

Introduction

The implementation of the Safe Foods for Canadians Act and Regulations and in the U.S. the Food Safety Modernization Act has brought new challenges to the food industry and the emphasis on preventive controls. To add to this there are an increase in the number of novel foods available (e.g., plant based proteins, insect based raw materials, flavours, probiotics) that may have some unknown safety risks.

Bringing a new food product to the market is the process of research, and development to innovation. The process of new product innovation takes different disciplines working together to develop a safe product for consumers. Key team members should include quality and regulatory experts to make sure the new product is in compliance with regulations and that the product is safe for consumers.

Food processing is a prominent area to ensure the safety of consumers and ties up with food innovation.

Background

Since 2016, approximately 70% of food consumption in Canada consisted of industrialized processed food and ultra-processed food. Many processed products have been associated with the foodborne pathogen contamination of *Escherichia coli* O157:H7, *Listeria monocytogenes* and *Salmonella*. The increased possibility of foodborne pathogens to infect large numbers of consumers raised food safety concerns. Recent outbreaks and recalls caused by foodborne pathogens in low moisture foods and ingredients have raised concerns about food safety.

Table 1. Outbreaks of *Salmonella* in Low Moisture Ingredients and Foods in Canada (2016-2021) (CFIA, 2021)

Food	Year	Location
Halva	2021, 2020	AB, MB, NS, ON, PE, QC, National
Tahani	2021, 2018	ON, QC, BC, PE, National
Cumin, Parsley, Garlic Powder	2021, 2020	ON
Cake Mix	2020, 2019, 2016	NB, National, ON
Teas, Dried Coco Herbs, Teas	2019, 2016, 2015	BC, NB, SK, National, ON
Cheddar crackers	2018	National
Chili Powder, Seasoning	2018	National
Dried Seeds, Seed Mix, Trial Mix	2018, 2015	ON, AB, BC, MB, SK, NB, National, QV
Potato Chips	2017, 2016	AB, BC, MB, NT, ON, SK, National
Pretzel, Bakery	2020, 2017, 2016	MB, ON, AB, BC, MB, SK
Pistachios	2016	ON, BC, National
Almond Butter Crunch	2016	AB, BC, MB, SK

Summary

The food industry is required to implement preventive controls to ensure the safety of food products. Co-management efforts between food safety and sustainability program managers are used to tie food safety with sustainability from farm to fork. Food safety and quality research studies enable and support food processors in the effort to provide safe food ingredients to the food industry.

Reference

CFIA, 2021., Food recall warnings and allergy alerts. <https://inspection.canada.ca/food-recall-warnings-and-allergy-alerts/>

CFIA, 2019., Understanding the Safe Food for Canadians Regulations. A Hand book for Food Businesses. A104-142/2018E-PDF.

NACMCF Executive Secretariat, 2010., Parameters for determining inoculated pack/challenge study protocols. J. Food Prot. 73(1): 140-202.

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Industrial Solutions

The food industry is required to implement preventive controls to ensure the safety of food products.

•Process Validation

Process validation and challenge studies are tools to validate the efficacy of the preventive controls. Process validation studies are conducted to evaluate the effectiveness of a kill step to achieve a desired food safety objective.

•Challenge Study

Challenge studies are performed to demonstrate the microbiological stability of an ingredient or a product against foodborne pathogens and spoilage microorganisms during storage.

•Shelf Life Study

A shelf life study is conducted to measure the longevity and consumer acceptability of a product during storage. Real-time and accelerated shelf life studies could be options of exploring the shelf life.



Table 2. Outbreaks of *L.monocytogenes* and *E.coli* O121 in Low Moisture Ingredients and Foods in Canada (2016-2021) (CFIA, 2021)

Pathogen	Food	Year	Location
<i>Listeria monocytogenes</i>	Smoked Pork Hock	2021	ON
	Peanut Spread	2020	National
	Snack Bar, Granola	2017, 2016	AB, BC, MB, SK, National
<i>E. coli</i> O121	Sunflower seeds, Trail Mix	2016	AB, BC, MB, NB, ON, QC, SK
	Pie and tart shells	2017	AB
	Flour	2016, 2017	ON, SK

	Shelf Life Studies
	Challenge Studies
	Process Validation
	Biocides & Desinfectants Efficacy
	Microbial Identification & Characterization
	Virus & <i>Clostridium botulinum</i>
	Method Development
	Spoilage Control