2006

Annual Review of

Collaborative Research Program

National Center for Food Safety & Technology

Illinois Institute of Technology

Confidential Information
Not for Publication
The National Center for Food Safety and Technology is funded, in part, by a Cooperative Agreement with the Center for Food Safety and Applied Nutrition of the U.S. Food and Drug Administration, Department of Health and Human Services.
# TABLE OF CONTENTS

**INTRODUCTION** .................................................................................................................. II

**CHEMICAL CONSTITUENTS AND ALLERGENS PLATFORM** ......................... 1
Effects of Cleaning on Removal of Allergens from Food-Contact Surfaces......... 3
Effects of Food Processing on Allergens.................................................................... 9

**FOOD DEFENSE** ..........................................................................................................15
Effects of Environmental Conditions on Survival of *Francisella tularenses*  
in Media and Foods ........................................................................................................... 17
Thermal Resistance of Non-Traditional Microbiological Agents .................... 25
Thermal Inactivation of Ricin in Reconstituted Infant Formula ....................... 36
Partition Coefficients for Toxic Agents in Multiple Phase Foods: Separation  
of Raw Whole Milk ........................................................................................................... 37
UV Treatment to Eliminate Agents in Water and Juice .................................. 41

**MICROBIOLOGY PLATFORM** ......................................................................................49
Effect of Desiccation and Low Water Activity on the  
Survival of Enteric Bacteria ............................................................................................. 51
Estimating Distribution of *Clostridium botulinum* Spores in Raw Foods ....... 55
Factors Affecting Survival of *Listeria monocytogenes* in  
Food Processing Environments ...................................................................................... 59
On-line *clostridium botulinum* bibliographic database ...................................... 63
Standardization of Sample Preparation Methods for Use with the  
Digoxigenin Enzyme Linked Immunosorbent Assay (DIG-ELISA) for  
*Clostridium botulinum* Toxin Detection ....................................................................... 69

**FOOD PROCESSING AND PACKAGING PLATFORM** .......................................73
Effects of High Pressure Processing (HPP) on the Reduction of Foodborne  
Pathogens in the Manufacture of Soft Cheeses .......................................................... 75
Evaluation of Online and Non-destructive High Voltage Leak Detection  
(HVLD System for Food Packages) ............................................................................ 79
High Pressure Synergy for *Clostridium botulinum* Inactivation ......................... 85
An Integrated Internet Information Resource (IIR) for Packaging Integrity  
and Tamper Evident Packaging (TEP) .................................................................... 89
Microwave Pasteurization of Shell Eggs .................................................................... 93
Shelf-Stable Egg Based Products Processed by Ultra High Pressure Technology 97
Framework for Setting Sterilization Targets ............................................................... 103
Factors Affecting Performance of High Pressure for Extended Shelf Life Foods.  
Effectiveness of High Pressure at Different Water Activities ............................. 107

Directory of NCFST Staff ...............................................................................................113
INTRODUCTION

The Annual Review of Research contains reports on collaborative research conducted at the National Center for Food Safety and Technology during fiscal year 2006 (October 1, 2005 through September 30, 2006).

NCFST was established in 1988 to bring together scientists from industry, academia and the Food and Drug Administration (FDA) to work collaboratively on food safety issues. The center is a unique food research consortium of FDA’s Center for Food Safety and Applied Nutrition, Division of Food Processing, Science and Technology, the Illinois Institute of Technology, and the food and food related industry. The science conducted at the center forms a foundation for regulatory policy and establishes the parameters to ensure the effectiveness of food processing and packaging technologies. Industry benefits from the clearly established criteria for evaluating new processes and from a clearer understanding of how regulatory policy is established. FDA benefits from the scientific contributions of industry, and consumers benefit from improved processing and packaging systems that help assure food safety.

NCFST’s food safety and security research is implemented through science platforms that reflect the organization’s expertise: food processing and packaging, food microbiology, chemical contaminants and allergens, and food defense. The goal of each of these platforms is to manage a research portfolio of projects based on stakeholders’ needs. The center is also well placed to facilitate innovation in the food industry through the assessment and validation of new technologies, especially food safety and preservation technologies, aimed at delivering key consumer drivers of safety, health, freshness, and convenience.

Going forward, the NCFST seeks to build on its strong foundation and history of the collaboration with industry, FDA, and academia to increase its research portfolio and expand its partnership with its stakeholders. By conducting important research on critical food processing issues to address food safety and security, NCFST can help improve the health and well being of the public.