

Principal Investigator

Gale Woods Farm
Three Rivers Park
District
Tim Reese
7210 Cty. Rd. 110
W.
Minnetrista, MN
55364
763-694-2002
treese@threeriversparkdistrict.org
Hennepin County

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Writer

Adria Zwack
University of
Minnesota Service
Learning Student

Staff Contact

Meg Moynihan
651-201-6616

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Rotational Use of High-quality Land: A Three Year Rotation of Pastured Pigs, Vegetable Production, and Annual Forage

Project Summary

Gale Woods Farm is a working educational farm owned and managed by Three Rivers Park District. The farm produces pasture-raised beef, lamb, chicken, turkey, and eggs, and operates a 60 share CSA organic vegetable garden. The farm also serves as a facility for agricultural and environmental education. More than 10,000 visitors a year visit for farm-sponsored events. Our Sustainable Agriculture Demonstration Grant project demonstrates a 3-year rotation of pastured pigs, annual vegetable production, and annual forage for finishing market lambs.

Project Description

We divided an existing pasture located on very productive soils into three sections of approximately 1.5 acres each. Our plan was to incorporate the following three components on each section each year, in a rotation. So far, we've learned that some components, notably pig pasturing, need more than 1 year to accomplish what we want (Figure 1).

Year 1: Pig pasture – pasture ten pigs from April through November to root and dig up the pasture in the first year of the rotation. At a stocking rate of 6.67 pigs/A, we expected pigs to forage for some of their nutritional needs and root up the pasture in preparation for a garden crop in Year 2.

(The pigs can also be used for a short time in the garden section to clean up leftover vegetable material after the garden harvest is completed.) The tillage would prepare for:

Year 2: Organic vegetable production – for our community supported agriculture (CSA) program, followed by:

Year 3: An annual forage crop – for finishing pastured market lambs. After drilling in an annual forage crop in early spring, about half of our market lambs would be moved onto this section at the time of weaning. The remaining lambs would be raised on different pastures, allowing for a comparison of growth rates and health.

The 3-year cycle on each section of land would then start over again at the beginning.

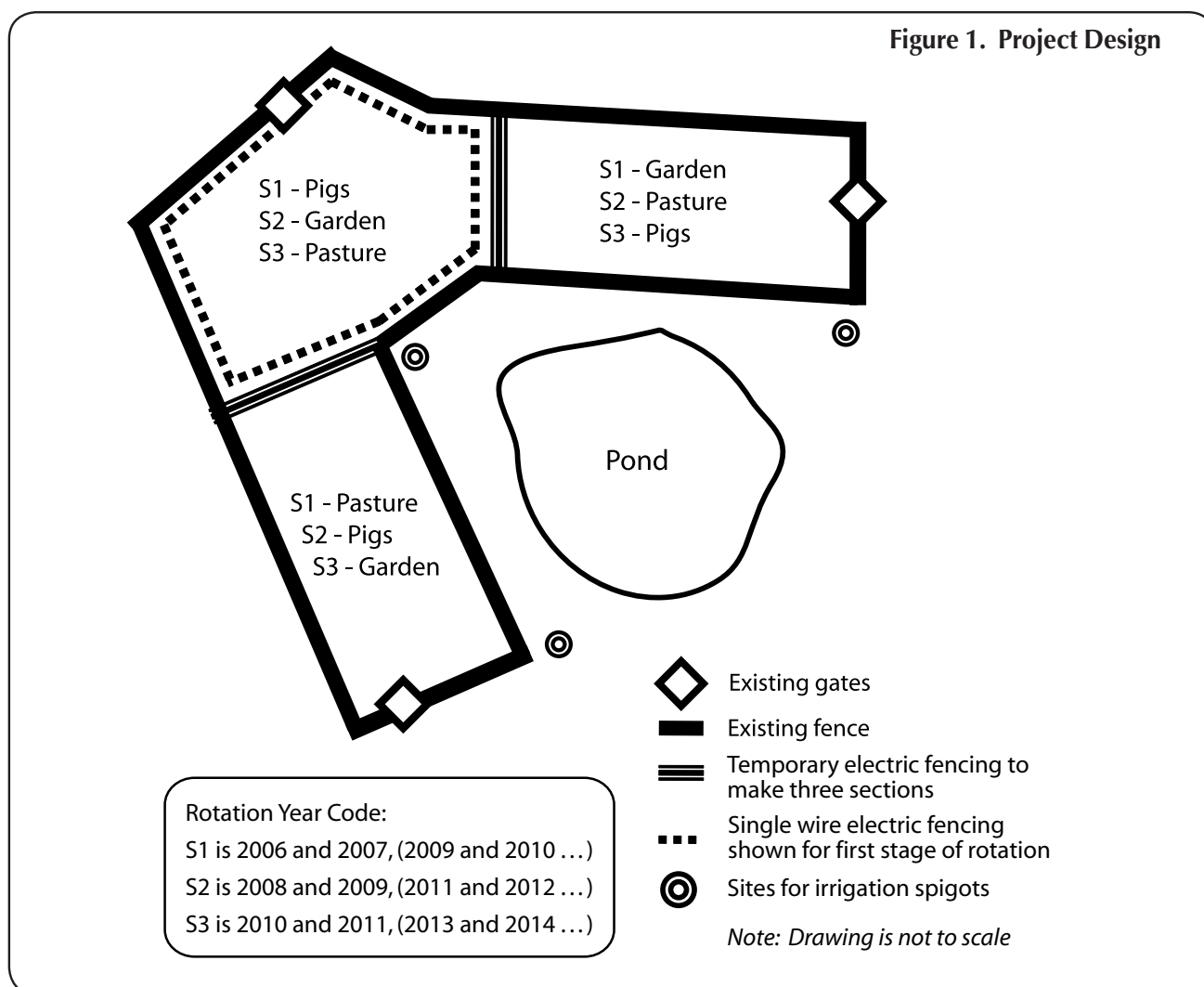
We are seeking several environmental and economic benefits from this project, including:

