

FNH 200

EXPLORING OUR FOOD



Land acknowledgement

I respectfully acknowledge that I work
and live on the traditional, ancestral, and
unceded territory of the Musqueam,
Squamish & Tsleil-Wauthuth Nations.



Agenda

Introduction

Course information

Lesson 1



FNH 200- Exploring our Food (Jan- Apr 2026)

Instructor: Azita Madadi Noei

Email: Canvas internal email

Office Hrs: by appointment-Zoom

My background

B.Sc. Nutrition and Dietetics

- *Food Irradiation*
- *Novel Computer Applications in Nutrition and Dietetics*

M.Sc. Food Science and Technology

- *Application of Biotechnology in Food*
- *Formulation of New Fermented products from Feta Cheese Whey using Lactic Acid Bacteria*

Ph.D. Food Science,

- *Anti-invasive Activity of Bovine Colostrum and Whey Proteins Against *Salmonella Typhimurium**

My background (Industrial Training)

- Pasteurized milk and dairy products
- Soft drink processing plant
- Baker's yeast processing plant (Red Star)
- Meat processing plant
- Confectionery Products Company
- Canned food company
- Vegetable oil processing plant
- Food and Drug Inspection
- Cheese production research station

Courses

Undergraduate:

- FNH200
- FNH302

Graduate courses:

- FOOD 510-Advnces in Food Science
- FOOD 524-Advances in Food Processing
- FOOD 521-Advances in Food Biotechnology
- FOOD 529-Laboratory methods in Sensory Evaluation
- FOOD 511-Master of Food science Workshop

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My Teaching Philosophy



Course Objectives and Outcomes

- Describe key concepts of food science
- Articulate personal values rationalizing your choice of food purchase/consumption
- Critically evaluate and form your own opinion on issues pertaining to food

Resources – required

- **Canvas is used for this course:**
 - Lessons, assigned readings & quizzes
 - Campus Wide Login (CWL)
- **Course Resources on Canvas:**
 - Login at:
<https://canvas.ubc.ca/>

Resources – required

- Course Outline (syllabus)
- Course Content: Lessons 1-13
- Lecture notes
- Assignments
- Discussions
- Videos
- Quizzes
- Announcements made through the “Discussion tool”

What you should check everyday on Canvas:

- **Course Content** (Lessons)
 - Review prior to coming to the class
 - Compile/Print lessons (*optional*)
 - Please note that lessons will be released as they are being reviewed and updated
 - Check posted messages in Canvas
- **Class slides**
 - Review/Print – add notes
- **Announcements** made through the Discussion tool
 - *From your instructor to all students*

Resources - supplementary

- **Reference Book:**

- “Food Science”.
 - By N. N. Potter and J. H. Hotchkiss. Aspen Publishers Inc., Chapman & Hall, 5th edition, 1995, 1998. Available in WoodWard Library
- “Essentials of Food Science
 - By Vaclavik, Vickie and Christian, Elizabeth W (online)

- **Videos** (will be viewed in some classes)

- Some of the videos are already incorporated into lessons

Evaluation

• Assignments (2)	16%
• Quizzes (4+1)	10%
• Midterm exam	30%
• Final exam	40%
• <u>Participation</u>	<u>4%</u>
<i>Total</i>	<i>100%</i>

- *Bonus mark for contribution (1.5 mark)*

Evaluation

- **On-line** quizzes (**4+1**):
 - Each quiz: 25 multiple choice questions on Canvas
 - Accessible on selected **Fridays 4:30 pm** till **Mondays 11:00 pm** (please check the dates on course schedule file in Canvas)
 - Limited time: **25 min** to complete it
 - Only be taken **once (except for first one)**
 - **No extensions**

Bonus mark (maximum 1.5 mark)

On-line discussion/Class contribution

- Consistently answering (more than 2) specific questions during the lecture (not the polls)
- Consistently answering (more than 2) students posting on the discussion board- I will post a note acknowledging your correct contribution
- Providing comments or suggestions for improvement.
- Participation in the discussion forum beyond what is required for class participation
- Quality control survey (0.5%)

Participation

In-class polls and questions (above 90% - less than 3 missing hours)- Each missing hour after that will be counted 0.5 per hour missed.

2 extra discussion boards equals 0.5 mark

Discussion forums (5)

Exams

Mid-term Exam (Feb 24)

Remote zoom invigilated – with lockdown browser

50 min

- L. 1-4

A one-sided- Letter size or A4 memory aid allowed (font 6 and above-typed or handwritten)

Final Exam (TBA)

In person-paperless, use your own computer with lockdown browser

A two-sided Letter size or A4 memory aid allowed (font 6 and above-typed or handwritten)

- 2 hrs long- L.1-13 (90% from the material after the midterm)

Midterm

Midterm exam will not be handed back

- Marks will be uploaded in “*Grades*”
- Midterm viewing hours will be provided

Course modules

Please consult with the provided schedule uploaded in the course canvas and read the corresponding lessons prior to coming to the class



**Please review the
course syllabus
posted on Canvas**

Questions?

Tour of the Course Website

Lesson 1

FOOD SCIENCE

 &
THE CANADIAN FOOD
SYSTEM



Food Science & the Canadian Food System

OBJECTIVES

- Describe the field of food science
- Describe the breadth and relative magnitude of various sectors of the Canadian food industry
- Illustrate how food is distributed to consumers in Canada
 - how apples are converted to a variety of food products
- Identify and reflect trends in food consumption in Canada

<https://join.iclicker.com/OONT>



What is Food Science?

HOW DOES IT DIFFER FROM AGRICULTURE AND
NUTRITION?



What is Food Science?

- **Food Science** is the application of basic principles of science & engineering to study and acquire new knowledge on physical, chemical and biochemical aspects of food.

What is Food Science?

- **Food Science** is the application of basic principles of science & engineering to study and acquire new knowledge on physical, chemical and biochemical aspects of food.
- **Food Technology** utilizes the information gathered by food science and applies the appropriate technologies to ensure the quality and safety of food.

