SCIENCE OF SAFE FOOD

Reduced Oxygen Packaging

May 31, 2019

Lincoln Lancaster County Health Department

University of Nebraska–Lincoln

LINCOLN LANCASTER COUNTY HEALTH DEPARTMENT

FOOD FROM THOUGHT

THE FOOD PROCESSING CENTER

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Overview of Reduced Oxygen Packaging

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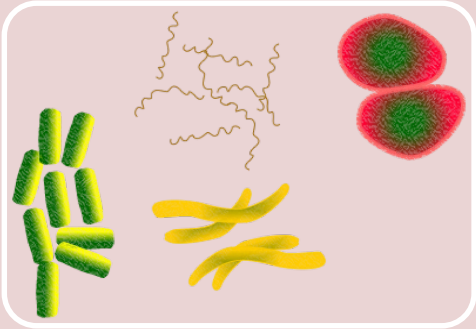
ROP Workshop



Overview of ROP

- Introduction
- Definition
- Benefits
- Misconceptions and risks

Types of Processes

- Vacuum packaging
- Cook chill
- Sous vide
- Modified Atmosphere Packaging (MAP)

Safety Concerns

- Microbiology
- Micro Applied to ROP
- Sanitation

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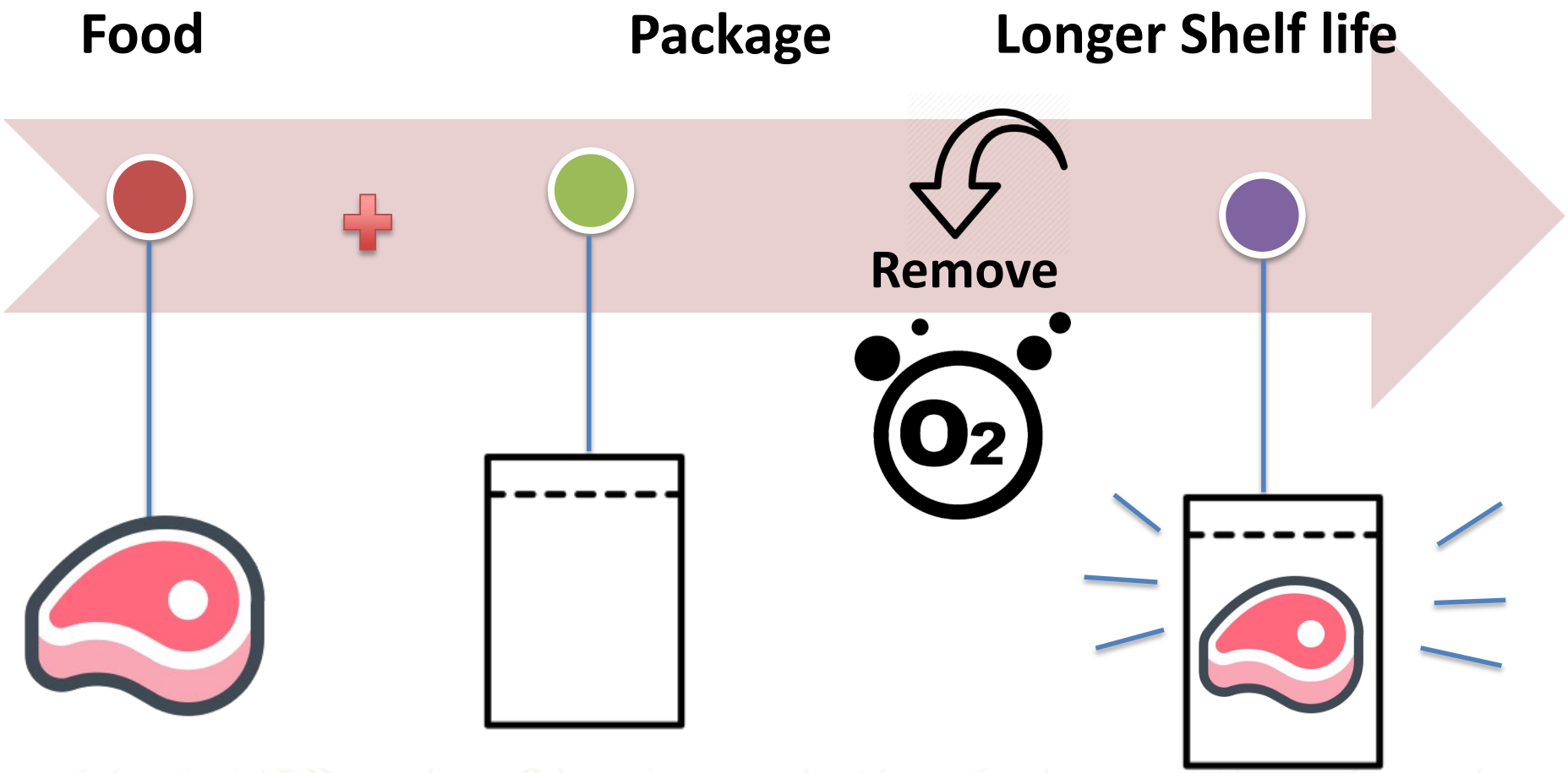
Topics

