



# Agricultural Systems Research

**Giving midwestern producers more climate-smart options**

The Agricultural Systems Research project is conducted by scientists at the USDA-ARS National Laboratory for Agriculture and the Environment (NLAE) in Ames, Iowa. Their goal is to advance sustainable resource use and reduce the environmental impacts of existing crop production systems while improving their efficiency and ecosystem services. Alternative crop combinations and use of climate-smart management systems are of particular interest. These include use of cover crops and double cropping of corn and soybean systems, “4R” nutrient management, silvopasture, and organic production with extended crop rotations. Ultimately, the research will help give producers more choice in how they increase their operational resiliency and safeguard the environment.

Project achievements include:

- Developing nutrient-loss reduction strategies for the upper Midwest
- Developing a novel technique to quantify nutrient mobility and better understand the effects of fertilizer and manure placement
- Evaluating a rye-soybean double-cropping system to increase rye biomass production for forage or bioenergy use without increased risk of nitrogen loss in subsurface drainage
- Demonstrating that cover crops reduce soil compaction and improve soil structure and cumulative water infiltration
- Providing critical information on how land-use conversion to perennial vegetative cover affects greenhouse gas fluxes, carbon cycling, and evolution of soil properties.

The project is just one example of NLAE’s commitment to increasing agricultural productivity while minimizing environmental impacts through cutting-edge studies of soil and plant processes.



## Project Fast Facts

- Established 1998 on long-term research site
- Team of four NLAE Research Scientists
- Falls under ARS National Program 216, titled “Sustainable Agricultural Systems”

**Stay up to date with ARS!** Learn how we’re solving major agricultural problems.

**USDA** Agricultural Research Service  
U.S. DEPARTMENT OF AGRICULTURE

USDA is an equal opportunity provider, employer, and lender.

[www.ars.usda.gov](http://www.ars.usda.gov)





# Water Availability and Watershed Management Research

**Putting tools and data to work for better resource conservation**

The Water Availability and Watershed Management Research program is conducted by scientists at the USDA-ARS National Laboratory for Agriculture and the Environment (NLAE) in Ames, Iowa. It focuses on sustainable intensification in agricultural watersheds through optimized management and technology. The goal is to improve and develop resilient conservation practices in a challenging environment where agricultural decisions become more complex, particularly in the subsurface drained Upper Mississippi River Basin. The project addresses these challenges by using long-term field and watershed data, newly developed sensing techniques, agricultural models, and data analysis to quantify the dynamics of agricultural systems (across different scales) and develop effective water resource management practices.



Project accomplishments include:

- Developing the Agricultural Conservation Planning Framework (ACPF) to assist with watershed improvement projects
- Developing saturated riparian buffers to remove nitrate from field drainage and which serve as a basis for USDA-NRCS conservation practice standards
- Evaluating a rye-soybean double-cropping system for forage and bioenergy uses as well as to reduce nitrogen loss in subsurface drainage
- Determining that drainage water can transport antibiotic resistance genes and antibiotics off farm fields
- Providing information on the effectiveness of conservation practice in removing nitrate across the drained North Central US.

The project is just one example of NLAE's commitment to increasing agricultural productivity while minimizing environmental impacts through cutting-edge studies of soil, water air, and plant processes.

## Project Fast Facts

- Established 1990 on long-term research site
- Staffed by 5 NLAE Research Scientists
- Falls under ARS National Program 211, titled "Water Availability and Watershed Management"

