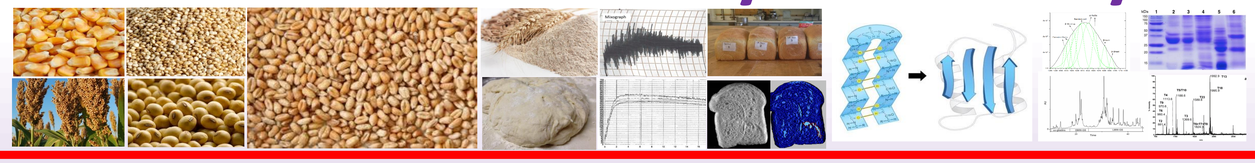
KANSAS STATE UNIVERSITY

Cereal Chemistry Laboratory



Kansas State University GRAIN SCIENCE & INDUSTRY

PROGRAM LEADER

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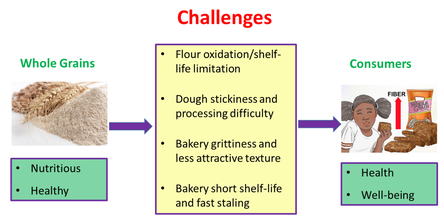
- **VISION:** Be a key resource in cereal chemistry research and education.
- **MISSION:** Provide excellence in research and education in cereal chemistry.
- **GOALS:** Develop nutritious and innovative cereal grain foods and food ingredients and provide relevant education and meaningful technical service.
- **RESEARCH FOCUSES:**
  - Cereal protein chemistry, modification, and functionality
  - Functional cereal foods and bakery science
  - Cereal food innovation, including gluten-free products
  - Functional protein hydrolysates
  - Food nanotechnology

FACILITY GLANCE

RESEARCH HIGHLIGHTS

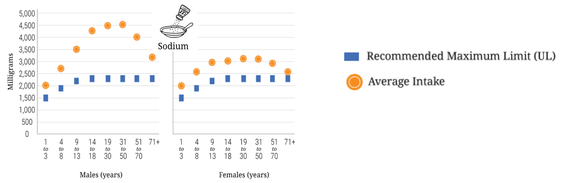
Developing Better Whole Grain Wheat Products:

- Whole grain contains nutritious dietary fibers, vitamins, minerals, and antioxidants, but average intakes are far below the recommended levels. Several key issues have to be solved to increase whole wheat products' availability and consumption.
- We are developing feasible approaches to increase whole wheat flour shelf-life, decrease dough stickiness, and improve bakery texture and quality.



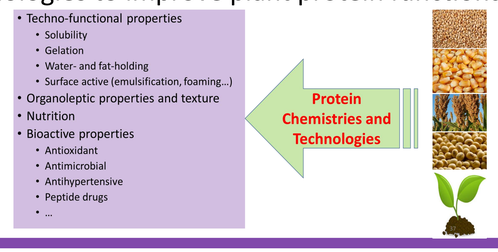
Salt Functions and Reductions in Wheat Products:

- High sodium consumption causes many harmful effects on health. Impulsive reduction of sodium salts results in negative impacts on dough processing and product quality. Fundamental understanding of salt functions in wheat doughs and bakeries is lacking.
- We are investigating the interactions of sodium salt with gluten, carbohydrate, and lipids in doughs and bakeries at molecular level and developing better strategies to mimic salt functions and tastes for sodium reduction.



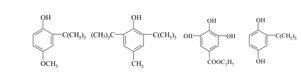
Functional Grain Protein Hydrolysates:

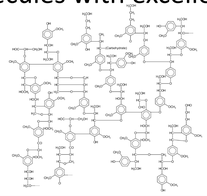
- Annual production of plant proteins is nearly four times more than animal protein, but only 1/3 is used for foods.
- Plant protein hydrolysates could be better alternatives to animal proteins as functional food ingredients and bioactive peptides in terms of availability, production cost, and environmental impact.
- We are developing enabling chemical pathways and technologies to improve plant protein functionalities.



Lignin Natural Antioxidants:

- Antioxidants serve vital functions in foods, feeds, pet foods, and many others. The market is dominated by synthetic chemicals. Demands for natural antioxidants is increasing.
- Lignins are the 2nd most abundant natural polymers and already present in many foods. They are phenolic polymers showing potential as natural antioxidants.
- We are modulating lignin depolymerization pathways to convert lignin to smaller molecules with excellent antioxidant activities.





LAB CAPABILITY

- **CONTRACT RESEARCH:** Cereal science- and chemistry-related research, including cereal grains and individual component processing, fractionation, modification, analysis, cereal food development and testing, and scientific literature compilation, use of our facilities and technical assistance.
- **TECHNICAL CONSULTS:** Provide technical solutions to solve problems related to cereal science and grain products.
- **TESTING AND MEASUREMENTS:** Sample preparation (centrifuge, freeze drier, rotary evaporator, sonicator, homogenizer, dialysis, ducted fume hood, etc.); Protein characterization (HPLC, gel electrophoresis, UV-Vis spectrophotometer, plate reader, FTIR, protein content, solubility, gelation, water/fat holding, surface active properties, etc.); Flour/dough/bakery testing and baking; Other accessible facilities (milling, rheometer, viscometer, DSC, TGA, DMA, Instron, AFM, SEM, TEM, GC-MS, NMR, etc.)