



Big Ideas for Ag's Future

Self-propelled fencing unit and encapsulated seed balls being explored.

by *Kindra Gordon, field editor*

If someone gave you \$1 million to test new ideas on your farm or ranch, what would you develop with it? That's the question Dwayne Beck and board members and staff of the Dakota Lakes Research Farm near Pierre, S.D., had the opportunity to ponder when the nonprofit received a \$1 million unrestricted grant from the Howard G. Buffett Foundation in 2015.

Beck, a South Dakota State University (SDSU) professor who has served as manager at Dakota Lakes since it was established in 1990, explains that Buffett simply indicated: "Do something you couldn't do without it (the grant money)."

That was all Beck, his colleagues and the research farm's board members needed to hear. Already, the Dakota Lakes Research Farm has established itself as a pioneer in no-till and crop-rotation farming methods. What did they want to tackle next? They came up with three big ideas to enhance forage and soil health, and they have been testing them on the ground the past two growing seasons.

Crops and cattle

Bringing livestock grazing back to cropland is one of the big issues the Dakota Lakes team chose to address. Beck notes that the current trend of separate livestock and grain operations has created a disconnect in nutrient cycling and

an increase in disease pressure on cropland. Beck and his team believe integrating cattle into cropping operations may offer better benefits to the land and livestock.

Thus, development of a self-propelled grazing cell, or some other means of controlling livestock on the land, is being explored.

Soil: 'Farmers' greatest asset'

Howard G. Buffett has many titles — former politician, businessman, farmer, author, photographer and son of billionaire investor Warren Buffett. Yet the one title he appears to relish most is being an advocate for no-till conservation farming.

Buffett has stated, "The greatest asset farmers have is under their feet — their soil.

Buffett says soil health requires minimal soil disturbance, continual cover/crop, and rotation of crops. He also advocates reducing inputs and says, "You can do amazing things if you know how to use nature."

To better understand the global importance of soil health, Buffett recommends the book *Dirt: The Erosion of Civilizations* by David Montgomery.

"A big pen that moves around on its own" is how Beck describes the group's vision for this tool, which could be used on fields to graze crop aftermath or cover crops. Presently, the researchers are working to develop various prototypes using the framework of a lateral-move irrigation system to create a large, self-propelled corral that moves across the field.

Beck explains, "Farming has become automated and mechanized, but that has not been done with livestock on the land ... only those in confinement." He suggests development of a self-propelled pen or a virtual pen with cows equipped with GPS collars could help reduce labor and better integrate livestock and crop management, reducing input costs by moving cattle out of feedlots and into pastures and fields.

Currently, the South Dakota researchers are using portable electric fencing with the framework of the existing irrigators in the field to graze cover crops and windrows. Field grazing has occurred during fall and winter at the research station in 2015 and 2016, and Beck reports that "it's working." The research is focused on gathering data related to managing the cattle and the land, determining stocking rate within the pen, and timing for moving the pen.

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Breed differences are also being monitored to see if grazing or management differences are identified.

For 2016, 120 cows are being grazed using the mobile system; 98 cows have activity collars on their necks to measure how much time the cow spends eating vs. loafing; 48 of the cows with collars also have pedometers on a hind leg to measure activity and number of steps.

By summer 2017, Beck anticipates a portable cell prototype will be tested. Ultimately, if the GPS collar technology becomes a reality for livestock containment on fields without fences, then Beck believes the mobile prototypes his team is developing may still have applications as a means to supply water, mineral, shelter and shade.

Additionally, Beck says that with data readers, producers should eventually have the technology to get data on a smartphone indicating which cow is in heat, or which cow is not moving enough — or is agitated — to help in managing herd health and production.

Beck underscores this is a project that will take time to determine the technology and management applications. He concludes, "I think it's a really important project. In the long run, we want to get cattle out of confinement and back on the land. It's good for the cattle and good for the land."

Special seed coatings

The second concept the researchers are exploring relates to seeding cover crops. The research question being explored is this: Can encapsulated seed balls be broadcast on a field to effectively plant cover crops?

Beck notes, "Mother Nature just threw seeds out there and they grew. Farming

has gone to all this big machinery and equipment. We think it might be possible to seed a lot of our crops by laying seed on top of the ground. The benefit is you don't have to cross the field with the heavy equipment needed to place seed into the soil."

Likewise, if seeding cover crops doesn't require extra labor and machinery, more crops may be planted, which could boost forage available for grazing and benefit soil health.

Beck and his team are evaluating seed-coating technology that encapsulates seed in a material that helps to absorb moisture and hold it, so the seed can absorb it and germinate after being broadcast onto the soil. Initially the work is focusing on seed-coating material that is currently available for use on a commercial scale.

"It's already being done in some areas, but in drier climates like ours it is more challenging to do," he states.

The Dakota Lakes project is working with farmers and researchers in multiple locations to test and fine-tune various coating levels and seed mixes that would be used for cover crops. Beck reports they are working with 14 plant species, six different coats and one bare treatment.

"We are evaluating different coating levels and seeds, and timing of the broadcast. We want to determine which application produces the best result," Beck says.

The coated seed balls have been tested during both the 2015 and 2016 growing seasons, and Beck says, "We've had some success and failures." In 2016, much of the seed was broadcast with airplanes, and Beck says knowledge was gained in getting pilots comfortable with the process and getting

the seed loaded on the planes quickly to add efficiency to the process.

The biggest focus is currently on determining the best timing of application. Beck explains that a certain level of humidity is needed to help the seed balls break down. They are working to establish seeding guidelines based on the growth stage of the crop that the seed balls are being seeded into.

Says Beck, "If you apply the seed balls too early, the cover crops are outcompeted by the primary crop; if you apply the seed balls too late, it's too dry for the cover crop to grow."

Initial results suggest the best timing application for the cover crop seed balls in an existing sunflower crop is at blossom drop. In corn, it appears to be when the ear is at half milk line.

Healthier habitat

The third concept at which the innovative Dakota Lakes group is taking a closer look involves enhancing habitat on public lands and roadsides through plantings and modified management of native grass.

"We are bringing several organizations to the table to look at roadsides and other right-of-way and publicly owned or managed areas to determine how they can be better managed for habitat for birds, pollinators and wildlife," Beck explains. Ducks Unlimited, Pheasants Forever, the South Dakota Association of Towns and Townships, crop commodity organizations, the Department of Transportation, the railroad industry and the Governor's Pheasant Habitat Work Group are all involved in the discussion.

Beck says Iowa has a successful roadside habitat program in place that he hopes South Dakota — and possibly other states — will look to as a pattern to develop more wildlife and environmentally friendly management protocols. He cites timing of mowing and species that are planted as opportunities to utilize these lands more holistically with the ecosystem in mind, while also exploring opportunities to use removed residue for livestock feed and potentially for energy production.

Of the efforts under way with all three ideas, Beck concludes, "These concepts are very applied and multi-disciplinary, and that's what Dakota Lakes has strived to focus on." He notes that the research efforts will continue through the next few years.

He adds, "Can we put this all together? I don't know. It's kind of like the early no-till days. Until you try to do something, you don't really know the questions."



Editor's Note: Kindra Gordon is a cattlemoan and freelance writer from Whitewood, S.D.



PHOTOS COURTESY RUTH BECK, SDSU EXTENSION

► Using the framework of an existing irrigation system on the field, researchers in South Dakota have created a portable fencing system to integrate livestock grazing on cropland. This system is believed to enhance nutrient cycling and break crop-disease cycles to benefit soil health and future crop performance, while also providing forage grazing for cattle.