



# **Farm-Level Incentives and Policy for Growing Alternative Energy Feedstocks**

**Chad Hart & Bruce Babcock**  
**Center for Agricultural and  
Rural Development**

# Changing Crop Patterns

- **Expected crop returns drive crop patterns**
  - **Corn and soybeans dominate in Iowa due to their returns over variable costs**
- **New energy crops will have to compete for acreage**
  - **Need returns above variable costs and annualized establishment costs, on par with existing crops**

# Projected Returns

- **For the next five years, returns from corn and soybeans are projected to average \$250/acre**
- **New energy crops will need returns at or above \$250/acre to pull acreage away from corn and soybeans**

# Switchgrass Costs

- **Estimated annual cost of producing switchgrass**
  - \$187/acre with a 4 ton/acre yield
  - \$241/acre with a 6 ton/acre yield
  - Includes baling, but not transporting the bales off-farm

# Moving to Switchgrass

- **Given costs and average returns for corn, farmers would consider shifting at a price of:**
  - **\$110/ton with yield = 4 tons/acre**
  - **\$82/ton with yield = 6 tons/acre**

# Ethanol Producer's Perspective

- **Feedstock bids depend on three factors**
  - Ethanol price
  - Cost of converting biomass to ethanol
  - Cost of transporting biomass to plant

# Transportation and Conversion Costs

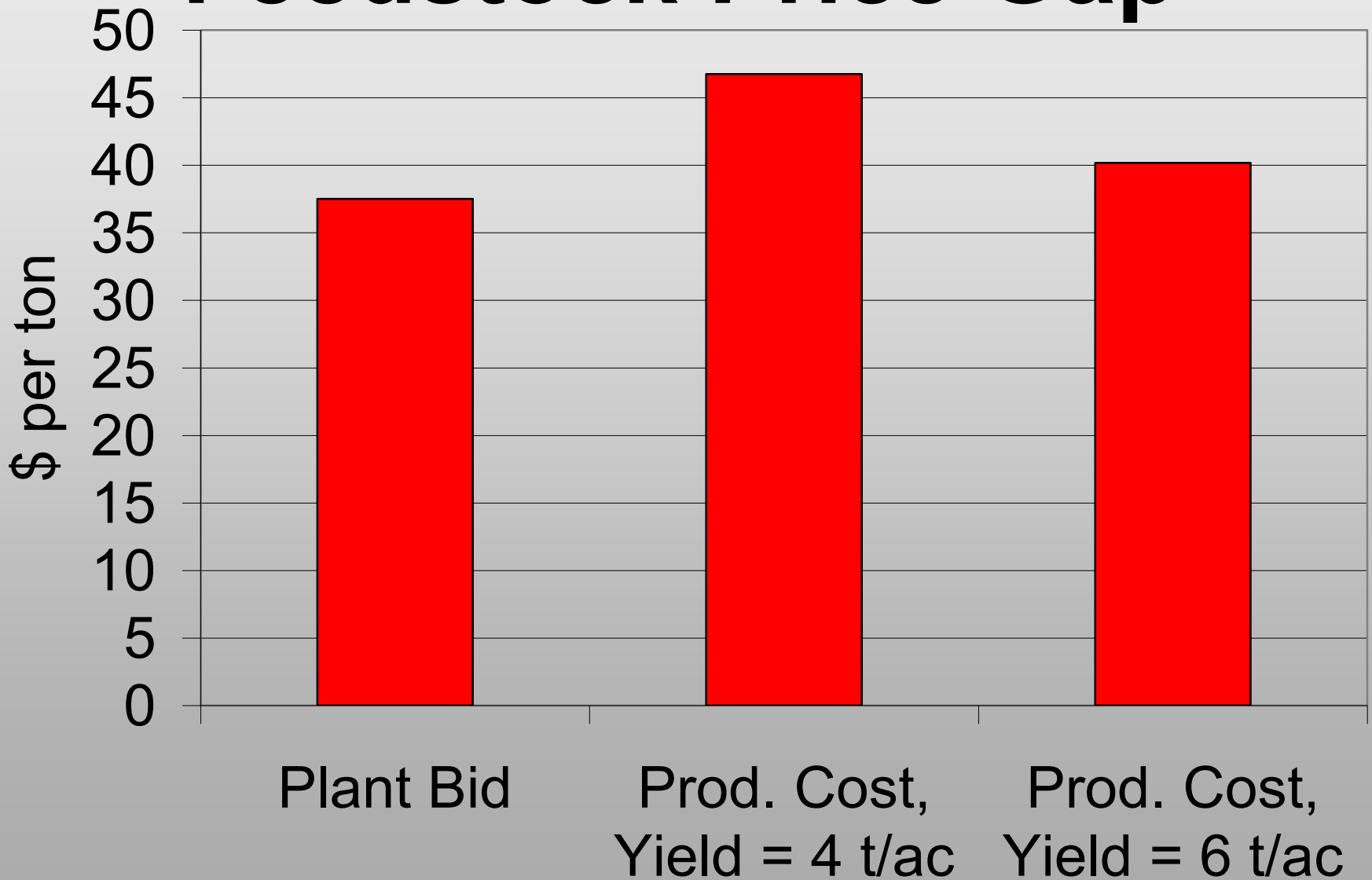
- **Transportation costs**
  - Rough estimate ~ \$8/ton
- **Conversion costs**
  - English et al. (2006)
    - \$1.40/gallon in 2006
    - \$0.73/gallon in 2015
  - Average 2008-2012 = \$1.10/gallon

# Switchgrass to Ethanol Costs and Returns

- **At 70 gallons of ethanol/ton of switchgrass, ethanol production costs are \$85/ton**
  - \$77/ton for conversion
  - \$8/ton for transportation
- **Revenues depend on ethanol price**
  - At \$1.75/gallon, revenue increases to \$122.50/ton
- **Maximum bid = the difference between revenue and cost per ton**
  - Ethanol price \$1.75, max. bid = \$37.50/ton



# Feedstock Price Gap



# Switchgrass Subsidies

- **Based on these numbers, Iowa land would not move to switchgrass without additional support**
  - **Subsidies from \$44 to \$107/ton**
- **Other areas of the country would not require such high subsidies to switch**
  - **Lower returns to traditional crops**

# Policy Options

- **Biomass Reserve Program**
  - Payments in exchange for dedicated biomass production
  - Allow returns to determine if biomass is harvested
  - Additional payments for field trials of alternative crops and cropping systems

# Two-Pronged Approach

- **Biomass Reserve**
  - Provides feedstock for cellulosic ethanol
- **Biomass Innovation Program**
  - Develops cropping alternatives to improve cellulosic ethanol's bottom line

# Program Parallels

- **Biomass Reserve similar to Conservation Reserve Program**
  - **Major difference: option to sell biomass**
- **Biomass Innovation Program similar to Conservation Innovation Grants**
  - **Could be integrated into Conservation Security Program**