Insights for Improved Participation in the Delivery of Corn Stover to Cellulosic Ethanol Plants

American-Made BioEnergy from Field to Refinery: Feedstock Logistics
C-FARE and USDA OCE Office of energy Policy and New Uses (OEPNU)
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Background and Motivations

- CenUSA Bioenergy – USDA NIFA AFRI competitive grant, “Sustainable Production and Distribution of Bioenergy for the Central USA” (#2001-68005-30411)

- Availability does not equal supply
The Case of Stover

- Two collection mechanisms
  - Processor collection
  - Producer delivery

- Planned for 25-mile radius, but in some cases 50+ miles from the plant to source feedstocks

- Processors must pay producers same price for feedstock

- Participation rates significantly lower than feedstock availability suggested

- Processors are accepting a very large radius in lieu of higher prices, and this is optimal.
Simulations of collection mechanisms

- Supplier delivery or processor collection
- Reservation-value pricing
- 100% participation
Transportation makes the marginal cost curve steep

![Graph showing the comparison between single price reservation pricing](image)

- **Single Price**
- **Reservation Pricing**

- Processor's Capacity (Metric Tons)
  - 300,000
  - 400,000
  - 500,000
  - 600,000
  - 700,000
  - 800,000
  - 900,000
  - 1,000,000
  - 1,100,000
  - 1,200,000
  - 1,300,000
  - 1,400,000
  - 1,500,000
  - 1,600,000
  - 1,700,000
  - 1,800,000
  - 1,900,000

- Unit Cost of Collection $/Ton
  - 30
  - 50
  - 70
  - 90
  - 110
  - 130
  - 150
  - 170

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The mandate is met with ag residue IF supply is 100%

Given participation factors, meeting the mandate will allow the use of higher-cost feedstocks.

Source: Parker, Nathan. Modeling Future Biofuel Supply Chains using Spatially Explicit Infrastructure Optimization
Institute of Transportation Studies, University of California, Davis, 2011.
A Solution

- Differentiating suppliers will enhance collection efficiencies and system welfare.
- Pricing stover on land characteristics should provide a solution to current large draw areas. Factors might include:
  - Carbon content
  - Availability of animal manure
  - Rotation
  - Operation size
- Hedonic model to estimate value or demand relative to factors
THANK YOU.

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