



Biofuels, Food & Feed Tradeoffs

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Assessment of Two Alternative Switchgrass Harvest and Transport Methods

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As fuel prices have increased

- ❖ Corn and grain prices have increased
- ❖ Opening the way for alternative bioenergy sources such as lignocellulosic biomass (LCB) conversion to biofuels, for example switchgrass for conversion
- ❖ Examine entry level possibilities for Arkansas producers to be able to enter the biofuel market

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Objectives

1. Comparing and contrasting two alternative modes of harvest that seem feasible in Arkansas
2. Using cost of production information to determine breakeven prices for producers and/or biorefineries
3. Discussing advantages and disadvantages related to the two modes of transport

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Procedure

1. Develop enterprise budgets for each alternative
2. Simulate 12 years of production
3. Analyze data

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Assumptions

- ❖ Producer fertilizes not for maximum yield but shoots stand with intermediate level of fertilizer 75 lb N plus P and K by soil test
- ❖ One late season harvest per year
- ❖ Year of establishment with zero yield
 Year 2 – 3 tons per acre
 Year 3 – 5 tons per acre
- ❖ 12 Year stand life

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Assumptions—Round Baling

- ❖ Harvest with 12' disc mower into windrows
- ❖ Large round baler with bale wrap for 20 bales per hour at DM weight of 1000 lb (16% m.c.) (5' x 5.5')
- ❖ Stacking at side of field on pads with tarp
- ❖ All operations can be performed by one individual
- ❖ Some storage required at the plant

Assumptions—Module Building

- ❖ Harvest with forage harvester into cotton boll buggies
- ❖ Harvesting rate—15 dry tons per hour (12% m.c.)
- ❖ Boll buggies load into cotton module builder at side of field and tarp (7'9"W, 9'H, and 32'L)
- ❖ Haul to plant with cotton module trucks
- ❖ Operations require 5 operators in the field at once

Hauling

❖ Round Bales

- ❖ \$3.60/mile for distance less than 50 miles (Petrolia), \$1.15 per bale load/unload charge and 26 bales per load (50% handled twice, 50% handled four times)

❖ Modules

- ❖ Texas--\$17.43 per module and \$1.22 per mile hauled
- ❖ Arkansas--\$50.00 per module and \$2.00 per mile hauled

Total Specified Cost—Round Bales

- ❖ Year of Establishment: \$201.37 per acre to establish on well drained marginal crop land
- ❖ Year 2: \$115.88 (bales stacked at side of field)
- ❖ Year 3: \$142.69
- ❖ Average yield:
 - ❖ Year 2—3 dry tons per acre
 - ❖ Years 3 to 12—5 dry tons per acre

❖ Prorated cost:

$$P = \left[\sum_{t=1}^n c_t / (1+i)^t \right] / y = \$39.48 / \text{dryton field side}$$

$$P = \left[\sum_{t=1}^n c_t / (1+i)^t \right] / y = \$52.92 / \text{dryton at plant}$$

Total Specified Cost—Modules

- ❖ Year of Establishment: \$201.37 per acre to establish on well drained marginal crop land
- ❖ Year 2: \$143.89 (modules tarped at side of field)
- ❖ Year 3: \$189.60
- ❖ Average yield:
 - ❖ Year 2—3 dry tons per acre
 - ❖ Years 3 to 12—5 dry tons per acre

❖ Prorated cost:

$$P = \left[\sum_{t=1}^n c_t / (1+i)^t \right] / y = \$46.62 / \text{dryton field side}$$

$$P = \left[\sum_{t=1}^n c_t / (1+i)^t \right] / y = \$60.81 / \text{dryton at plant}$$

Comparison of Two Systems

Round Bales:

- ❖ Product must be chopped at biofuel plant
- ❖ Able to use 1 operator for all functions
 - ❖ Cutting, baling, stacking, and tarping

Modules:

- ❖ Requires 5 operators
 - ❖ 1-harvester, 2-boll buggies, and 2-module builder and tarping
- ❖ Product is already chopped before delivery

Questions?