

Impact Statement 2003

Summarize Program

The Extrusion Program in the Department of Grain Science and Industry has a strong emphasis on all three major academic activities - service, research and teaching. At the core of the extrusion program is the Extrusion Research Center which is currently housed in the Department of Grain Science and Industry (Shellenberger Hall). The Extrusion Research Center has a variety of production facilities including a pilot scale Wenger TX-52 twin screw extruder, a pilot scale Wenger X-20 single screw extruder, a lab scale American Leistritz Micro 18 twin screw extruder, and a Wenger Series 4800 gas-fired dryer. Additionally, the Extrusion Lab in Waters 47 has equipment and bench space for analysis of raw materials and extruded products. As supervisor of the Extrusion Program Dr. Sajid Alavi is involved in extrusion related research projects including - 1) phase transition analysis for understanding structure formation in extruded products, 2) use of non-destructive X-ray tomography imaging for characterizing extrudate micro-structure, and 3) production of water-resistant biodegradable packaging foams. Currently there is one Ph.D. level graduate student engaged in extrusion related research under Dr. Alavi's supervision. The Center also provides services to other on-campus and off-campus researchers.

Additionally, the Center provides services to the industry for pilot scale trial runs for various products. In 2002, approximately 400 hours of extrusion time was spent on activities related to both industry and research. Out of this, half the time was spent on industry related work, and the other half was spent on academic research (for both on-campus and off-campus researchers) and laboratory classes. Some of the companies which utilized the services of the Center were Wenger Manufacturing, Phibro, Safeway, Abbott Labs and Kemin Nutrisurance. Products made included pet food, corn puffs, sorghum puffs, soybean puffs, pasta, snack food, breakfast cereal, aquatic feed, corn starch, wheat starch.

Teaching of undergraduate and graduate level extrusion classes is an important aspect of the Extrusion Program. GRSC 720 Extrusion Processing in the Food and Feed Industry is a senior level extrusion class taught every Fall (starting Fall 2002) by Dr. Sajid Alavi with emphasis on introduction to extrusion technology and hands on laboratory exercises. In addition, a graduate level extrusion class GRSC 820 Advanced Extrusion Processing will be offered from Spring 2004 onwards.

Summarize Impact

Agricultural products which utilize extrusion technology constitute approximately a \$40 billion annual market in the U.S. alone. This includes breakfast cereal, snacks, pasta, pet food, and aquatic feed. The Extrusion Program in the Department of Grain Science and Industry is an invaluable asset to the ongoing quest for enhancing the value of Kansas agricultural commodities like wheat, corn and soybean. The program includes ongoing research at both fundamental and applied levels for further developing extrusion technology for food and feed processing, and utilizing commodities like wheat for non-food applications like biodegradable packaging. The Extrusion Program works very closely with Kansas agro-industry and provides services and consultancy to a range of companies including pet food manufacturers and equipment manufacturers like Wenger Manufacturing. The relationship with Wenger especially is very beneficial to the State of Kansas as a whole, as it serves as both a catalyst and a testing ground for new processing technologies. Moreover the teaching aspect of the Extrusion Program ensures that Grain Science and Food Science graduates from the University are well versed with latest processing technologies.

Summarize Next Steps

In the coming years, an important step will be the collaboration of the Extrusion Program with other value-added agricultural products research being conducted at K-State. The Extrusion Research Center facilities will be moved to the new Biological and Value Added Products (BIVAP) facility which is under construction. This will help in better coordination of value-added research activities with other researchers and improved access to Kansas entrepreneurs who are interested in employing new cutting edge processing technologies for utilization of agricultural commodities.

Other steps will include further strengthening of the research program by extensive solicitation of funding from external agencies such as U.S.D.A. and N.S.F. in the areas of biodegradable packaging and non-invasive technologies for microstructure characterization.