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Establishing Switchgrass for Grazing and Energy

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By Jon Biermacher, Billy Cook, and John Guretzky

The purpose of this article is to describe a research project that has been designed to examine the economic feasibility of utilizing switchgrass in a dual-purpose production system that allows for 1) springtime grazing by stocker cattle and 2) fall biomass production that can be harvested and delivered to a biorefinery that will convert it into ethanol. We would also like to report on the production and economic activities associated with establishing the switchgrass that will be used for the study.

Grazing experiment

In 2007 a 30-acre tract of switchgrass (cultivar "Alamo") was established successfully at the Noble Foundation's Red River Farm near Burneyville, Okla. Twelve, 2-acre paddocks have been created within this tract to evaluate stocker cattle performance (gain per acre) at stocking rates of zero, two, four and six steers per paddock. Grazing will occur from approximately the middle of April to the middle of June each year for a total of three years. Commercial stocker steers will be purchased in October, preconditioned and placed on rye pastures in order to uniformly prepare them to graze the switchgrass after rye grazeout. Cattle weighing approximately 600 to 700 pounds will be removed from the rye pasture after grazeout, shrunk overnight without feed or water, weighed individually, implanted with a growth implant and randomly assigned to the switchgrass treatments. Before the onset of grazing, the switchgrass pastures will be fertilized uniformly with 70 pounds of N per acre, and soils will be tested and corrected for phosphorous and potassium deficiencies. After termination of grazing in mid-June, pastures will be sprayed with the herbicide 2,4-D Amine at a rate of 2 pints per acre to control broadleaf weeds and will be topdressed with 50 pounds of N per acre to encourage regrowth of switchgrass. Later each year, after the first killing freeze, the regrowth will be harvested and weighed to estimate the amount of biomass that can be supplied to a biorefinery after grazing.

Establishment protocol

Field operations, levels of inputs and costs ($/acre) reflecting the protocol used to establish the 30-acre tract of switchgrass are reported in Table 1. We note that prior to establishment of switchgrass in 2007, the primary crop grown on the tract was continuous cereal rye. First we applied the herbicide glyphosate in early May at 2 pints per acre in order to eradicate weeds growing in the field. Next we prepared the soil for planting by discing twice followed by seedbed preparation using a field cultivator. We then broadcasted switchgrass seed at 4 pounds of pure live seed per acre using a

Brillion grass seeder. Switchgrass emerged and was left to grow on its own until July when it was mowed to a 12-inch height and sprayed with 3 pints of 2,4-D Amine to control pigweeds. In our calculations, we utilized custom rates published by the Oklahoma Cooperative Extension Service for each of the field operations. The total cost of establishing switchgrass was $98.50 per acre. Research has shown that, when managed properly, a perennial native grass can have an expected life greater than 10 years. As a result, we have amortized the $98.50 over 10 years at a 9 percent annual rate of interest. We found that the amortized cost per acre per year was $15.35.

Over the next three years we will learn a great deal about the economic feasibility of utilizing switchgrass as a forage crop for stocker cattle grazing and as a biomass crop for conversion into bioenergy. As we learn more about the agronomics, animal science and economics, we will be reporting that information to you.

Table 1. Field Operations, Levels of Inputs and Costs ($/acre) to Establish a 30-Acre Tract of Switchgrass at the Noble Foundation's Red River Farm at Burneyville, Okla.

Field Operation/Operating Input	Unit	Date	Amount	$/Unit	$/Acre
Herbicide (glyphosate)	Pint		2	1.75	3.50
Custom herbicide application	Acre	7-May	1	4.00	4.00
Custom discing	Acre	21-May	2	12.00	24.00
Custom field cultivation	Acre	21-May	1	7.50	7.50
Switchgrass seed (Alamo)	Lbs (PLS)		4	10.00	40.00
Custom planting switchgrass seed	Acre	22-May	1	13.00	13.00
Custom mowing	Acre	1-Aug	1	14.00	14.00
Herbicide (2,4-D Amine)	Pint		3	1.59	4.77
Custom herbicide application	Acre	8-Aug	1	4.00	4.00
Total specified expenses	Acre				98.50
Establishment costs (Amortized over 10 years at 9%)	Acre				15.35

Custom rates reference: Doye, D., R. Sahs, and D. Kletke. "Oklahoma Farm and Ranch Custom Rates, 2003-2004." Oklahoma Cooperative Extension Service, Current Report CR-205, 2004.

http://www.noble.org/ag/research/establishsg/