- Introduction
  - What is ROP?
- Definitions
  - Aerobic
  - Anaerobic
- Benefits
  - Why should I use ROP?
- Misconceptions and risks
  - Outbreaks in ROP

Introduction - ROP



Definitions

- Aerobic conditions: The environment contains oxygen

Pictures courtesy of Ben Davy

Definitions

- Anaerobic conditions: There is NO oxygen in the environment

Pictures courtesy of Ben Davy

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ROP Benefits

Prevents the growth of spoilage organisms

Prolongs Quality

Extends Shelf Life

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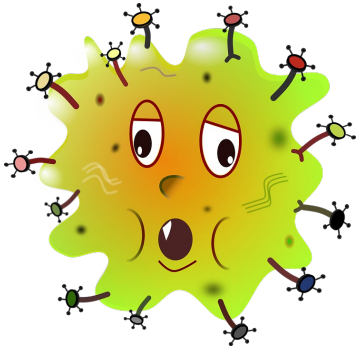
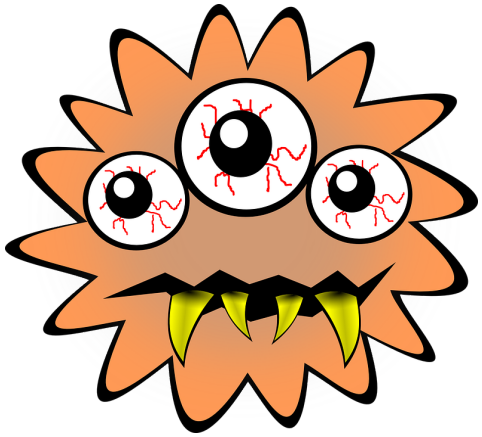
ROP Benefits

Growth Prevention of Spoilage Organisms

ROP creates an environment with low oxygen that prevents the growth of aerobic bacteria, yeast, molds.





ROP Benefits

Growth Prevention of Spoilage Organisms

These microorganisms are largely responsible for the “off” odors, slime, texture changes, and other forms of spoilage.

ROP Benefits

Prolongs Quality

Reduces Fat oxidation and rancidity

Prevents chemical reactions that produce off odors and color change

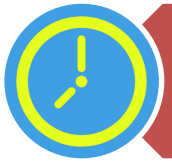
Reduces aerobic bacterial growth

Eliminates the risk of contamination during storage

Extends Shelf Life

ROP Benefits

Why use ROP in Retail?



Reduces preparation and clean-up times

Portion control problem eliminated

Less mess, fewer utensils

Extends shelf life

Creates a tender/or flavorful food product, such as with sous vide.

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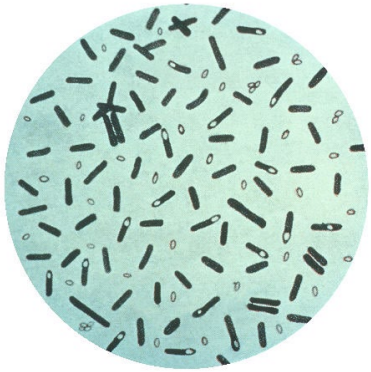
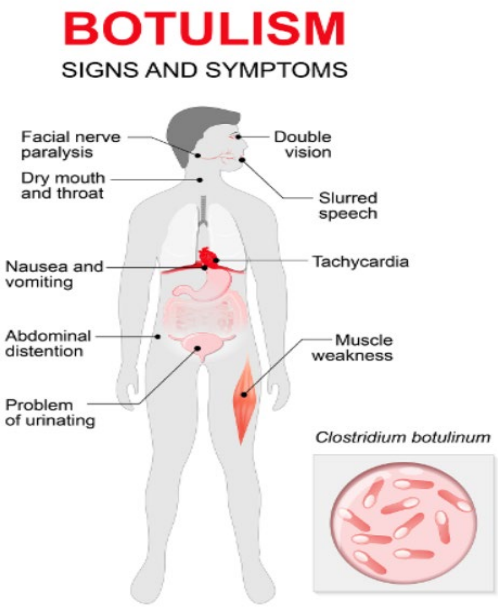
Misconceptions and Risks

"Sealing food in vacuum packs eliminates the need to handle it properly."

Foodborne Botulism





(Food Safety News, 2017)

Misconceptions and Risks

2009 Outbreak of Botulism Linked to Vacuum-Packed Hot-Smoked Whitefish, France

Three members of the same French family developed botulism after eating a vacuum-packed whitefish. The fish had been purchased by the family, on August 22, during a recent visit to Finland and was consumed several weeks after purchase. No leftover fish was available to confirm this hypothesis. The fish had originally been processed and packaged in Canada. Vacuum packed hot-smoked whitefish had previously been associated with botulism in multiple countries, including Finland, Germany, the USA, and Israel.

