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Agricultural Utilization Research Institute

<https://auri.org/>

Market Opportunity Assessment for Human Food Grade Dried Distiller's Grains

REQUEST FOR PROPOSAL

The Agricultural Utilization Research Institute (AURI, <https://auri.org/>) is soliciting proposals to identify the market potential of upcycling the byproduct (dried distiller's grains – DDG) of the corn dry milling ethanol manufacturing process from an animal feed use to a human food grade use (food grade dried distiller's grains – FDDG), likely as a high protein and/or fiber commercial ingredient.

Background:

Ethanol manufacturing in Minnesota generally employs a dry milling process to convert corn into three products: ethanol, distiller corn oil (DCO), and distiller grains. A typical corn dry mill process consists of four steps: grain handling and milling, liquefaction and saccharification, fermentation, and coproduct recovery. Grain handling and milling focus on particle size reduction of raw corn to promote better starch to glucose conversion. Liquefaction and saccharification convert the starch into glucose, and the next process step, adding yeast, ferments the glucose into ethanol. Profitability is realized through recovery, purification, and drying of the high protein and fiber distiller's grains coproduct (DDG), primarily for the animal feed market. Minnesota's ethanol industry typically produces more than 3.3 million tons of DDG's annually, generating approximately \$600M of revenue.

Converting DDG's into a human food grade high protein and/or high fiber ingredient may further improve the value of this abundant coproduct stream. In fact, United Nations estimates indicate that the global population will increase by 9% between 2020 and 2030 to 8.5 billion [1], which will create a 24% increase in protein demand during the same period [2]. Thus, protein demand will grow with the population as global leaders and consumers place greater emphasis on sustainability [3], creating an environment for "recovered" food products, such as DDG's produced as a byproduct of ethanol manufacturing, to flourish in the marketplace and provide local producers considerable export opportunities. Additionally, the *Dietary Guidelines for Americans 2020-2025* state that "Calcium, potassium, **dietary fiber**, and vitamin D are considered dietary components of public health concern for the general U.S. population because low intakes are associated with health concerns" [4]. One can then reasonably conclude that increasing the availability of high fiber ingredients in the marketplace can contribute to closing this dietary gap.

[1] <https://population.un.org/wpp/>

[2] Correlation of global protein consumption to global GDP growth built with data from the UN Food and Agriculture Organization (<https://www.fao.org/faostat/en/#home>), the World Bank (<https://databank.worldbank.org/home.aspx>), and the International Monetary Fund (<https://www.imf.org/en/Data>)

[3] <https://www.hartman-group.com/documents/270242195/value-in-the-time-of-covid-19>

[4] https://www.dietaryguidelines.gov/sites/default/files/2021-03/Dietary_Guidelines_for_Americans-2020-2025.pdf; page 36.

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Project Purpose:

This project is Phase One of a larger effort meant to identify the market opportunity and associated cost of producing a higher value human food use for the ethanol manufacturing DDG byproduct. Results will provide insight on the largest market opportunities using human food grade distiller's grains (FDDG) as an input. Research outcomes should quantify volume and value (revenue) potential of *at least* two primary possible products:

1. **FDDG's as a high protein/fiber commercial flour (compared to conventional commodity grains) for food applications development.** This could include FDDG potential as a substitute or supplement to commodity grain ingredients such as corn flour or other high protein/fiber supplement streams such as okara flour (a soy byproduct from tofu manufacturing), other similar existing ingredients, or lower availability flours. For example, previous technical research demonstrates the transformation of DDG's into FDDG's and the additional processing necessary to transform the FDDG's into a high protein/fiber baking ingredient (FDDG flour). Note that "high protein" in this context (relative to commodity cereal grain flours) is approximately 40%+ by weight.
2. **FDDG flour as an input for further processing into a functional protein concentrate/isolate and/or high nutritional fiber product.** The protein product would perform similarly to and compete directly with protein concentrates/isolates of pea, hemp, oat, and others. Note that a concentrate typically contains 70%+ protein by weight while an isolate is typically 90%+ protein by weight. The high nutritional fiber product would compete directly with products such as inulin, psyllium, brans, and resistant starches.

Scope of work:

This market assessment should have a global focus, with a more detailed analysis on the (likely) shorter term North American potential. The report should include:

- Primary research (interviews with subject matter experts) in food and consumer science, alternative proteins, food waste recovery, and ingredients manufacturing to validate volumes, prices, applications, barrier to adoption, and preferred adoption strategies.
- Secondary research (database / third party market research) to determine food application and growth potential of an FDDG product based on the current known characteristics of the product. This analysis will indicate any gap between expected product attributes and market demand. Results should include price and volume estimates under different assumptions.
- Data combination and synthesis into a final assessment of volume and market potential of the most promising product possibilities.

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In summary, this project should focus on addressing and quantifying answers to the following questions:

1. What unique unmet market need(s) or problem(s) can food grade dried distiller's grains (FDDG's) solve?
2. What is the right product market for FDDG's? High protein/high fiber corn flour vs. macromolecule-specific isolates (corn protein isolate, corn fiber concentrate)?
3. What competitive products would/could FDDG's replace and why?
4. What is the potential revenue that FDDG's could drive for a manufacturer in the right market?

AURI can provide protein and fiber product data for the existing DDG's product and conjecture for proposed food grade products, upon acceptance of the winning proposal.

Deliverable:

The end product of this study is a final report in an electronic format that includes relevant attachments, lists the assumptions that support the conclusions, and provides a quantified market opportunity assessment (including relevant market geographies and price/volume estimates). It is important to document all sources of information used in the report by source name, resource document, website links, etc. The delivery deadline for the final report is no later than **December 23, 2022**, unless a later date is agreed upon. All contact information, notes, and other related materials collected and developed in the completion of the market assessment are to be the property of AURI.

Proposal requirements:

An emailed proposal to AURI should include the following information:

1. A signed cover sheet including name, address, phone and fax numbers, and e-mail address of applicant organization and principal contact.
2. Qualifications and experience of the proposing individual/organization including references.
3. Narrative of the methodology for addressing and completing the scope of work and deliverables outlined above, estimated timelines with critical milestones, and cost of the study.

Proposal should be e-mailed to: bphilipp@auri.org.

The deadline for submitting proposals is **Friday, July 15, 2022**.

All submissions will be confidential. Authorization to proceed will follow after review of proposals and completion of final negotiations with the company selected. AURI anticipates awarding a contract by **August 8, 2022**.

For additional information, contact:

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