BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Case studies in food risk assessments

Lorraine McIntyre
Food Safety Specialist

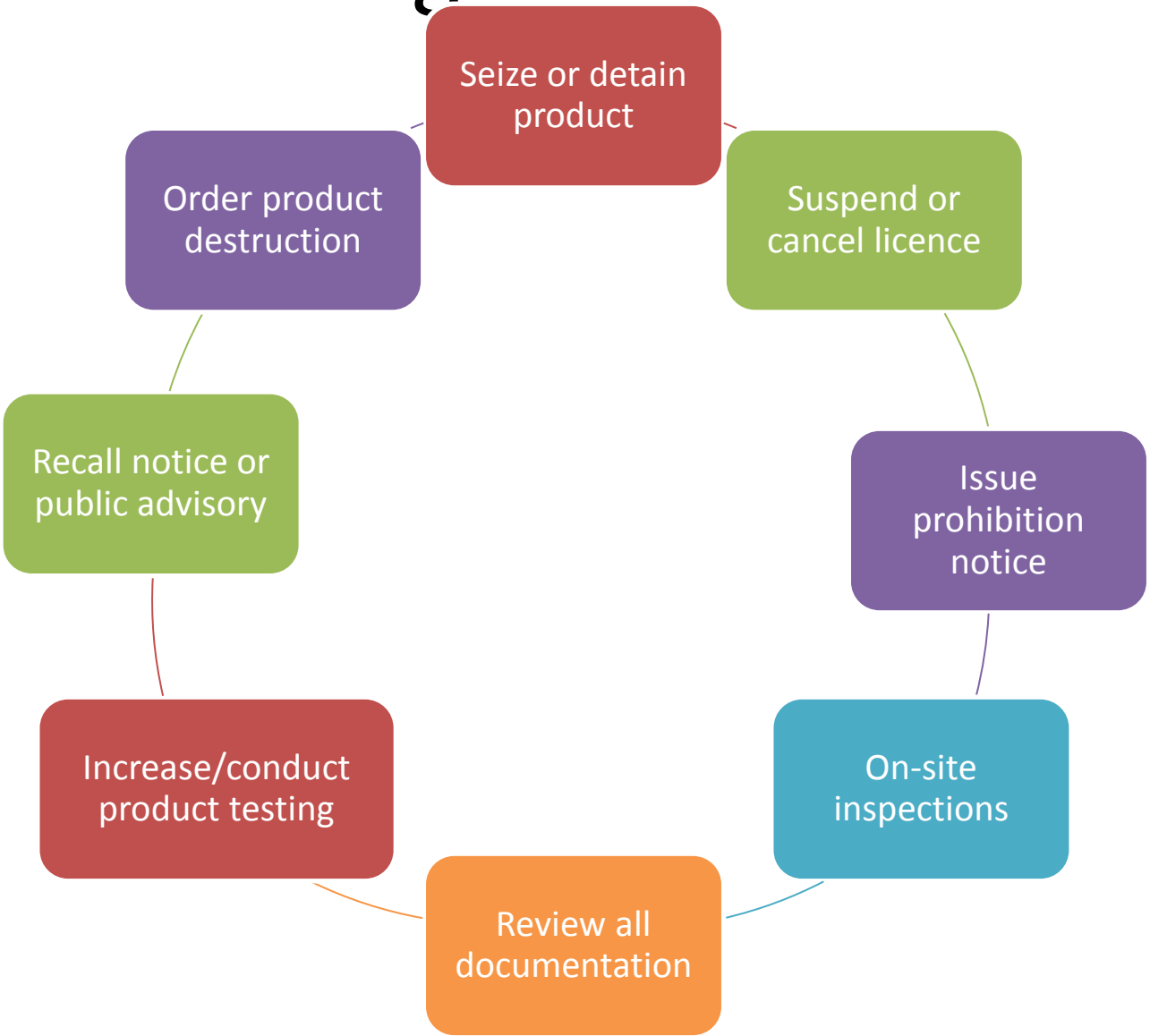
February 26, 2015

What you're going to learn today…

1. Quick review of risk analysis theory
2. Practical application, where to start
3. Case studies
   a) FM: Shelf-life of refrigerated partially dried pasta
   b) FM: Raw cocoa/carob chocolate
      - Commercial or Natural/Organic
   c) Bakery couche
   d) Sous vide eggs
   e) FM: Flax/sunflower oil