Are *Food Science* and *Nutrition* the same?

Nutrition - effects of food on the person who consumes them

Food science - study chemical, microbial physical, and sensory properties of foods & their ingredients during processing and storage...

Murano, P.S. (2003)

Food Science

Multidisciplinary

- Chemistry
- Physics
- Analysis
- Microbiology
- Processing
- Engineering



Agriculture-Food Science-Nutrition



Have plenty of vegetables and fruits

Eat protein foods

Make water your drink of choice

Choose whole grain foods



Pioneers in Food Science



Food Science discoveries

Canning

- Nicholas Appert
 - French confectioner
- In 1795, Napoleon offered 12,000 francs for a new way of preserving food.



Nicholas Appert
(c.1806)

Food Science discoveries

Canning

- Nicholas Appert
 - French confectioner
- In 1795, Napoleon offered 12,000 francs for a new way of preserving food.
- 1st prize!
 - by placing food in bottles, corking them, and then heating the bottles in a water bath.



Nicholas Appert
(c.1806)

Food Science discoveries

- Nicholas Appert discovered : Heat processing **results in** longer shelf life and initiated the **canning** technology.



Can of “roast veal” (c. 1824)



19th century can of soup (c.1856)

Food Science discoveries

Observation



In the 1900s, Clarence Birdseye

- On an expedition in Labrador for the U.S. Geographic Service
- Fish meat **exposed** to the Arctic air was still tender and fresh tasting even when cooked months later.
- Common freezing methods at that time did not result in a high-quality product

The secret lay in rapid freezing at extremely low temperatures.

Food Science discoveries

Conclusion

Rapid freezing of fish in extremely low temperatures preserved the quality of fish much better than the conventional freezing method



Clarence
Birdseye

Food Science discoveries

- *Other discoveries?*

Food Science discoveries

- *Other discoveries?*
 - UHT & Tetra Pak
 - HTST pasteurization
 - Freeze drying (space foods!)
 - Instant noodles, instant pudding
 - Dehydrated foods
 - Vacuum packaging
 - Spreadable margarines ...

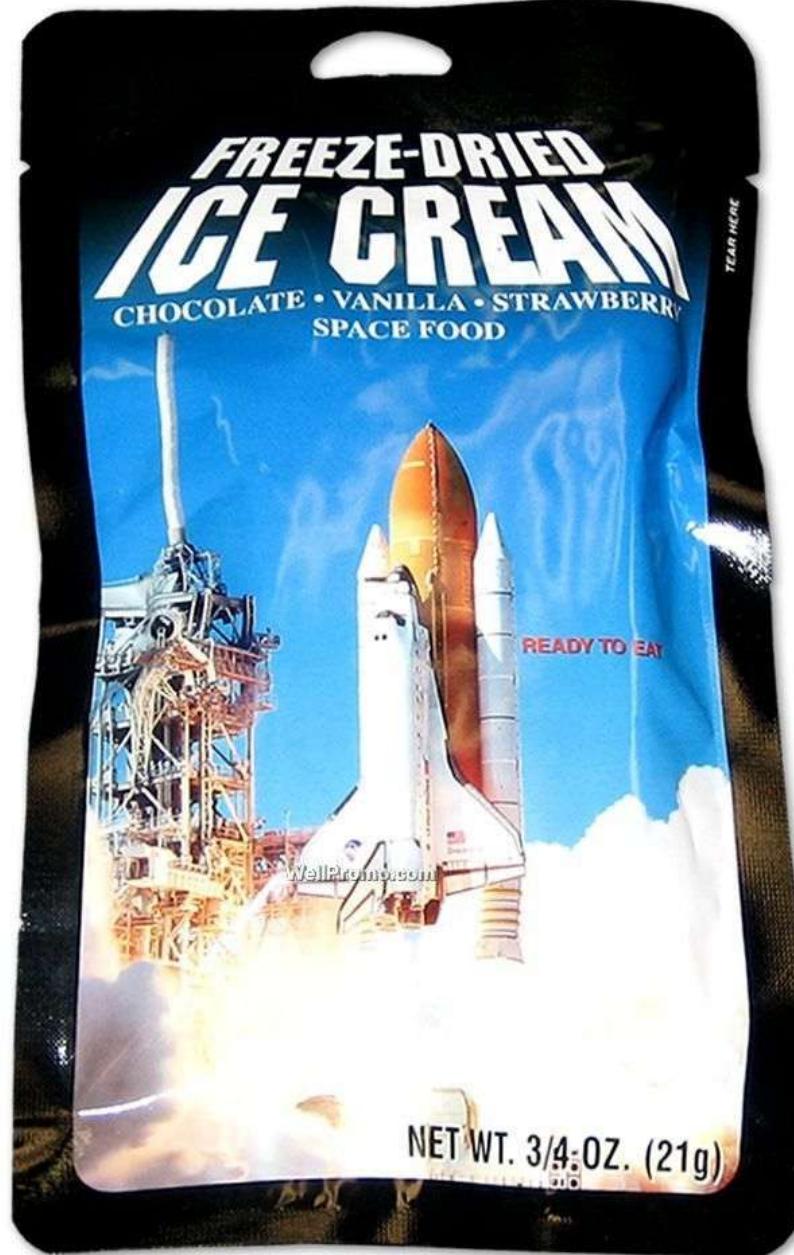
Please watch these videos and comment on the discussion board (Discussion forum)

Video Time...(5 minutes)

[World-Without-Food-Science. \(1.29 min\)](#)

[Day-In-The-Life/Michele-Perchonok \(3.38 min\)](#)

[Day-In-The-Life/Fuhung-Hsieh \(3.39 min\)](#)



Canadian Food System



Canadian Food System

- 3 meals/day = 1095 meals/year
- Total annual value of product shipment by the food manufacturing industry in Canada is approximately **\$123 billion**
- Canada was the 10th largest exporter of value-added processed packaged food and seafood products at a total value of Can\$48.0 billion in 2022

The Canadian Food Industry

- Size and Scope

- How does the food industry contribute to the Canadian economy?
- What is the relative value of different commodity types?