Tags: c. botulinum, clostridium botulinum, c. bot., botulism, type e, botulism type e, canada

Outbreak began:	September 2009
Affected Country:	International
Affected States/Territories:	Not Applicable
Organism(s):	Botulism
Vehicle(s):	Seafood, Finfish, Whitefish
Molecular Results Available:	Unknown
Test Results:	None
Location(s):	Home

Incidents of foodborne botulism involving non-proteolytic *C. botulinum* (Goodburn, 2006)

Year	Country	Product	Toxin Type	Cases (Deaths)	Factors contributing botulism outbreak	Reference
1982	Madagascar	Commercial pork sausage	E	60 (30)	Inadequate preservation	Viscens *et al.*, 1985
1985	USA	Uneviscerated salted, air-dried fish (kapchunka)	E	2 (2)	Poorly controlled salting, lack of refrigeration	CDC, 1985
1991	Sweden	Vacuum-packed hot-smoked rainbow trout	E	?	?	Korkeala et al., 1998
1994	Sweden	Vacuum-packed hot-smoked rainbow trout	E	?	?	Korkeala et al., 1999
1997	Germany	Commercial hot-smoked vacuum-packed fish (Raucherfisch)	E	2	Suspected temperature abuse	Jahkola and Korkeala, 1997; Korkeala et al., 1998
1997	Germany	Home smoked vacuum-packed fish (Lachsforellen)	E	4	Temperature abuse	Anon, 1998
1998	France	Commercial frozen vacuum packed scallops	E	1	Temperature abuse (?)	Boyer et al., 2001
1998	France	Commercial frozen vacuum packed prawns	E	1	Temperature abuse (?)	Boyer et al., 2001
2001	USA	Home-made fermented beaver tail and paw	E	3	temperature abuse	CDC, 2001
2002	USA	Home-made "muktuk" (from Beluga whale)	E	12	Unsafe process	Anon, 2002
2004	Germany	Commercial vacuum-packed smoked salmon	E	1	Consumed after "use by date"	Dressier, 2005

https://www.researchgate.net/profile/Kaarin_Goodburn/publication/237298240_Clostridium_botulinum_in_vacuum_packed_VP_and_modified_atmosphere_packed_MAP_chilled_foods/links/548e9b4b0cf2d1800d842fd9.pdf

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Misconceptions and Risks

Smoked Wild Coho Salmon recalled for botulism risk

By News Desk on May 3, 2018

Seabear Company of Anacortes, Washington is voluntarily recalling 1,225/ 3 oz. units of Cold Smoked Wild Coho Salmon Lox, Gerard & Dominique Seafoods brand, affecte
contar eatening
illness look or
smell

Botuli ptoms:
genera ing.
Diffic nstipation
may a k
imme

No ill

The re %.
Labeling instructions state to freeze or refrigerate, once thawed they can be kept unopened in the fridge for up to 30 days. Because the water phase salt is under 3.5% the product must **remain frozen** until ready to consume. Keeping in the refrigerator after thawing in a reduced oxygen package has the potential to be contaminated with *Clostridium botulinum.*

Low salt, vacuum packed fish must be kept frozen until ready to use, label said to refrigerate or freeze - RECALL

Illinois Firm Recalls Chicken Products Produced Without Adequate Ready-To-Eat HACCP Plan and a Listeria Monocytogenes Program

Class I Recall **014-2015(Original)**
Health Risk: High **Jan 17, 2015**

En Español

Congressional and Public Affairs
Felicia Thompson
(202) 720-9113

WASHINGT approximately 8,856
pounds of c Hazard Analysis &
Critical Con S. Department of
Agriculture's

The product

- 2 packs

The product dates from Nov. 19,
2014 throug , and then packaged
using a Cry 015. La Guadalupana
Wholesale's co-packer did not conduct a hazard analysis to determine the food safety hazards reasonably likely to occur in the cryovacing process and did not identify the preventive measures the establishment could apply to control those hazards. The chicken tamales are a RTE product and fall within the Fully Cooked Not Shelf Stable category. As such, their production requires an *Lm* program. The product is also processed by means of physical handling and packaging, thus further requiring a HACCP plan. They were distributed for retail sale in Chicago, Ill.

The problem was discovered by an FSIS inspector, who was conducting a sanitation task in the co-packer's establishment and saw plant personnel handling the RTE product in a room where raw product is also handled. An investigation was conducted and found that the co-packer had not conducted an RTE hazard analysis, developed or implemented a HACCP plan for the chicken tamales, or developed and implemented an *Lm* testing program. Thus, there is no assurance the products are wholesome and; therefore, safe for consumption. Consequently, the products may support the growth of pathogens that may be detrimental to health.

Fully cooked, vacuum packed chicken tamales processed without a HACCP plan - RECALL

https://www.foodsafetynews.com/2018/05/smoked-wild-coho-salmon-recalled-for-botulism-risk/
https://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/recall-case-archive/archive/2015/recall-014-2015-release

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Misconceptions and Risks

- Need to store frozen food in the freezer and thaw in appropriate manner
- Vacuum seal does NOT kill bacteria
- Vacuum packaging does NOT automatically make food safe and eliminate the need to take precautions

ROP Overview

Continue to be vigilant with food safety

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