- reduced off-farm inputs including purchased grain, tractor fuel, and labor;
- reduced need for chemical de-wormers because the rotation should reduce parasite loads on pasture;
- increased efficiency in pasture use by maximizing use of the pasture and making better use of areas of high soil fertility for garden production;
- expanded organic vegetable production with reduced inputs from the addition of the rotational portion for a garden;
- diversified farm products through the introduction of pigs; and



Pasture in 2007 after pig tillage and oat planting.

Figure 1. Project Design



- demonstration of innovative land use to consumers, students, and other farmers.

During the first year of this project, we established required fencing and watering infrastructure. We subdivided the existing pasture with temporary electronet fencing to create three separate sections. We also installed a single strand of electrical fencing tape inside the permanent perimeter fence in the pig section to prevent pigs from digging under the perimeter fence. We added a seasonal irrigation line along the perimeter of the pasture for livestock water and crop irrigation.

In the second year of this project, we focused on managing the pigs more intensively, to accomplish a more complete “rooting up” of the paddock that will be put into garden production next. We also found sturdily-mounted automatic waterers to be useful.

Results

Component 1 - Pastured Pigs

Both years, we purchased feeder pigs from the Van Der Pol family at Pastures a’ Plenty Farm in Kerkhoven, MN. They were a Duroc/Berkshire cross with a trace of Chester White. In 2006, we purchased ten pigs, approximately 2.5 months old. In 2007, we purchased nine pigs, approximately 1.5 months old upon arrival. In 2007, they were put out on pasture on April 30, about 2 weeks earlier than 2006.

In both years, the pigs were fed a two phase ration from the local feed mill. They received 1.5 tons of grower ration and 1.5 tons of finisher ration. This ration lasted until the final 3 weeks when they were finished on approximately 500 lb of cracked corn. In addition, the pigs received ample quantities of garden waste and expired food from a local grocer. Butchering occurred on September 27, 2006 and on October 24, 2007.

2006

We provided one Port-A-Hut shelter on the pasture and moved it as needed to spread out the digging of the pigs. The pigs rooted up approximately 40% of the 1.5 acre field during 5 months on pasture. Eight of them were sent for processing at about 6 months of age, weighing between 225 to 275 lb. Their rate of gain was just less than 2 lb/day. We kept two gilts for breeding purposes. The pork was sold on-site through shares and individual cuts.

2007

In the project's second year, we reduced our animal costs by raising one less animal. We also reduced our feed costs by switching to a lower protein feed (cracked corn) earlier in the season. However, butchering costs increased because we processed the pork into more expensive items, such as sausage.

To guide the pigs' rooting activities, we again used one Port-A-Hut shelter on pasture, but this year we focused on more actively managing the rooting area by keeping them in a smaller area than we had in 2006. We used electronet fencing to make strips that were approximately .33 acre in size and placed all nine pigs in the strip. With this more intensive pasture stocking rate, the pigs rooted the entire 1.5 acre field very well.

The pigs were sent for processing at about 6 months of age, weighing between 175 and 275 lb. They gained an average of just under 2 lb/day, but their rate of gain varied greatly. Two of the pigs were "runts" and didn't gain as well, which we assumed was due primarily to genetics, rather than management. The pork was again sold on-site through shares and individual cuts.

In both years, the annual operating costs and revenue were nearly equal—without including capital and labor (Table 1).

Table 1: Costs Associated with Raising Pigs in 2006 and 2007

Costs (excluding capital and labor)	2006	2007
Animal Purchase	\$806.00	\$450.00
Feed	\$850.00	\$682.00
Butchering	\$977.00	\$1,637.00
Total Costs	\$2,633.00	\$2,769.00
Value of Pork Sold	\$2,670.00	\$2,685.00
Total Projected Gain/Loss	\$37.00	-\$84.00



Mounted automatic waterer.