Food Expenditure

<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1110012501>



Canada

Average expenditure per household

Food expenditures, summary-level categories	2015	2016	2017	2018	2019	2021
Dollars						
Food expenditures 7	8,629	8,784	8,968..	10,311	10,305	
Food purchased from stores	6,126	6,176	6,364..	7,536	8,065	
Bakery products	574	578	588..	687	698	
Cereal grains and cereal products	341	347	360..	420	464	
Fruit, fruit preparations and nuts	755	781	795..	930	1,030	
Vegetables and vegetable preparations	710	718	787..	974	967	
Dairy products and eggs	903	888	914..	1,049	1,161	
Meat	1,194	1,163	1,165..	1,481	1,517	
Fish and seafood	213	203	219..	274	305	
Non-alcoholic beverages and other food products	1,437	1,499	1,536..	1,721	1,923	
Food purchased from restaurants	2,502	2,608	2,604..	2,775	2,189	
Restaurant meals	2,222	2,303	2,284..	2,458	1,963	
Restaurant snacks and beverages	281	305	320..	316	226	

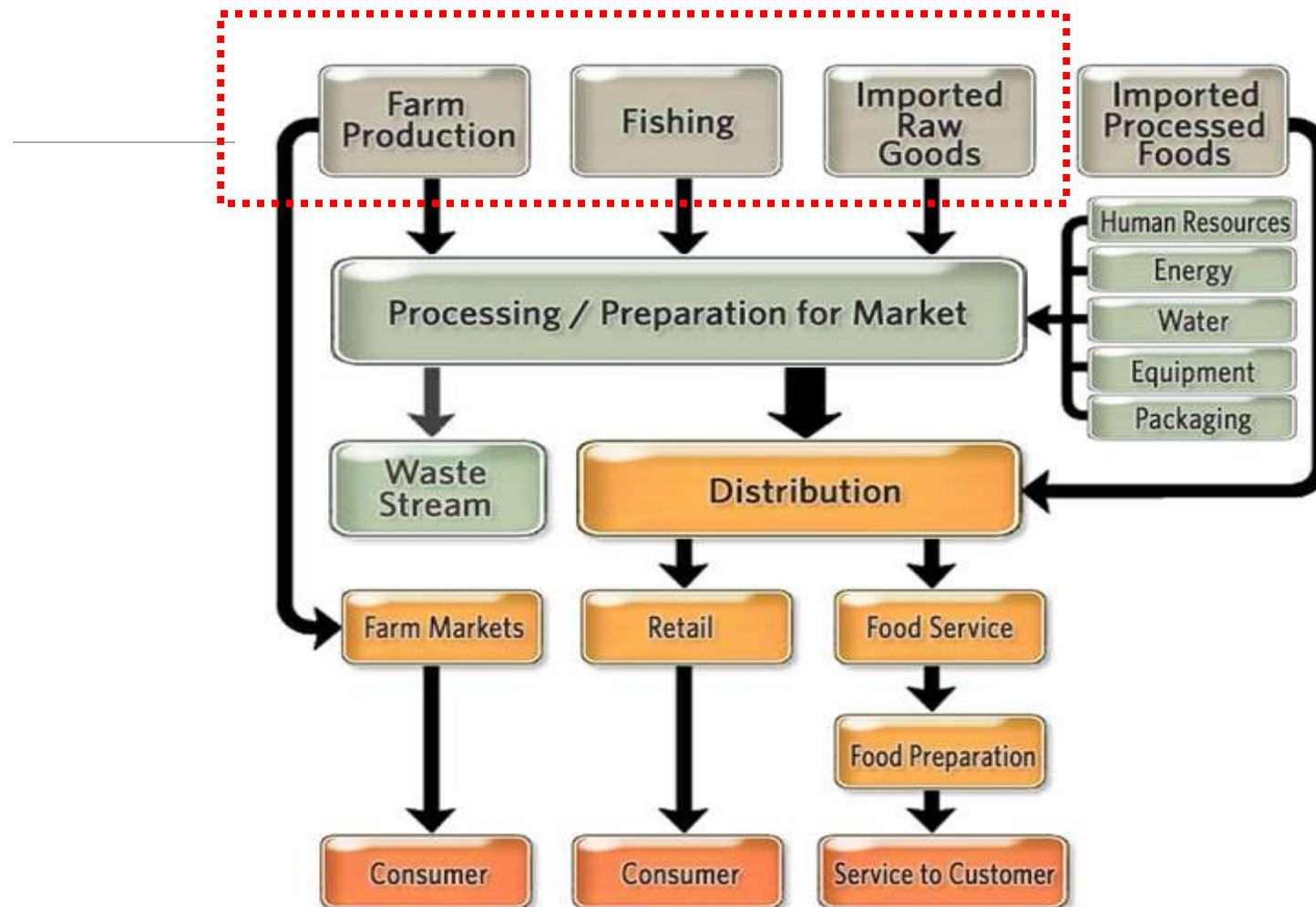
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British Columbia						
Average expenditure per household						
Food expenditures, summary-level categories	2015	2016	2017	2018	2019	2021
	Dollars					
Food expenditures 7	9,168	9,139	9,734..		10,639	11,341
Food purchased from stores	6,491	6,359	6,760..		7,553	8,208
Bakery products	561	497	516..		645	739
Cereal grains and cereal products	398	360	437..		433	486
Fruit, fruit preparations and nuts	863	810	892..		938	1,071
Vegetables and vegetable preparations	772	800	937..		988	1,013
Dairy products and eggs	963	905	980..		1,133	1,226
Meat	1,142	1,245	1,147..		1,391	1,325
Fish and seafood	207	229	239..		235	245
Non-alcoholic beverages and other food products	1,585	1,512	1,611..		1,788	2,103
Food purchased from restaurants	2,677	2,780	2,975..		3,086	3,075
Restaurant meals	2,358	2,430	2,606..		2,724	2,828
Restaurant snacks and beverages	320	350	369..		363	247

