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**A Multi-Purpose, Pilot-Scale Processing Facility for Food Safety
Research, Teaching, and Outreach**

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The Need

Rapidly changing regulations and market trends are creating a significant need for research to ensure the safety of ready-to-eat food products. The burden-of-proof for ensuring product safety is continuing to increase for food processors, who must, in many cases, prove the safety of a product/process via either *inoculated challenge studies* or *validated microbial models*. However, the vast majority of food processors lack the facilities or capacity to meet this need. Additionally, the application of basic research results (at the level of a Petri dish) to a real-world process (at the commercial, manufacturing level) is simply too great of a leap for processors to make without evidence that the results can be scaled-up.

Our Response

Therefore, to meet this pressing need, Michigan State University is planning a unique, Biosafety Level-2, Pilot-Scale Food Processing Facility for inoculated challenge studies, research validation trials, testing with industry partners, and teaching/training. This facility, being planned for Farrall Hall, is a joint effort of the Department of Biosystems and Agricultural Engineering, the Department of Food Science and Human Nutrition (both part of the College of Agriculture and Natural Resources), the Michigan Agricultural Experiment Station, and the MSU National Center for Food Safety and Toxicology, and will enable direct application of the latest research results to real-world challenges in the critical area of food safety engineering.

Facility Capacity

In a challenge study, the microorganism of concern is inoculated into the food product, which is subjected to an actual processing operation simulating the commercial process. Such studies are impossible in actual processing facilities, where pathogens cannot be brought on site. This new facility (~1,470 sq ft) is being designed to accommodate these types of studies for a wide range of applications. The design requirements for a biosafety level-2 facility include negative air pressure and controlled access, in order to contain pathogens within the facility and to protect researchers and workers in the building. The facility will include a dressing room, a prep lab, a storage room for cleaning and sanitation supplies, and the main processing floor. The main room will include four flexible "stations", each of which will have electrical, water, steam, and drain capacity to handle a variety of pilot-scale processing equipment, such as mixers, cooking equipment, dairy processing equipment, etc.

Benefits to MSU

This multi-user facility will enable MSU researchers to test laboratory-scale research findings in commercial-type equipment and validate computer simulations of food processes and microbial responses. This capacity will put MSU at the forefront of food safety research, both advancing knowledge and directly impacting the safety of manufactured food products, and will be a critical element in acquiring future federally funded research projects. For example, one of the first projects to use the facility is funded by the USDA National Integrated Food Safety Initiative and will entail inoculated challenge studies in a pilot-scale, moist-air impingement oven, contributed by industry partner FMC FoodTech (Sandusky, OH). The oven will be used to validate models currently being developed at MSU to help industry simultaneously ensure the safety of ready-to-eat meat and poultry products and maximize product yield and quality. Core faculty members who have existing projects that will utilize this facility include Drs. Bradley Marks (food engineering), Elliot Ryser (food microbiology), Al Booren (meat science/processing), and Evangelyn Alocilja (biosensors), with many new collaborative opportunities expected once the facility is operational.

Benefits to Industry

Most food processing companies lack separate facilities where inoculated challenge studies can be conducted. Although a few similar facilities exist across the country, the MSU facility will have the unique mission of accommodating a wide variety of food processing applications/equipment, rather than focusing on one type of product or process. Additionally, the purpose of the facility is to enable both pre-competitive research and product-specific testing supported by industry partners. Such partnerships will be critical in directly serving the needs of stakeholders and in supporting the continuing operation of the facility, which is targeted for completion by Fall 2004. The MSU faculty involved in this endeavor comprise a unique, multidisciplinary team committed to improving the safety of processed food products through innovative research, outreach, and training. *Anyone with a potential interest in the facility, including establishing partnerships in this area should contact [Dr. Bradley Marks \(marksbp@msu.edu\)](mailto:marksbp@msu.edu).*



A pilot-scale, moist-air impingement oven.