

IPRO 340

- Alternative Uses for Spent Grain



What is the problem?

- What is spent grain?
 - Boiled barley
- Enough to fill crown hall one foot deep every month
 - 50+ breweries in Chicagoland



Goals for Project

Find alternative applications
for spent grain

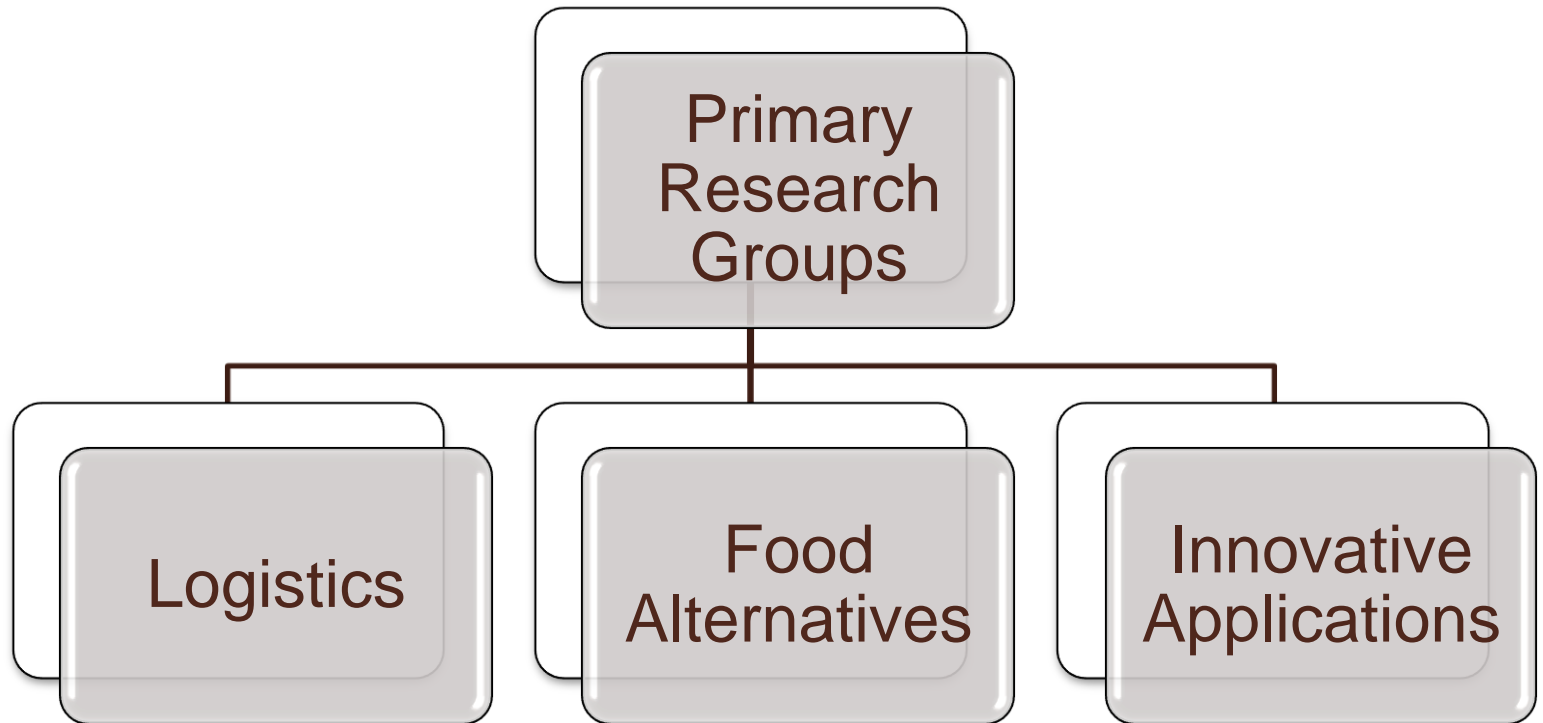
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Analyze alternatives

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Provide a suggestion for
Rock Bottom

Team Organization



Accomplishments

Food Alternatives

- Good source of nutrients
 - Approximately 30% crude protein
- Cooking with Spent Grain
 - Cookies, Bread, Crackers, Granola
 - Animal Feed, Dog Biscuits
- Alternative for flour
 - Can be dried and ground

Innovative Applications

- Biogas Production
 - Aerobic/anaerobic digester creates 1.3 million BTUs per 1 metric ton wet spent grain.
- Charcoal Production
 - Higher energy output than wood, but also a higher ignition temperature.
- Brick Component
 - Used to increase porosity of brick without any negative effects. It may be substituted for sawdust.
- Dye Absorbent
 - Absorbers cadmium, lead and chromium compared to other low-cost biological materials.

Logistics

- Spent grain molds quickly in summer months
- Fuel prices effect Break- Even
- Will someone purchase for more than \$0.05/lb?
- Handling can be improved in most breweries
- Product freshness for down stream uses

Major Obstacles

- Ethical dilemma
 - Sharing sensitive information
 - Trade secrets

Anticipated Challenges

- Preservation
 - High moisture content
 - Spoils quickly
- Microbrewers have limited resources
 - Space, capital, time
- Transportation

Questions and Needs

- Collaboration with related businesses and other IPROS
- Additional lab analysis

Questions?

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Mashing Up Ideas
for Tuns of Results

References

- [1] Personal correspondence with PurposeEnergy, Inc.
- [2] S.I. Mussatto, et. al., “Brewers’ spent grain: generation, characteristics and potential applications” *Journal of Cereal Science* 43 (2006) 1-14
- [3] S. Aliyu and M. Bala, “Brewer’s spent grain: A review of its potentials and applications” *African Journal of Biotechnology* Vol. 10(3), pp. 324-331, 17 January, 2011