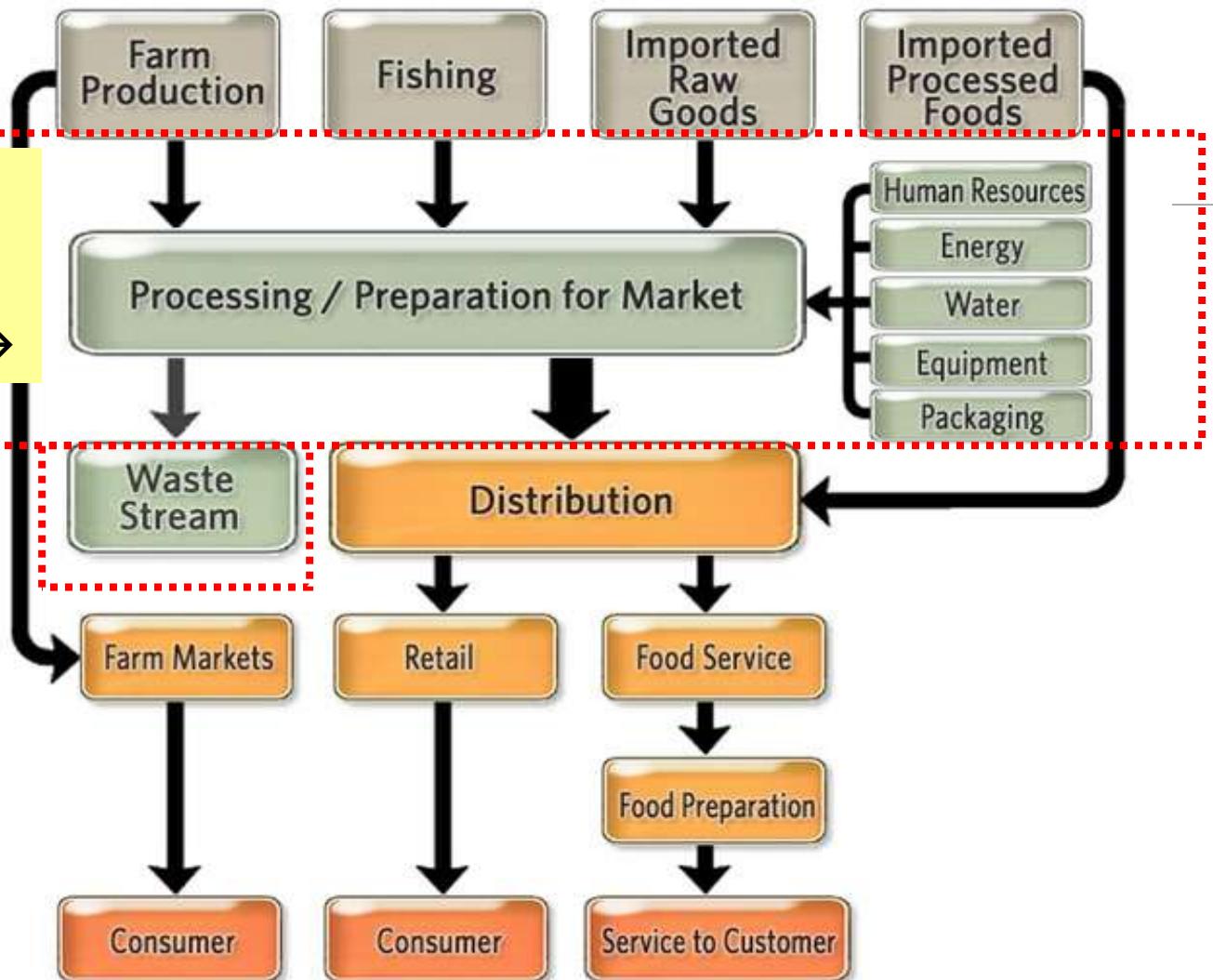
(1) primary agricultural production (in Canada or elsewhere)

