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Sustainable Agriculture

Study Finds Establishing Silvopasture Takes Careful Planning and Management

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Silvopasture is an agroforestry practice which integrates rotationally grazed livestock with tree crops.

The practice can yield short-term benefits, like shade and forage for grazing animals, and long-term benefits, like increased income from forest products. However, if not managed carefully, forest grazing can cause environmental degradation. A three-year silvopasture study is currently underway which explores the effects of management decisions and evaluates the challenges and opportunities posed by various silvopasture applications. The goal of the study is to develop evidence-based guidelines for Pennsylvania graziers.

Sheep grazing on Dickinson College Farm's silvopasture demonstration plot. Credit: Wesley Lickus

The project is coordinated by Susan Parry, the Pennsylvania State Grassland Conservationist with the USDA National Resources Conservation Service (NRCS), and is funded by a SARE Partnership grant. The project comprises on-farm demonstrations that allow for qualitative observations of real-life silvopasture implementation, and the development of a monitoring protocol to capture quantitative soil health and forage quality data.

The on-farm demonstration projects are being conducted at Dickinson College Farm in Cumberland County and at Wyebrook Farm in Chester County. Monitoring plots have been established at each farm to demonstrate two separate approaches to silvopasture. The first approach is one in which animals are integrated into a pre-existing forested area. The second approach is where trees are planted into existing pasture. Although quite different in practice,

both silvopasture strategies have challenges stemming from the site-specific impacts that livestock can have on an environment.

Because livestock will typically eat whatever they can find, including tree bark and desirable understory species, turning animals into a forested area that has insufficient forage can result in vegetation loss, soil erosion and tree damage. Therefore, in order to meet forage goals, farm managers need to adequately plan for and prepare their silvopasture sites by establishing appropriate forage species. That can be challenging in its own right, said Parry, given the shady and often rocky or steep conditions found in many farms' woodlots.

Parry and her colleagues have found that a crucial first step in establishing forage at the on-farm demonstration plots was to thin forests for improved light penetration. Managers at Wyebrook Farm found it was necessary to remove up to 40 percent of the tree canopy, while Dickinson College Farm managers had to remove a considerable population of invasive understory species in addition to removing select trees to gain the 60 percent canopy opening needed to establish forage. Each farm had to consider seeding options to gain an appropriate mix of forage plants, and only after the forage was well established did they allow animals to graze there. Parry warned that, if left in these forested areas too long, animals can compact soil and destroy forage plantings. Therefore, it may be necessary for grazing time to be quite limited depending on conditions.

With the second approach, where trees were planted into existing pasture, farm managers found they were less concerned with forage quality and more with protecting the newly planted trees. "If animals aren't accustomed to grazing in pasture that has trees, they'll rub against them, eat the bark, and ultimately destroy the trees," Parry said.

Strategies used to minimize tree damage depend on how the trees are planted. Some producers plant trees in small, dense groves in order to limit animals' access to individual trees. Managers

at both the Dickinson College and Wyebrook farms each preferred to space trees out evenly, which required additional protective measures. They found that neither tree cages nor fortified cages with stronger posts were enough to sustain the impact of the animals' attention. The most successful enclosures within the study so far have utilized barbed wire.

Technical considerations like these are the types of lessons that Parry and her colleagues had hoped would emerge from this study. They plan to condense the findings into a case study and technical silvopasture manual for Pennsylvania farmers. They also want to document the environmental impacts that these demonstration systems can have on existing on-site natural resources, such as plant communities and soil health. However, because there currently are no established protocols in place for measuring impacts of silvopasture systems, the team has had to develop their own protocols. Data collection is still underway, and the team will publish their findings upon the study's conclusion.

In addition to USDA NRCS, Dickinson College Farm and Wyebrook Farm, the project team also includes staff from the Pennsylvania DCNR Bureau of Forestry, PA Grazing Lands Coalition, the USDA Agricultural Research Service, and Comprehensive Land Services. The project, titled "Advancing on-farm understanding and application of silvopasture technologies in Pennsylvania," is funded by the Northeast Sustainable Agriculture Research and Education (SARE) program. SARE is a program of the National Institute of Food and Agriculture, U.S. Department of Agriculture.

More information about the project, including a fact sheet, is available on the project website [http://www.paglc.org/?page_id=92] .