**Stay up to date with ARS!** Learn how we're solving major agricultural problems.



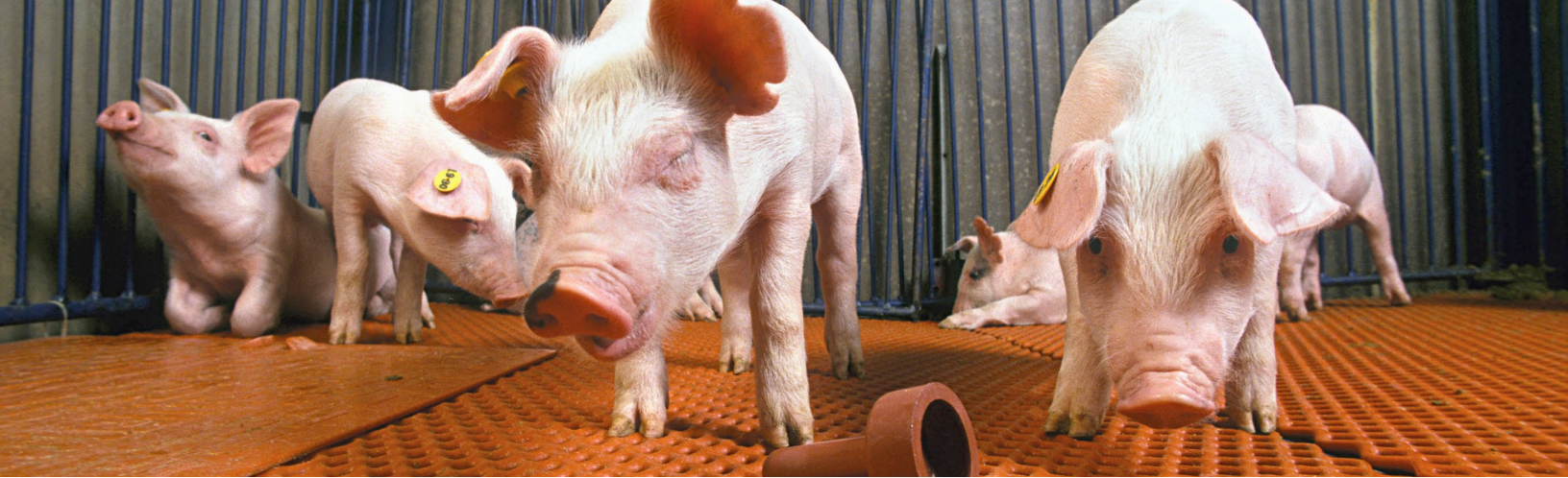
**Agricultural Research Service**

U.S. DEPARTMENT OF AGRICULTURE

USDA is an equal opportunity provider, employer, and lender.

[www.ars.usda.gov](http://www.ars.usda.gov)





## Animal Research at the National Laboratory for Agriculture and the Environment

The animal research program of the ARS National Laboratory Agriculture and the Environment (NLAE) is housed within the National Swine Research and Information Center on the Iowa State University campus in Ames. As such, the program brings together a unique consortium of federal, academic, and industry experts dedicated to furthering the safety, environmental sustainability, and efficiency of U.S. pork production. The industry, which numbers 66,439 hog farms—primarily in the Midwest and North Carolina—produced nearly 28 billion pounds of pork in 2021 as a top source of animal protein for consumers worldwide.

Specializing in animal nutrition, gastrointestinal physiology, and microbiology among other fields, NLAE researchers boast a 20-year track record of impactful research that includes:

- developing vaccines with cross-protection against different types of Salmonella bacteria,
- determining the oxidative balance in swine and poultry as affected by diet and phase of production,
- determining the dietary energy value of corn and soybean co-products, and alternative lipids,
- evaluating swine diet formulations and vegetative buffers to reduce gas emissions and odor transport from finishing barns,
- identifying factors associated with swine deep-pit manure foaming, a methane combustion concern.
- determining how improving gastrointestinal health and function can improve sustainable animal production



### Fast Facts

- Established in 2001
- Staffed by 3 NLAE Research Scientists in Ames, IA
- Conducts research under an ARS National Program #101 titled “Food-Animal Production”
- Actively engaged in solving livestock industry challenges

Stay up to date with ARS! Learn how we're solving major agricultural problems.



Agricultural Research Service

U.S. DEPARTMENT OF AGRICULTURE

USDA is an equal opportunity provider, employer, and lender.

[www.ars.usda.gov](http://www.ars.usda.gov)