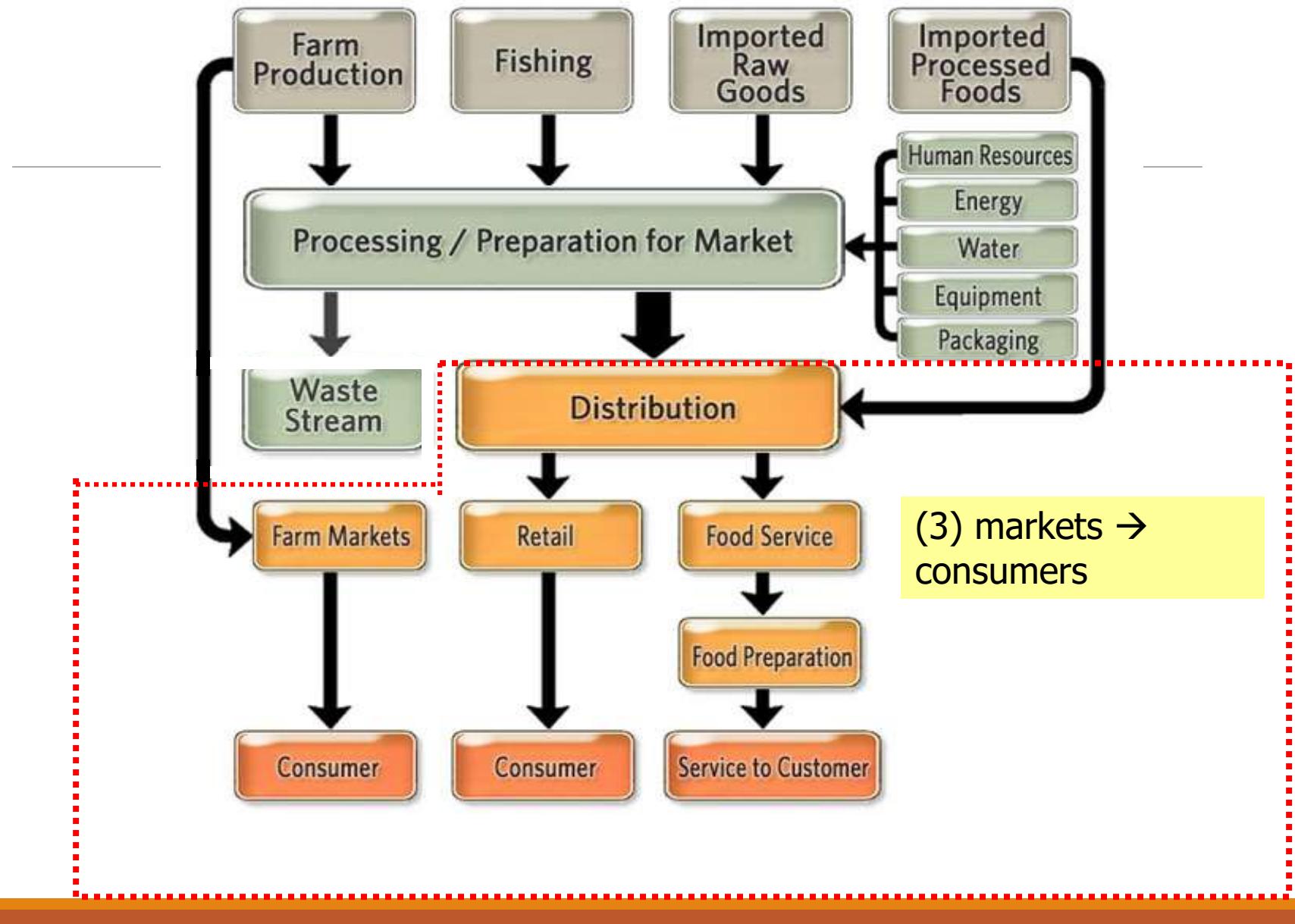


Primary production (agriculture) of raw materials in Canada

Food Commodity	Province
Animal (beef, poultry, pork)	
Dairy milk	
Cereals, grains	
Tree fruits; small fruits; berries (cran, rasp, blue)	
Vegetables	
Seafood	

(2) “post-farm gate” - apply principles of Food Science →





Food Processing

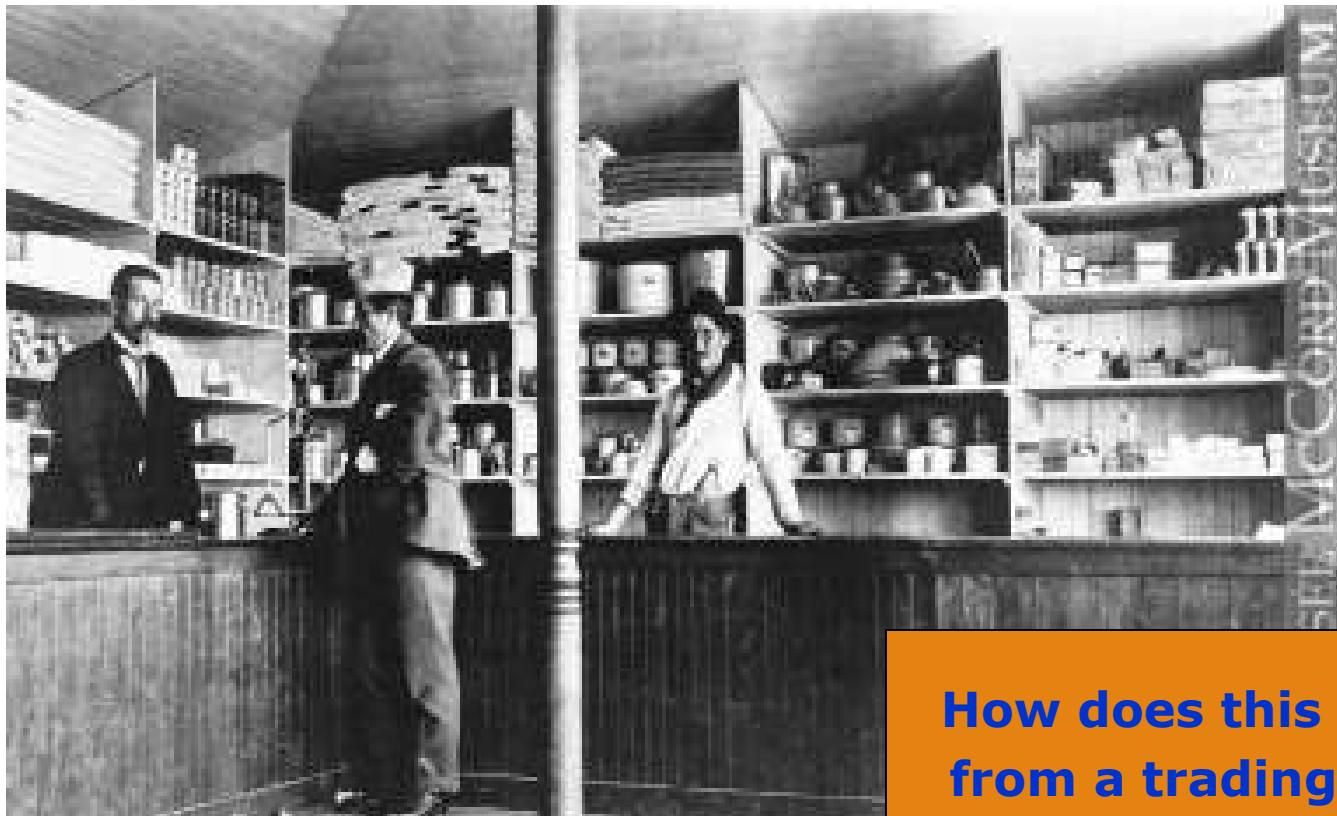
Some products are sold to consumers with **little processing**

- eg. **fresh fruits, vegetables**, and
- also available as processed products (eg
canned, dried, frozen, fermented,....)

