



The area outlined in blue delineates the monitored field. All surface runoff in this area moves in the same direction and flows through a water monitoring station. The triangle indicates the location of the water monitoring station.

Soil samples from the monitoring site were first collected in November 2013. The soil profile was sampled at a depth of 0 to 6 inches and 6 to 24 inches. Topsoil (0 to 6 inches) was analyzed for organic matter, pH, nitrate-nitrogen, phosphorus (Bray test) and potassium. Soil from 6 to 24 inches was analyzed for nitrate-nitrogen. Results are summarized in the table below:

Soil Sample Analysis of the Monitored Field	
SOIL PROPERTY	VALUE
pH	6.9
Organic matter, %	4.9
Nitrate-Nitrogen to two feet, lb./acre	71
Phosphorus (Bray test),ppm	75
Potassium, ppm	234

These values are representative of similar soils in southeastern Minnesota where swine manure has been routinely applied. The very high phosphorus value is likely a consequence of repeated manure application.

## EQUIPMENT INSTALLATION

Installation of equipment to measure surface water and subsurface tile drainage flow was completed in November 2012. Water samples are collected automatically whenever surface runoff or tile flow occurs. A weather station was also installed at the same time to record precipitation, temperature, and other meaningful climatic variables. Water samples collected are analyzed for sediment, total phosphorus, inorganic (ortho) phosphorus, chloride, total kjeldahl nitrogen, ammonia nitrogen and nitrate-nitrogen. By combining information on water flow with sediment and nutrient concentrations, it is possible to calculate the total nutrient and sediment movement off the landscape.

## CONCLUSION

The Discovery Farms Minnesota program at the Herbst Farm is designed to provide information to help better understand how farm management practices can impact sediment and nutrient movement to local streams and rivers. Throughout the 5 to 7 year duration of this project, information will be gathered from the monitored field to provide insight on water quality issues where confinement hog finishing is the major enterprise. This information will help to identify some of the strengths and challenges facing similar farming systems within similar landscapes.

## FOR MORE INFORMATION, PLEASE CONTACT

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## HERBST FARM Farm, Site and Study Design



## OVERVIEW OF OPERATION

The Herbst Farm is located southeast of Kasson, Minnesota in Dodge County. It is a family farm that was established in 1958 by Ralph and LaDonna Herbst. Brian, son of Ralph and LaDonna, grew up working closely with his dad and always had a desire to farm. Brian graduated from the University of Wisconsin-River Falls with a degree in Diversified Agricultural Production. His wife, Cynthia, majored in Agricultural Business at Southwest Minnesota State University in Marshall. They have three sons: Adam who is majoring in Agricultural Business at Iowa State University, Aaron who is a junior at Kasson-Mantorville High School and Eli who is in eighth grade.



The major crops grown on the Herbst Farm include corn and soybeans along with contract finishing hogs. The hogs add an additional revenue stream and provide manure to supplement crop nutrient needs. The corn is marketed to a local ethanol plant, feed mill, or specialty non-GMO corn outlet. Soybeans are generally sold into a soybean meal market. Brian applied to be a Discovery Farm because he believed that he could learn from the sediment, nitrogen and phosphorus data collected from his field. If the data show that different practices are needed, he is willing to take a serious look at any suggested practices to improve his operation.

## PRODUCTION PRACTICES

Brian works closely with a crop consultant to ensure that the most up to date management practices are used. Manure from the swine finishing barns usually provides the nutrients required to support a high-yielding corn and soybean crop. Manure is analyzed for nutrient content annually. A typical manure analysis would be 63 lb. N, 38 lb. P<sub>2</sub>O<sub>5</sub>, 41 lb. K<sub>2</sub>O and 5.5 lb. S per 1,000 gallons of manure. Manure is usually knifed into the existing stubble in the fall of the soybean year at a rate of is approximately 2,000 - 2,500 gallons per acre. After the manure is applied in the fall, a chisel plow is used to incorporate it. This is followed by a field cultivator in the spring before corn planting. Acres going into corn that have received manure but require additional nitrogen receive 28-0-0 fertilizer either before planting or sidedressed during the growing season. Variable rate technology is used for the 28-0-0 fertilizer application.

A 22 inch row spacing is used for both corn and soybean production. If possible, corn is planted in late April at a plant population of 37,500 plants per acre. The soybean crop is planted in mid-May using a seeding rate of 140,000 seeds per acre. Pesticides and micronutrients are applied to both the corn and soybean crop. Brian routinely scouts fields during the late spring and early summer to determine the pesticide and nutrient needs.

## LOCATION AND CLIMATE

Dodge County is located in southeastern Minnesota. The region is characterized by gently rolling hills and numerous small streams and rivers. Water leaving Dodge County can enter one of three rivers which all flow into the Mississippi River. Water from the Herbst Farm flows to Cascade Creek then into the Zumbro River.

Most of the soils in the monitored field are classified as Readlyn silt loam or Marquis silt loam. In one depressional (low lying) area of the field, there is a small percentage of Tripoli silty clay loam. The parent material is a thin deposit of loess over glacial till with a loam to clay loam texture. These soils have an available water holding capacity of approximately 10

inches to a depth of 5 feet. Drainage of the soils in the monitored area range from moderately well drained to poorly drained. The poor drainage of the Readlyn and Tripoli soils explains the need for tile drainage. The average annual precipitation for the area is 33.9 inches. Approximately 72% (24.5 inches) of the total precipitation falls during the growing season (April through September). The average annual snowfall is 42.4 inches. The average summer and winter temperature is 68°F and 16°F, respectively.



## FARM AND MONITORING SITE SELECTION

The initial visit to the Herbst Farm occurred in the early fall of 2012 with a tour of multiple fields to evaluate potential sites for surface water monitoring as well as subsurface drainage tile monitoring. The current field being monitored was selected because the landscape and crop production practices are representative of other farming practices in the region and the field site is capable of generating a robust data set.

The site selected for monitoring provides edge-of-field evaluation of a field with a corn-soybean rotation and swine manure application. This edge-of-field monitoring site captures surface water and subsurface tile drainage from 13.9 acres and has an average slope of 2.9%.

