Today’s modern farming systems are under constant pressure. Farmers are faced with the challenges of protecting soil and water quality and managing nutrients, all while considering the economic needs of managing a profitable farm.

Reliance on off-farm inputs to meet these needs has become a costly habit for both farmers and the environment, inspiring a team of Penn State researchers to look at cropping system strategies that can enhance the sustainability of an average-sized dairy farm. Their findings suggest that more sustainable approaches to farming are not only possible, but also profitable.

The Sustainable Dairy Cropping Systems project is led by Heather Karsten, an associate professor in the Department of Plant Science at Penn State. Since 2009, researchers and graduate students from several areas of expertise have looked at the sustainability of a Pennsylvania dairy farm with the goal of designing management practices to reduce off-farm inputs and environmental impacts.

The project simulates a 240-ac farm on 12 ac of land. Fourteen researchers and six graduate students are involved in the project, which evaluates two manure management strategies and a variety of weed management practices in two diverse crop rotations that include cover crops, legumes, and canola. Canola is grown as fuel for a tractor that is powered by vegetable oil and used on the farm. Milk production of the dairy herd is simulated by the project dairy nutritionist Virginia Ishler and a dairy nutrition computer model using the annual crop yield and feed and forage quality data from the research farm.

“We’re integrating a number of innovative practices that many members of our team have been studying into a whole farm and crop rotations that would be typical of how a farmer would have to integrate and adopt management practices,” Karsten says. “When we do that, it gives us an opportunity to understand: What are the interactions? What are the possible system benefits?”

One example Karsten mentions are slugs, the major pest in no-till cropping systems in the region. No-till practices can result in increased slug activity and serious problems for farmers. The Penn State team has found that some of the management practices they’ve used to reduce herbicide use, such as high-residue cultivation between rows and plowing once to terminate alfalfa, helps reduce slug populations.

Another approach to reduce herbicide applications is to establish alfalfa with a companion crop of triticale and pea.

By Chris Zimmerman  
*Crops & Soils* magazine contributing writer

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Promising new research on sustainable dairy cropping systems

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Brian Gray holds canola oil pressed and filtered for a New Holland tractor converted to run on straight vegetable oil. Photo by Heather Karsten.