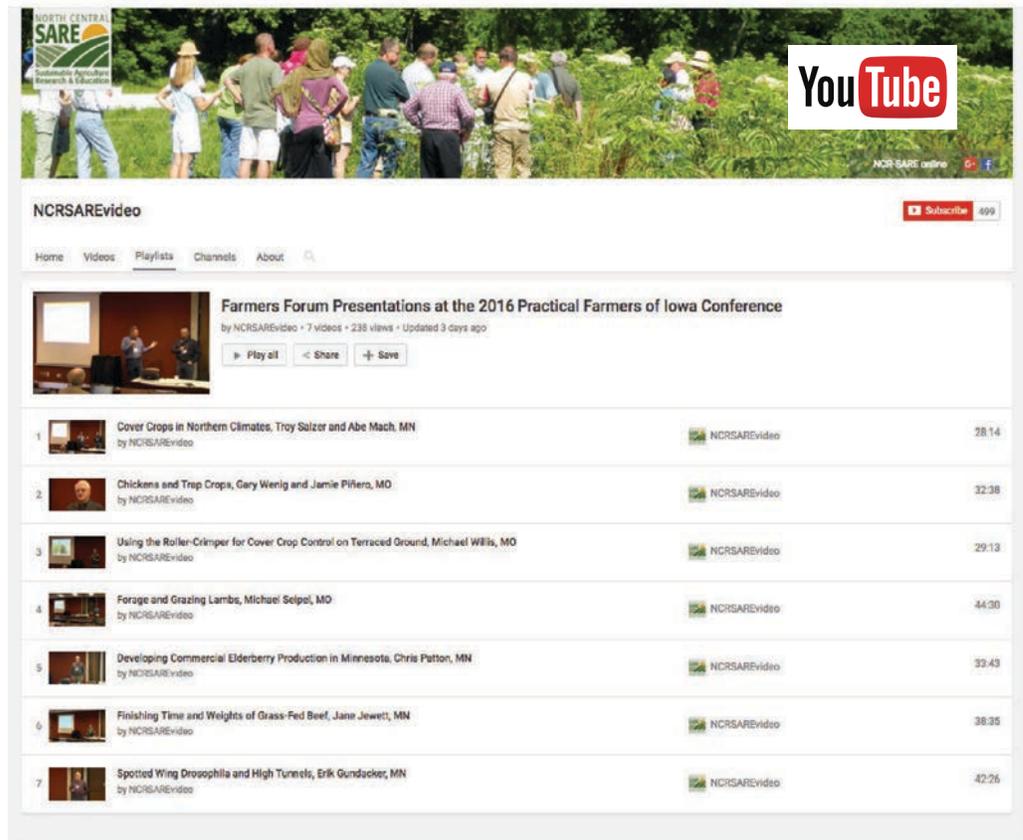
Every day, farmers and ranchers around the world develop new, innovative strategies to produce and distribute food, fuel, and fiber sustainably. While these strategies vary greatly, they all embrace three broad goals, or what SARE calls the 3 Pillars of Sustainability:

- Profit over the long term
- Stewardship of our nation's land, air, and water
- Quality of life for farmers, ranchers, and their communities

Held in conjunction with regional agriculture conferences, NCR-SARE Farmers Forums give SARE grantees the opportunity to share information about sustainable agriculture practices with farmers, ranchers, researchers, educators, and others.

In order to share Farmers Forum presentations with a wider audience, NCR-SARE creates videos of the Farmers Forum presentations and publishes them on YouTube.

You can view videos of the presentations featured in this highlight by visiting <http://tinyurl.com/FarmersForumPFI>



To find out more about NCR-SARE's educational programs and grants, please contact:



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