Plant Protein Innovation center
Function and Structure

Mission: We are striving to be first. The plant protein innovation center (PPIC) will be the first center of its kind in the nation for plant and other alternative proteins. The PPIC will bring together interdisciplinary researchers and industry partners to produce and study nutritious and functional plant protein ingredients for food applications. The PPIC will address industry-identified plant-protein challenges and opportunities to develop a wealth of interdisciplinary research that will bring to the supply chain new nutritious and functional plant protein ingredients and products, working all the way from breeding and genetics to processing, formulation, and marketing.

Background: Plant-based proteins are more in demand than ever before. As our society becomes more health conscious and at the same time concerned with the environment, demand for plant-based protein has steadily increased. Specifically, increases in vegan population and health conscious consumers are among the main drivers for plant protein popularity. This has created a need to not only develop more plant-based protein ingredients, but to seek sustainable and environmentally friendly sources.

Identified plant protein challenges and knowledge gaps: Protein is a nutrient that has several physiological benefits associated with it, including weight management, supplemental energy, and reduced risk of aging complications and chronic diseases. From an industry perspective, other than cost reductions and attractive environmental and health benefits, producers are seeking functional, non-allergenic protein ingredients that can replace modified ingredients as part of the clean label drive. The demonstration of equivalent or superior/new functionality of novel plant proteins compared to existing alternatives is essential to both the food industry and the consumer. However, there is limited consumer and producer knowledge of plant proteins other than soy. Food producers are seeking information on the nutritional, physiological, flavor, and functional characteristics of plant proteins. There is a need to understand how these novel proteins can partially or wholly replace traditional protein ingredients in various food products to deliver optimal acceptability, nutrition and functionality. Other interests include valorizing by-products by utilizing current processing streams, reducing cost by improving efficiency, enhancing functionality through unique processing, finding a unique and a competitive place in the market, replacing unfamiliar ingredients with functional proteins (clean label), identifying unique applications for different sources of proteins, and utilizing all possible resources to expand the overall ingredients supply.

Coming together to grow research: while there has been some research done on novel proteins, the information is far from being comprehensive and is done in isolation. Some scientists are researching the nutritional quality of peas, others are breeding new dry beans varieties, while others are investigating processing methods for canola. By combining individual efforts and ideas, we can do more and reach attainable goals faster. The PPIC will invite scientists both internal and external to the University of Minnesota to be part of a research cohort. Collaboration will empower plant-based protein research by allowing scientists to come together to think beyond their area of focus. Working together will facilitate cross-lab use of high-end instrumentation that can uncover more information than ever before, and will open up larger

grant opportunities. Partnering with industry is essential. The PPIC requires the support of key industry players, who are driven to work together towards a better future. Industry partners, will be protein suppliers, producers, and users, but all having common interests. In addition to individual researchers coming together with industry, partnership with international entities such as the Canadian Consulate and their associated Protein Highway Initiative, other research institutions/centers, commodity groups, entrepreneurs, and government agencies are imperative to the mission and success of the Center. These partnerships will ultimately provide research diversity and unique perspectives that lead to innovative solutions to real-world problems.

Expertise: The University of Minnesota is the home for experts in several fields including protein chemistry, functionality, and bioactivity, protein extraction, proteomics, polymer characterization, human nutrition and dietetics, flavor chemistry, metabolomics, toxicology, animal nutrition, breading and genetics, biomaterials and bioengineering, informatics, and marketing. Apart from individual and well-equipped individual labs, researchers at the University of Minnesota have access to several facilities: Food Processing Pilot Plant, Sensory Center, Mass Spectrometry and Proteomics Center, Rheology Characterization Lab, Polymer Characterization Facility, Imaging Center, NMR Center, Biotechnology Institute, Analytical Biochemistry, and Statistical Consulting Center (https://ppic.cfans.umn.edu/analytical-instrumentation-and-research-capabilities). The University of Minnesota is also seeking partnerships with other national and international institutions that have complementary expertise. Researchers will come together to innovate, while training the next generation of scientists and future hires.

Model: The PPIC will offer a platform for scientists from different disciplines, industry partners, and stakeholders to exchange ideas, develop new collaborations, and start new research programs. The PPIC will have a technical committee and an executive board. Serving on the Technical Committee will depend on the level of involvement as detailed below. Serving on the Executive Board will be by invitation, and will be for a renewable three years term. The Executive Board will have at least 3 members and at most 10 members. The Technical Committee will consist of industry representatives, university researchers, and other stakeholders. The Executive Board will be selected by the Director of the PPIC and be composed of a diverse group that will provide objective input for the benefit of the community. This structure ensures that the input of our industry partners will be incorporated in the development of the different research programs so they will see direct benefit to their businesses.