Per capita food availability (Kg per person per year unless otherwise stated) Data corrected for the loss

Commodity	2019	2020	2021	2022	2023
Cereal	48.05	47.82	45.8	46.94	47.39
Sugar, Honey, Syrups	18.73	19.32	18.47	19.7	18.05
Pea nuts and tree nuts	5.17	5.31	5.19	4.99	4.9
Tea and coffee (Litre)	151.41	154.64	161.58	172.36	154.51
Alcoholic Beverages (Litre)	166.14	165.42	167.77	162.53	155.82
Soft drinks (Litre)	47.35	44.6	43.4	41.1	38.55
Cheese	11.76	12.05	12.2	11.94	11.73
Other Dairy Products	18.99	19.38	19.19	18.44	18.28
Fluid milk	44.68	44.8	42.82	41.17	40.02
Poultry (boneless weight)	39.19	38.2	38.06	38.9	38.88
Eggs	9.38	9.33	9.4	9.42	9.31
Red meat (boneless weight)	37.4	36.11	34.28	35.5	34.82
Butter, oil	17.84	17.96	18.07	17.02	16.49
Total fruit and preparations	62.98	62.28	63.72	60.96	57.61
Total Vegetable and preparation	48	47.56	46.72	45.14	43.73
Potatoes	57.95	58.1	62.19	55.71	57.35
Total seafood	5.4	5.05	4.82	5.03	4.7

Critical Thinking



How does this image from a trading store (ca. 1910) compare to a typical grocery store (supermarket) of today?

Most popular fruit in Canada

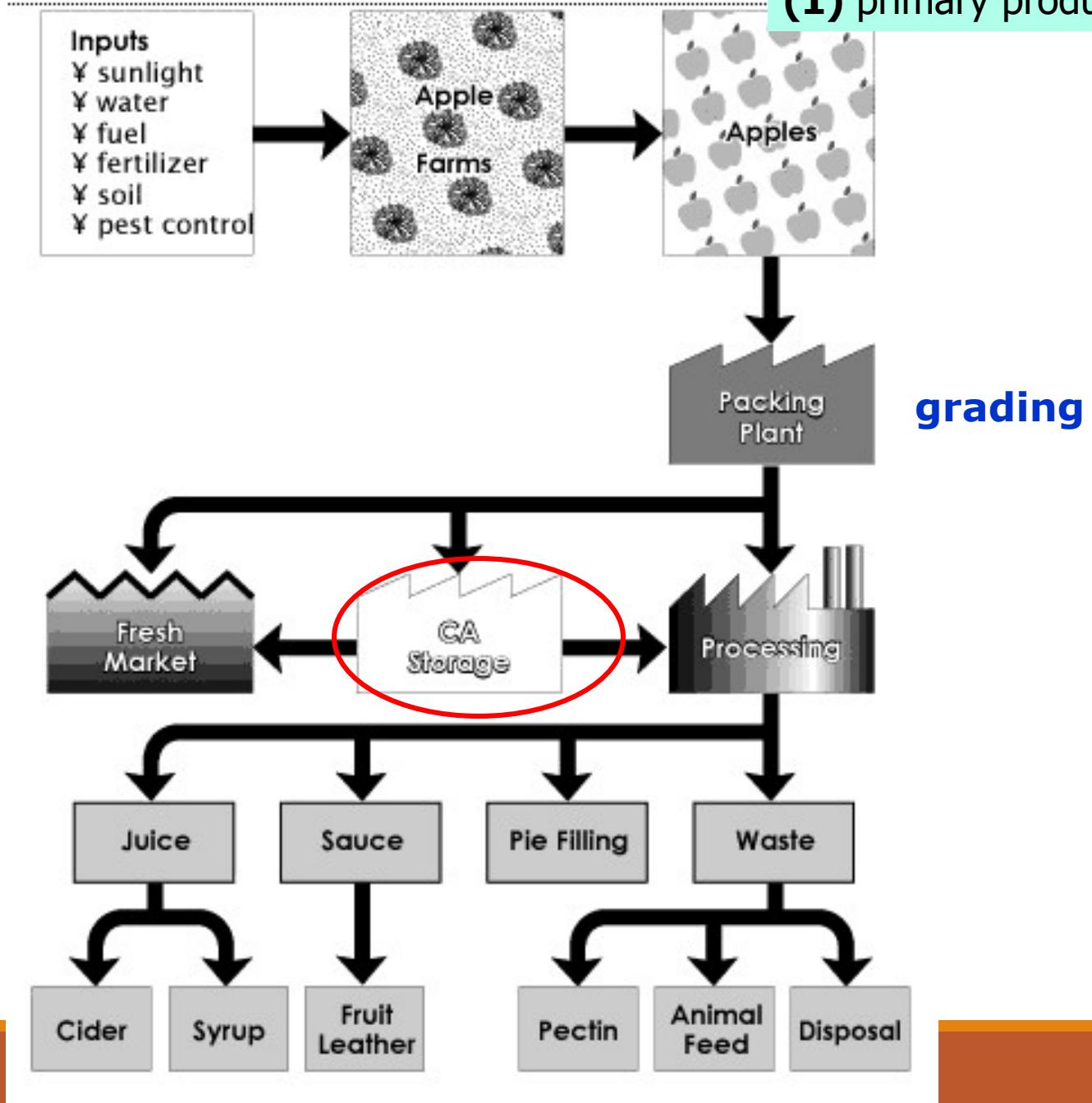
Most popular vegetable in Canada

Apple Processing



(1) primary production

Fig. 1.2



Controlled Atmosphere (CA) storage

- Slow down respiration rate & ripening process
(↓ senescence)
- Extending storage life (**for months**)
- Exact conditions depend on the type of fruit & variety (eg var. of apple)

Example of CA- storage:

McIntosh apples : optimal storage

1. Temperature (T) ($\sim 3^\circ\text{C}$)
2. Relative Humidity (RH) (87%)
3. Atmosphere (gases):

2.5% O₂ 2.5% CO₂ 95% N₂

After 6 weeks:

