

## Highlights of the Ecology of Grazing Land Systems Midwestern Tour – Part I

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The Ecology of Grazing Land Systems (EGLS) class of 2011 included 17 graduate students and faculty from Clemson University, The University of Missouri, The University of Tennessee, Texas Tech and Virginia Tech. This year the students participating in the course came from 12 states and China. Six Virginia Tech students participated in the course, in part with the help of Virginia Forage and Grassland Council support. The EGLS class toured forage-based farming operations and grasslands throughout the US Midwest in July and August of 2011.

We students are writing a two-part story on our experiences. Following are some of the highlights and innovations we observed in the first half of the trip through Indiana, Michigan, Wisconsin and Minnesota. A second installment in the next Forager will be written by our peers and cover our experiences in South Dakota and Nebraska.



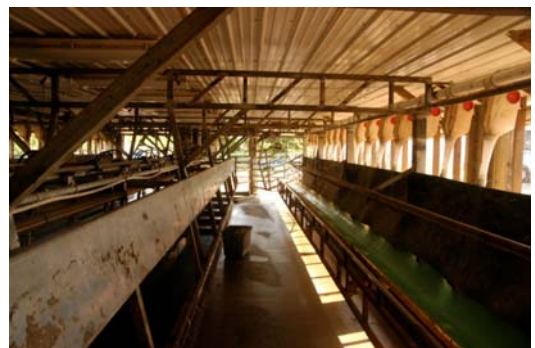
### NRCS Headquarters, Indianapolis, IN

Our first stop was at the NRCS headquarters in Indianapolis. Following a discussion of the geology and soils of the state, we saw a clear demonstration of the difference in aggregate stability between a soil managed with no-till techniques for 40 years and one managed with conventional tillage. Here, the no-till soil (left, 3% organic matter) is perfectly stable when submerged in water, while the conventional soil (right, <1% organic matter) completely disintegrates and settles to the bottom of the cylinder. The NRCS is working to promote more widespread use of no-till management, cover cropping and increased crop residues for soil protection.



### Riverview Farm, Logansport, IN

David Forgey, a national leader in pasture-based dairying, and his partner Scott Foerg run a seasonal, pasture-based dairy with about 250



cows on 500 acres of pasture. Forgey has been doing things this way for the last 20 years. Prior to that, the dairy had been a confinement operation, but by the late 1980s Forgey was struggling to stay afloat because of high feed costs and had to choose to either get out of the business or change his operation. Now, his cows graze on pastures during the growing season from mid-March to mid-November with only minimal supplements for the lactating animals. Cows are dried off just before the end of the year and fed haylage and hay until calving season in the spring. This seasonal

management of the dairy herd allows Forgey to reduce his feeding costs by not milking in the winter and also gives everyone a break for a few months. He says that though his overall milk production fell slightly in switching from the confinement system to seasonal pasture dairy, his net profit per cow has increased significantly allowing him not only to stay in business, but to succeed. He is using some key innovations such as growing highly productive reed canarygrass for forage in wet, bottomland pastures (upper left) and a simplified, cost-effective New Zealand-style milking parlor (lower right).



#### **Sweeten Hay Farm, Peru, IN**

Jeremy Sweeten didn't grow up on a farm, but he's always wanted to be a farmer. After graduating from Purdue with an MS degree in forage agronomy, he and his wife started custom mowing and baling hay for local dairies. He now not only has his custom hay business, but also raises replacement heifers, buying them from local dairies as calves and then selling them back when they are ready to breed. He has had several ups and downs because of summer droughts and challenges in the dairy industry in recent years resulting in a number of his clients going out of business. Part of his farm, not used for hay or grazing, is in the Conservation Reserve Program (CRP) (upper left). It's been seeded in a variety of native warm-season grasses including eastern gamagrass, big bluestem, little bluestem and indiagrass, and is managed by controlled burning every three years in hopes of providing habitat for species such as the northern bobwhite quail. When the land comes out of the CRP program in the next few years he will maintain it as native warm season grass and use it for hay and pasturing cattle.

#### **Kellogg Biological Station, Michigan State University, Kalamazoo, MI**



Dr. Santiago Utsumi and colleagues at the Kellogg Biological Station (KBS) in Michigan are working with some major innovations for the dairy industry. The university has two robotic milking machines (left). Robotic milkers, now common in Europe and just arriving in the United States, present the opportunity to automate much farm labor while more intensively managing individual cows. Each robot can service up to 60 cows. Cows are trained to come to the machines, where they receive mixed rations while being milked. Research has shown that the cows don't come to relieve milk pressure in the udder but to get the feed. Cows may arrive multiple times per day, but the machines can sort the cows and the milk. Robots can reject cows if they come too often or route milk that does not meet quality standards away from the sale tank. One-way gates and RFID tags control movements of cows through barns and pasture paddocks, further reducing labor. Costs are high up-front, but these systems are projected to pay for themselves within a decade through reduced labor costs and they can improve the quality of life for dairy workers. This system, very different from the seasonal system used



by Forgey and Foerg, is considered for Michigan because of the shortened grazing season and the necessity of feeding conserved forage. Pull-behind GPS-linked laser pasture meters (left) create detailed spatial models of pasture growth and condition for GIS maps, allowing for precision management of soil inputs and cow movements. The combination of the greater forage production this can create through higher precision management and the ability to increase individual cow yields by milking more than twice per day with the robotic milkers has the potential to increase farm efficiency, productivity, and profitability.