Responsibilities of the PPIC Director: The PPIC Director (Professor B. Pam Ismail) will manage some research programs as appropriate and will be responsible for leading the administrative, strategic and technical functions of the PPIC. Responsibilities will include:

1. Form and engage the Technical Committee to establish and maintain research direction and priorities
2. Form and engage the Executive Board to perform listed responsibilities below
3. Identify and leverage additional funding sources (foundations, federal and state, etc.)
4. Identify researchers internal and external to the University of Minnesota with complementary expertise to address the PPIC research priorities
5. Oversee processes for research project selection and monitoring

6. Identify budget guidelines, approve PPIC annual budget, and apportion resources as needed to fulfill the PPIC obligations, including the hiring of support staff
7. Ensure all contractual obligations of the PPIC are fulfilled
8. Produce and collect progress reports
9. Organize annual meetings

Responsibilities of the Technical Committee will include:

1. Solicit opinions and perspectives of key stakeholders (plant protein growers, manufacturers, users, etc.) for determining/selecting research priorities
1. Develop call for proposals
2. Review proposals and make recommendations to the Executive Board

Responsibilities of the Executive Board will include:

2. Seek and establish partnerships with various entities
3. Help identify and leverage additional funding sources (foundations, federal and state, etc.)
4. Identify and refine the center's specific goals
5. Determine milestones and timelines
6. Make final funding decisions

Involvement with the PPIC (three membership options):

1. **Affiliate:** this will entail a yearly membership fee of $3,000 for start-up companies that have annual revenue of less than $2 million. As an affiliate member of PPIC, benefits will include contribution to research ideas, access to non-proprietary research findings, access to annual meetings with two waived registrations, opportunities to host booths for their respective company at annual meetings, visibility and network opportunities, and interaction with scientists from various disciplines.
2. **Associate:** this will entail a yearly membership fee of $6,000 for companies that have less than $5 million annual revenue from plant/alternative protein ingredients and products businesses, and for organizations wishing to join the center. As an Associate member of PPIC, benefits will include a welcome package worth $4,000 that covers some or all of the cost of a project custom designed to meet the company's research needs, a 20% discount on any subsequent projects to continue reaching research goals, high priority project timelines, contribution to research ideas, access to non-proprietary research findings, involvement in research projects, access to annual meetings with two waived registrations, short courses with one waived registration, opportunities to host booths for their respective company at annual meetings, visibility and network opportunities, and interaction with scientists from various disciplines.
3. **Partner*:** this will entail a yearly contribution of $20,000 for companies that have $5-100 million annual revenue from plant/alternative protein ingredients and products businesses; and $40,000 for companies with more than $100 million in annual revenue from plant/alternative protein businesses. As a Partner of PPIC, benefits will include having an R&D scientist on the technical committee, contribution to and development of the center Research Priorities, receiving quarterly updates on PPIC

funded projects, involvement in decision making to fund research proposals, a welcome package worth $8,000 that covers some or all of the cost of a project custom designed to meet the company's research needs, a 20% discount on any subsequent projects to continue reaching research goals, high priority project timelines, contribution to research ideas, access to non-proprietary research findings, involvement in research projects, access to annual meetings with three waived registrations, short courses with two waived registrations, opportunities to host booths for their respective company at annual meetings, visibility and network opportunities, and interaction with scientists from various disciplines.

* *A company that makes more than $5 million annual revenue from plant/alternative protein ingredients and products businesses may join at an associate level for a one-year trial period, non-renewable, for $10,000 one-time membership fee. If they wish to remain a member of the PPIC they must join at the partner level the following year and will have to sign a new agreement*.

Use of membership dollars:

The bulk of membership dollars will go into research allocations and funding graduate students and post docs. Fifteen percent of the membership dollars will go toward indirect costs assessed by the college of Food, Agricultural and Natural Resource Sciences (CFANS) and up to 10% will go toward sustaining the center's function (administrative cost). CFANS and the Department of Food Science and Nutrition (FScN), will cover the administrative costs for the first two years. The hope is for the center to grow and be self-sustaining within two years of its launch.

As approved by the Center's Executive Board, CFANS may use membership dollars as cost share for participation in third party (not private) funded (open access) research projects directly related to PPIC's mission and research priorities.

Other sources of funding:

The Center will also seek funding from foundations, federal and state agencies, and private donors/investors. Additional funding will be used for research, graduate students and post docs. Some additional funds may also be used to acquire necessary instrumentation and cover indirect costs and administrative fees.

Research type:

1. **Precompetitive:** Research will be pre-competitive, focusing on fundamental science that addresses industry needs and consumers' demands. Industry contributions, as well as state/federal and private investors funding will go toward a pool of funds that support pre-competitive research.
2. **Sponsored:** research can also be carried out through sponsored research agreements with industry and individual Center researchers. IP privileges can be negotiated (Provide a link to MN IP three options).

Use of Animals:

PPIC funds will not be utilized in any research involving animal models

Outreach: Annual meetings will be held to share research findings and new ideas, and also review current and establish new programs. Workshops (free to members) and short courses will be designed based on need/request, and offered semiannually.

Outcomes and Benefits: Partnerships and coming together for research will result in new knowledge and innovative technologies. Industry will have early access to graduate students, who will be future hires. Success of the Center will also lead to government and private investors' support. The PPIC will foster interdisciplinary collaborations and networking that will lead to new partnerships, research discoveries, scientific exchange, career opportunities, business successes, and potentially consumer education.