2.5% O₂ 4.5% CO₂ 93% N₂

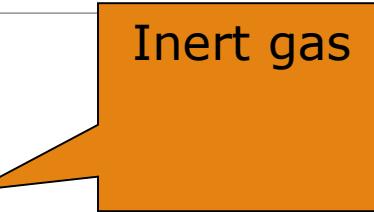
Up to 8 months in CA, vs
5 months in the air at optimum T and RH

Example of CA- storage:

McIntosh apples: optimal storage

CA-gases mixture:

2.5% O₂ 2.5% CO₂ 95% N₂

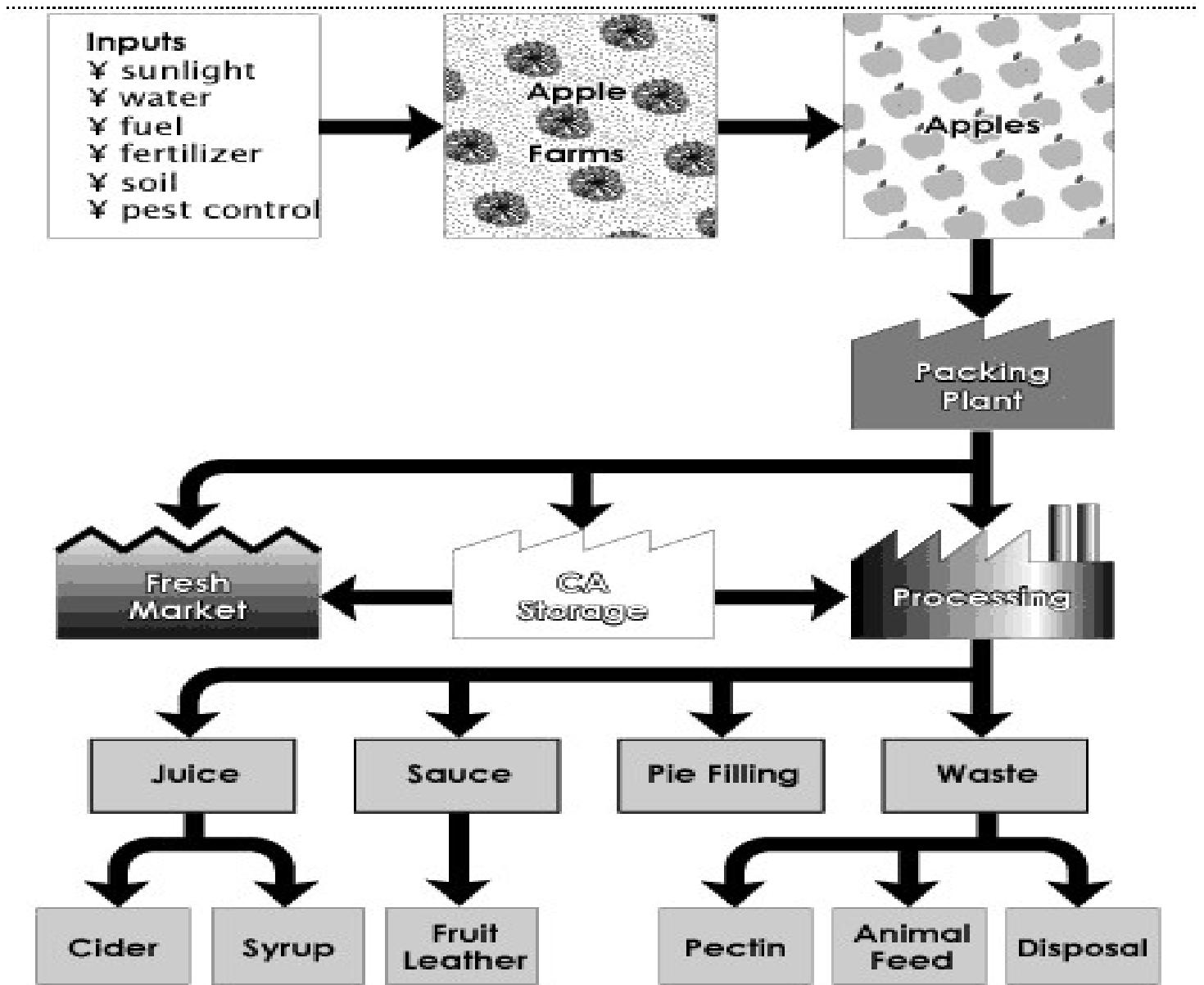


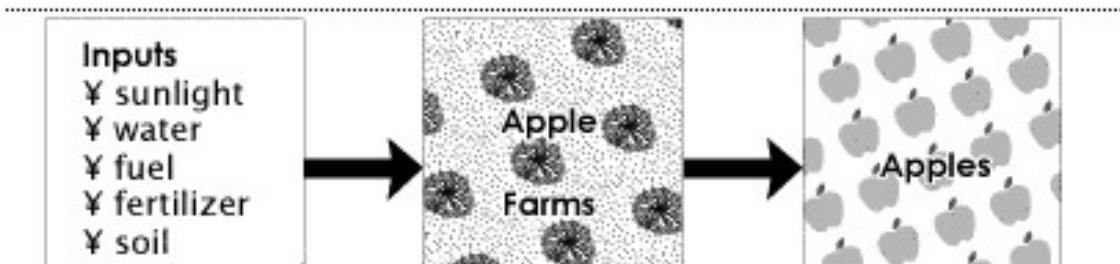
Inert gas

Atmospheric gasses:

21% O₂ 0.03% CO₂ 78% N₂





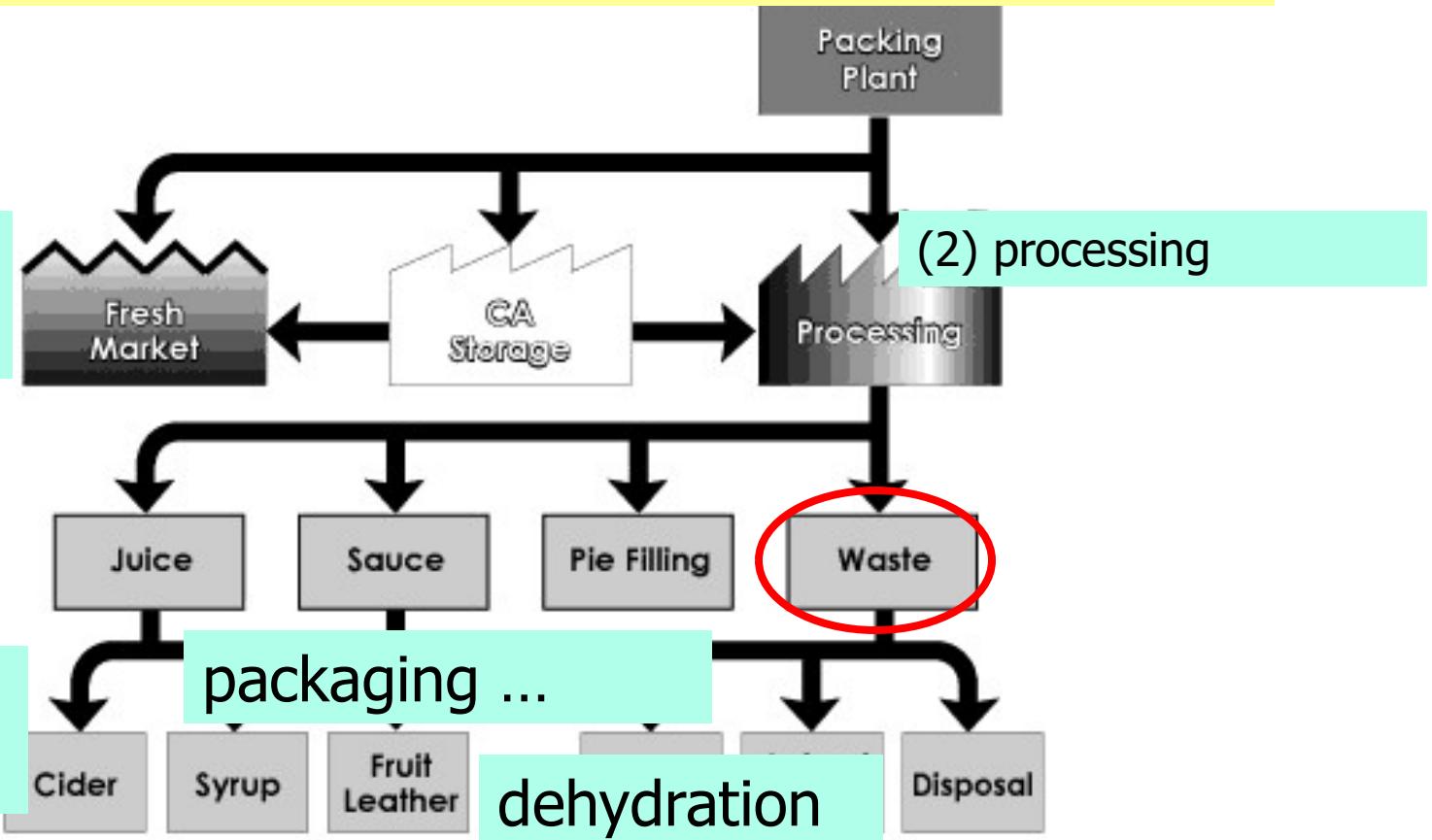


... Processing of Apples ... by application of Food Science

low temp
preservation

thermal
processing

fermentation
(biotechnology)



... Processing of Apples into:

- **Juice**

- usually pasteurized or
- Commercially Sterilized (in “*tetrapak*” boxes)
- starting material for production of **cider** (by yeast)
- and/or apple **vinegar** (by bacteria)



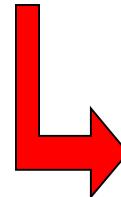
... Processing of Apples into:

- **Juice**



apple juice **Yeast** → ETOH + flavours
“**APPLE CIDER**”

Bacteria



Acetic acid
“**APPLE VINEGAR**”

... Processing of Apples into:

- **Apple Sauce, Pie Fillings**
- **Dehydrated Apple**
 - Slices, Fruit Leather,
 - Ingredient for confectionary products,
 - Breakfast cereals etc.



Fruit Leather

[HTTPS://WWW.SUNRYPE.CA/PRODUCT-CATEGORIES/PRODUCTS/81](https://www.sunrype.ca/product-categories/products/81)

... Processing of Apples into:

- “Fruit to go”
 - “100% Dried Fruit Snack”
 - **IMPORTANT: Look at**
 - Label- Information
 - Type of packaging



Critical Thinking

Identify a food that you enjoy.

**How do you think a food
scientist/technologist**

**would be involved in the production,
processing/preservation and marketing of
that food product?**

Critical Thinking

Make a list of questions you have about the science of foods. For example, why tomatoes are red, why gravy thickens, what is used to make "sugar-free" candy...

Save your questions and search for answers as you complete this course.

Trends in Food Consumption



Top trends to 2020 (Canada)

- 1.Aging Canadians
- 2.Food for Health
- 3.New face of Canada
- 4.Veggie Movement
- 5.Small Indulgences
- 6.Changing Meal Patterns
- 7.Evolving Society
- 8.Convenience
- 9.Educated Consumers
- 10.Shifting Expenditures

Critical thinking (Discussion)

By the end of 2026 which food category do you think will have the highest growth and why?



Top Trends for 2023

- 1. Resizing the Restaurant/Retail Gap**
- 2. Morphing Meal Patterns**
- 3. Sustainable Superstars**
- 4. Everyday Self-Care**
- 5. Gourmet Convenience**
- 6. Wraps & Rolls**
- 7. Urgent Care**
- 8. Technical Difficulty**
- 9. Event Makers**
- 10. The Parent Trap**

Next time you are in grocery store observe :

- Variety
- Shelf size
- Label







Terms to remember

- Food Science**
- Food Technology**
- Pioneers in Food Science and Technology**
- Highlights of Canadian Food Systems**
- Apple processing and storage**
- Food consumption highlights in Canada**