However, a simple cost/revenue analysis is incomplete in the setting of this educational farm. It is hard to assign a dollar amount to the value of having pigs, particularly in this "pasturing for tillage" setting that is part of our educational programming.

Component 2 - Garden Production**2006**

In the project's first year, we planted pumpkins, potatoes, popcorn, and winter squash on a loamy peat soil with an organic matter content of 17%. Eliminating the thick sod in this pasture (mainly reed canarygrass and bluegrass) before planting required approximately 30 hr of tractor time with a disc and field cultivator.

We then established garden beds and planted clover and buckwheat in the walkways. The cover crop didn't take very well due to the lack of moisture during establishment. We were unable to measure specific crop yields because of time constraints, but qualitative evaluation indicated very good yields which we credited to high quality soil and low pest/disease pressure. It was fairly dry during the middle part of the growing season. However, due to the nature of the soils, we only had to irrigate once or twice during August. We saw very few Colorado potato beetles and the ones we did see arrived very late. Striped cucumber beetles and squash bugs have been a problem in other areas of the farm but were present in relatively small numbers in this demonstration plot.

2007

In the second year, we planted the garden in the same field that was established in 2006. Since we wanted to keep the pigs in place another year, we did not rotate these fields as we had originally planned. Planting was much easier this year as the pasture sod did not need to be removed. After harvest, most of the garden plots were planted to annual rye and oats late in the fall, and were grazed by cattle in early November when other pastures had stopped producing for the year. The remaining garden plots will be planted to

a pasture mix in the spring of 2008 and will be grazed by spring born lambs. In 2008, the garden will move into the area that was tilled by the pigs in both 2006 and 2007. The sod in these areas was completely eliminated by the pigs, so perennial weed pressure should be greatly reduced.

Component 3 - Annual Forage

We did not plant the third section to an annual forage crop in either 2006 or 2007 as it had not yet been tilled by the pigs nor planted to the garden rotation. This component will be developed once there is a field section ready for forage, after pig and garden use.

Rotation of Three Components

In the initial plan for this project, we intended to rotate the sections every season; it would have taken 3 years of developing the system for all three components to function as part of the rotation. However, we discovered that ten pigs were not able to adequately root up their portion of the pasture under the original management scheme, so we gave them one more season of rooting in the same pasture. In addition, the garden section had fairly significant annual weed pressure in 2006 (mainly velvet leaf and pigweed), so we decided to give the garden another season of active cultivation before planting it to a forage. The low levels of pest and disease problems in this garden encouraged us to use it as a garden for one more season.

We discovered that it was better to modify our plan and manage each section in a more phased approach rather than rotating three complete sections too quickly. As the pigs slowly advance through the pasture, the garden will be phased in behind them. We now expect that most sections will require 2 years of pig tillage rather than one.

In 2006, about 4,000 people visited the project in conjunction with other educational programs at the farm. In 2007, we estimate that about 9,000 people visited; 22 of them attended a field day specifically about the project that was held on September 29, 2007. Unfortunately, we experienced heavy morning rain, which may have kept attendance down. For those attendees undaunted by the morning's weather, it was a good time to see the fields, as they were at the end of a season of pig tillage.

Management Tips

1. To achieve adequate tillage, manage the rooting of grazing pigs intensively. We found that forcing the pigs into an area of 6 to 8 ft²/lb of animal works quite well. When we moved the pigs every 2 weeks, they were very successful at rooting up the sod in the entire 1.5 acre paddock.
2. To naturally manage the movement of pigs on pasture, provide shade and a wallow when it is hot and dry. We found moving the shade and the wallow 2 to 3 times/week facilitates the spreading out of the pigs' digging.
3. Find a local grocer or cafeteria that is willing to set aside expired produce or leftover food for pig feed. This can be an excellent and free source of additional feed.
4. Find a very sturdy automatic waterer and mount it on something the pigs can't tip over. Pigs are very curious and, especially when they are larger, they will tip over a waterer, chew through the hose, and make a mess if the water is not managed improperly.
5. To prevent weed growth on recently rooted up areas, plant a quick growing annual crop. We planted oats at the rate of approximately 100 lb/A to cover the soil and prevent weed infestations.

Cooperators

Wayne Martin, University of Minnesota, St. Paul, MN
Jim and Lee Ann Van Der Pol, Kerkoven, MN

Project Location

From Minneapolis/St. Paul take I-394 west. I-394 turns into US 12. Follow US 12 until the exit for Cty. Rd. 15 west. Follow Cty. Rd. 15 for approximately 8 miles until the town of Mound. At the intersection (stoplight) with Cty. Rd. 110, take a left. In approximately 2 miles, turn right at the sign for Gale Woods Farm. This road/driveway dead ends at the farm.