Work is also ongoing at KBS to develop perennial wheat to take advantage of their much more extensive root systems and year-round ground coverage, in contrast to annual grain crops. They are conducting trials of 'kernza' (left - an intermediate wheatgrass developed by The Land Institute in Salinas, KS). The kernza is bred for greater grain yields and the research at MSU is evaluating its effects on nitrogen leaching, soil water storage, and root growth and deposition in comparison with annual wheat.



#### **Arlington Agricultural Research Station, University of Wisconsin-Madison**

University of Wisconsin has a 480 cow confinement dairy with an innovative sand bedding recycling system (left). Sand is used to bed the free stall barn not only for the comfort of the cows in their stalls, but it also helps improve traction as they move around the barns. Automated aisle scrapers and flush systems remove sand, manure and urine to a sand processing pit. Water flows through the pit and sand settles out while the manure flows out with the water. The sand is then scooped up and piled in windrows to dry and to reduce bacterial loads. About every two weeks the sand pile is turned over into a new windrow until it is ready to be used again for bedding, about six weeks later. The waste water is also recycled after a period of time in settling ponds to run back through the barn flush system. The research station also has an excellent record for calf survival rates. Heifer calves, weaned at six weeks, are raised in individual hutches (right) for eight weeks, and then they are moved to larger "super hutches" with four to eight calves until twelve weeks of age. They are then moved out to be with the main heifer herd. The dairy herd manager attributes their success to very strict vaccination and cleanliness, re-bedding the hutches three times per week, feeding only pasteurized milk, and employing meticulous calf raisers.





### **Spring Creek Farm, WI**

Dick Ryan custom grazes 1,000-1,500 beef and dairy animals each year on his farm using forages carefully selected to match the soils and topography. Low, wet paddocks (left) have been planted to Garrison creeping foxtail and red clover while drier hillside paddocks contain orchardgrass and alfalfa. Meadow fescue, bluegrass, landino clover, and festolium fill in the intermediate areas. Year-round forage production is more important to Ryan than the yields of specific pastures. He does, however, expect each acre of pasture to annually produce at least 550 lbs of livestock gain and each animal to net \$100. Ryan feeds approximately three pounds per day of grain as a means of closely observing the animals for health issues and encouraging their consumption of his custom blended mineral mix which makes up for pasture forage deficiencies observed with regular testing. Some of his pastures have been in place for over 90 years and have high levels of organic matter—up to 7%. He overwinters 300-400 animals outdoors on a bedded pack. Heat, produced by decomposition of the bedded pack, and a windbreak keep animals comfortable throughout the winter and reduce health issues that might result if the animals were placed indoors for winter confinement. Our class had some questions about the nutrient management issues because few nutrients leave the farm while large amounts of nutrients enter the farm in the form of hay, feed and mineral supplements.



### **U.S. Dairy Forage Research Center, USDA ARS, WI**

The U.S. Dairy Forage Research Center is conducting innovative research on water and air quality in relation to conventional confined dairy operations. They have found that phosphorus and protein supplementation in standard rations far exceed animal requirements, leading to unnecessary water pollution and greenhouse gas (GHG) emissions. Emissions chambers (upper left) are being used to measure the effects of feeding practices on gaseous emissions of methane, ammonia, nitrous oxide, carbon dioxide and volatile organic compounds. Simulated barnyards (right), designed to collect all leachates and runoff, are being used to test the effects of various bedding materials (wood chips, sand, or native soil) on water and air pollution from outdoor barn lots common to many confinement feeding operations.



So far the research has shown that use of different bedding materials often results in trade-offs between which pollutants are released and which are bound up or mitigated. Tannins in the animals' diets also help mitigate nitrogen pollution by reducing urea production.



### **Beyer Organic Dairy Farm, Minnesota**

The Beyer's are recent converts to organic dairy farming, having changed over from a conventional confinement system in 2005. Reduced profit margins from their conventional dairy motivated them to find another way to stay in

business and they found a solution in organic farming. With the change, their production was reduced by about half, but they also received a premium for their milk that nearly doubled the price they received per unit. In addition, because organic certification requires at least 30% of animal dry matter intake to come from pastures, feed input costs were reduced by employing rotational grazing and vet bills have dropped to nearly nothing due to animals being in a healthier environment. Cropping system costs have also been reduced because the cost of fuel required for extra tillage has been less than the herbicides used in traditional cropping systems. The end result has been a significant net profit increase for the business. The Beyers make extensive use of natural remedies to maintain herd health. They use both commercial organic treatments, often including garlic, and also plant forages such as chicory and plantain, known to have medicinal benefits, which the cows can select at-will .

These innovations have allowed farming operations to overcome adversity, survive and succeed. Some promise enhanced environmental quality and more effective and efficient management in the future as they mature. In the case of the commercial dairies which moved from conventional confinement to pasturing, it was a choice between going out of business or moving to a forage-based operation in order to cut expenses and stay profitable. All of the farmers we met have worked hard to find their niches within their land bases, resources and markets. In Part II of this article, we move from the humid east into the drier ecosystems west of the Mississippi to discuss what we learned travelling through South Dakota and Nebraska.