



Bio-Possibilities Through Extrusion

The Extrusion Center in the Department of Grain Science and Industry at Kansas State University is part of the ultramodern Bioprocessing & Industrial Value Added Program facility, and provides fundamental and applied research, education of students and outside clients, and technical service for industrial clients.

With a highly experienced team of faculty, full-time operational staff, post-doctoral research associates, and graduate students, the Extrusion Center processes grain-based ingredients to develop food and feed applications.



Our state-of-the-art facilities include a pilot scale Wenger TX-52 twin screw extruder, pilot scale Wenger X-20 single screw extruder, and a Wenger Series 4800 gas-fired dryer. In addition, we have a lab-scale American Leistritz Micro 18 twin screw extruder that provides the flexibility to conduct experiments on a small scale. We also have extensive analytical equipment and bench space for characterization of raw materials and final extruded products.

Our equipment is designed to capture all the operating conditions data to better understand factors that control the rheological properties during processing and the physical properties of the final products. It also enables us to learn more about the molecular interactions that are critical to the extrusion processes which lead to producing desired new products.

In the Extrusion Center, our extruders are used for processing food and feed products, including animal feed, specialty feeds for aquaculture, cereals, pasta, pet food, and snacks. We use extrusion not only as a process for mixing and forming food products, but also as a means of sterilizing and cooking these products to make them more digestible for animals and humans.

Research and Development Focus

- Processing and development of a range of products including breakfast cereal, snacks, pasta, textured vegetable protein, pet food, aquatic feed, and industrial products
- Non-invasive imaging of three-dimensional structure of extruded products
- Rheology and material properties of biopolymers
- Relationships between material properties, structure, and physical characteristics and texture of extruded products
- Starch-based nano-composites using extrusion
- Pre-cooked high-fiber flour with enhanced functional properties
- Starch-based encapsulation of lipids, flavors and organic pesticides



"We consider BIVAP to be a cornerstone in the emerging markets of bioprocessing. These markets will reinvigorate value-added agriculture and will energize the Kansas economy. The experience of the BIVAP staff is significant and their willingness to partner with other faculty to create innovative approaches is commendable."

Lafe Bailey
Wenger Manufacturing



Services

Our services include contract research in areas of extrusion and rheology, pilot and lab-scale production, and concept-testing of various extruded products and technical consulting on various extrusion-related problems.

Characterization and Testing

- Mechanical properties of materials
- Thermal properties such as glass transition
- Sensory and shelf-life evaluation of various extruded products in cooperation with other labs
- Phase transition behavior of biomaterials
- Supercritical fluid extraction for determination of lipid content for raw and processed materials

Short Courses

The Extrusion Center conducts the popular "Extrusion Processing–Technology and Commercialization" short course every year in August for national and international participants interested in gaining a thorough knowledge of extrusion processes and technology.

Discover Your Bio-Possibilities

For more information on the Extrusion Center, contact Eric Maichel (785-532-4802; emaichel@ksu.edu) or Sajid Alavi (785-532-2403, salavi@ksu.edu) or visit our website at www.grains.ksu.edu.