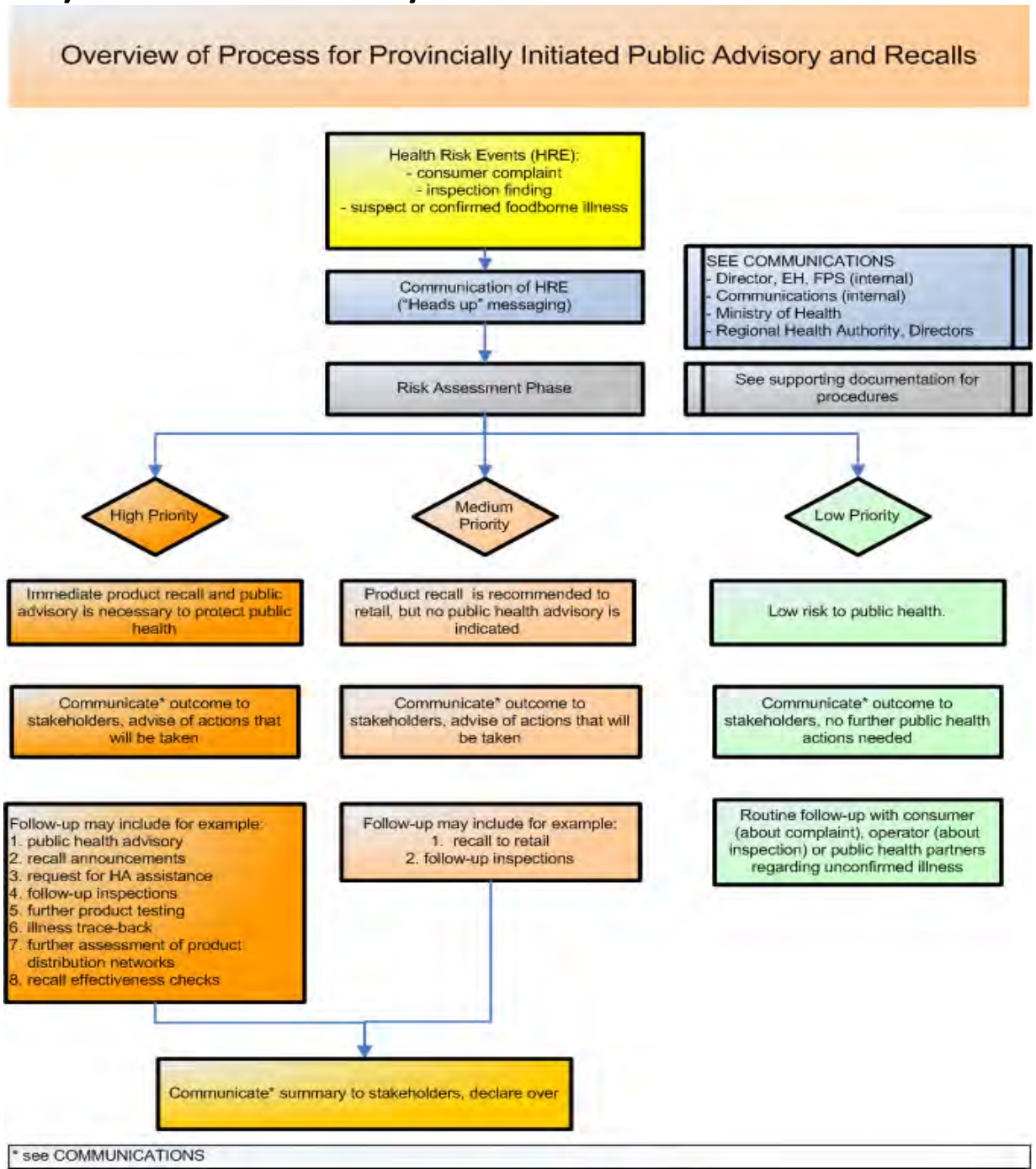
Risk Analysis

Risk management activities



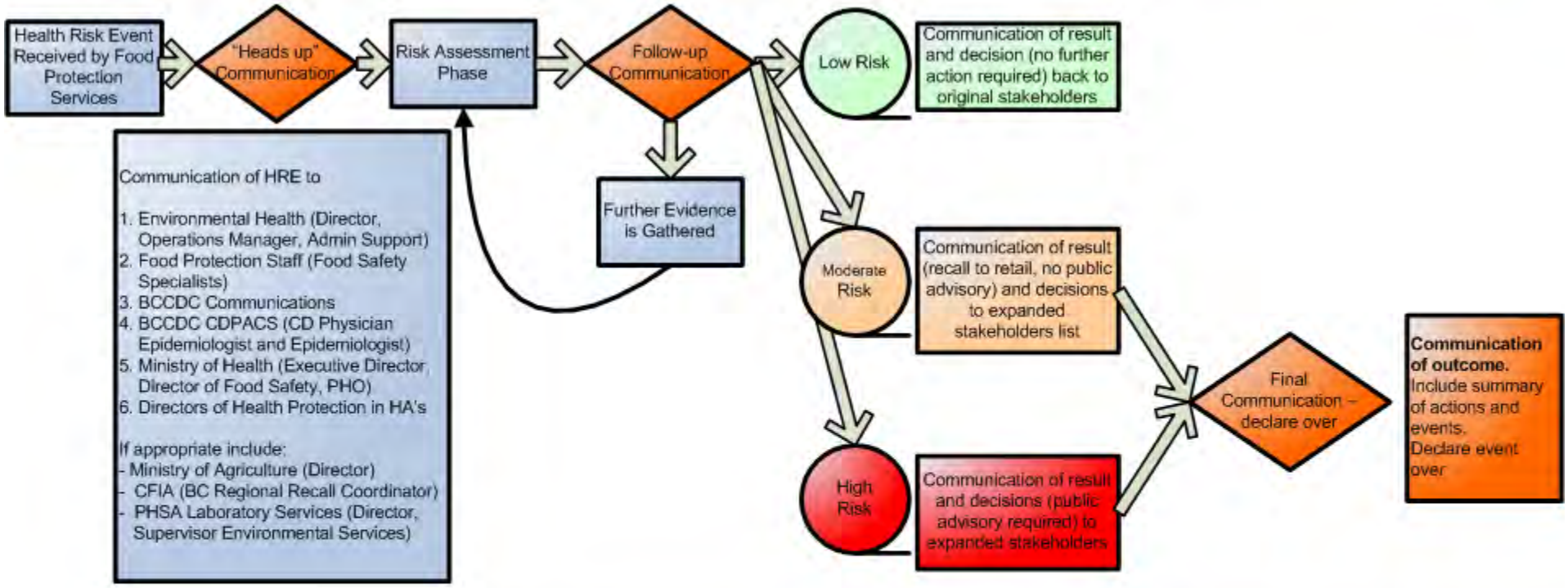
Risk communication activities

RISK ASSESSMENT / COMMUNICATION / MANAGEMENT OVERVIEW FOR RECALLS/PSAs



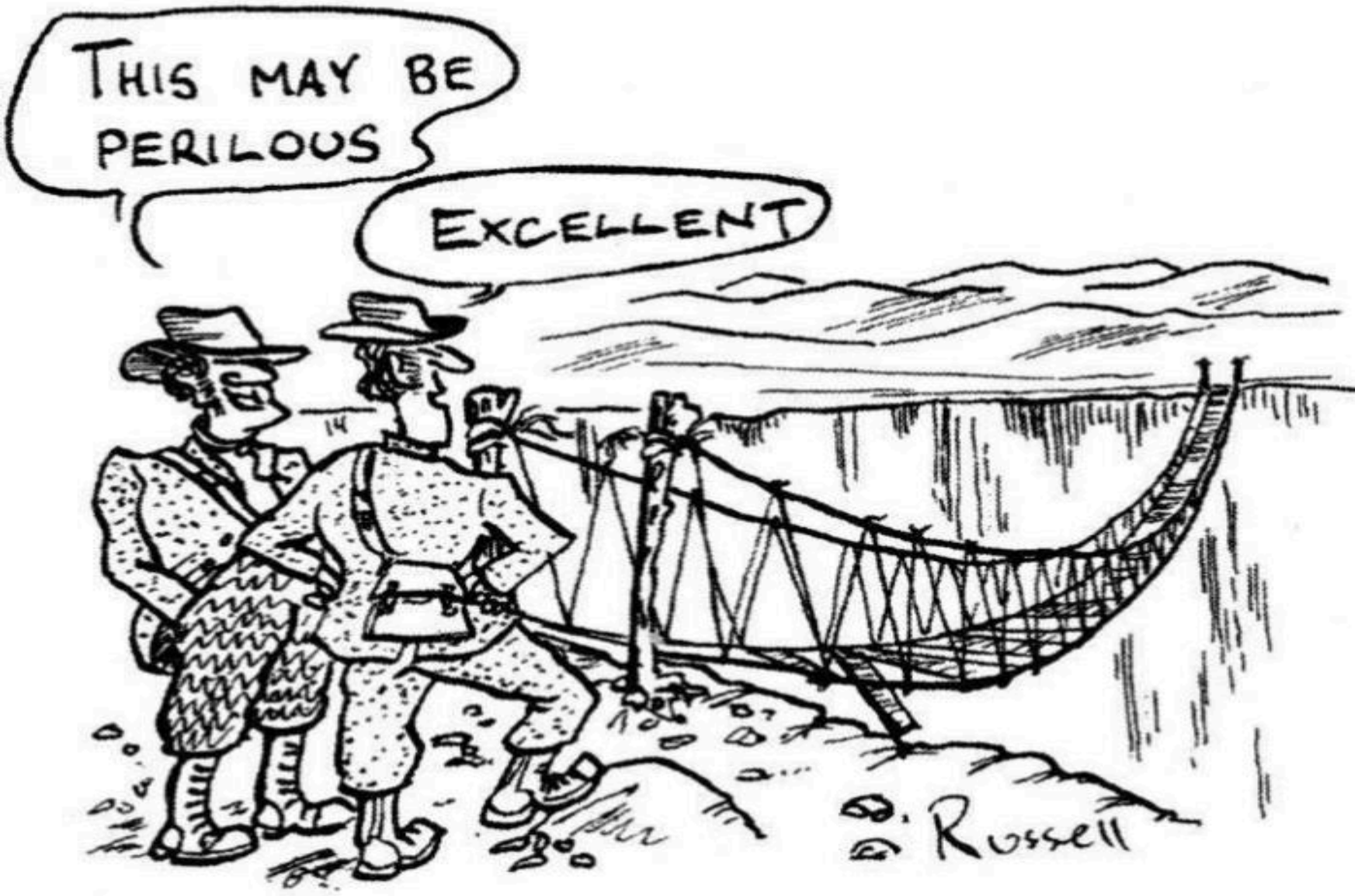
RISK COMMUNICATION PHASE

Communications during a Provincially Initiated Recall or Public Advisory



Communications Matrix – escalates depending on risk of HRE		
LOW RISK (green)	MODERATE RISK (tan)	HIGH RISK (red)
1. Environmental Health (Director, Operations Manager, Admin Support) 2. Food Protection Staff (Food Safety Specialists) 3. BCCDC Communications 4. BCCDC CDPACS (CD Physician Epidemiologist and Epidemiologist) 5. ministry of Health (Executive Director, Director of Food Safety, PHO) 6. Directors of Health Protection in HA's	7. CFIA (BC Regional Recall Coordinator) 8. Food Safety Contacts List If appropriate include: - Ministry of Agriculture (Director) - PHSA Laboratory Services (Director, Supervisor Environmental Services)	9. Canadian Food and Restaurant Association 10. Retail Council of Canada 11. Washington and Oregon States DOH 12. BC NurseLine, 811 13. Drug & Poison Information Centre If appropriate include: - Ministry of Agriculture (Director) - PHSA Laboratory Services (Director, Supervisor Environmental Services)

Victorian risk assessment



Risk Assessment Considerations

Collect background information

- Any history of FBI with this food in the past?
- Review literature & research available on product or food processing methods
- Identify standards for preparation of this food (if it exists) e.g., legislation, guidelines, laboratory testing, etc.
- Is this a novel or common food? Have we given advice on this in the past?
- What do your colleagues know?

Examine food properties

- Are food ingredients safe for consumption and from an approved source?
- Review the 3 categories of hazards
- Are any ingredients in the food potentially hazardous?
- Intrinsic factors (pH, Aw, antimicrobials, e.g. nitrite)
- Extrinsic factors (packaging, O2, storage temp and time)
- shelf-life, use in other foods

Examine food preparation

- Identify and assess food handling practices that contribute to risk
- Are hazards controlled (i.e., CCP in the process)?
- Is the food adequately processed to destroy &/or prevent growth of pathogens?
- Are preservatives used?
- What are the critical limits?

Evaluate the evidence/ make recommendations

- Are there enough hurdles?
- Lab evidence: do counts meet guidelines? What additional tests are recommended?
- Do you have enough information about the food, food process to make an informed recommendation?

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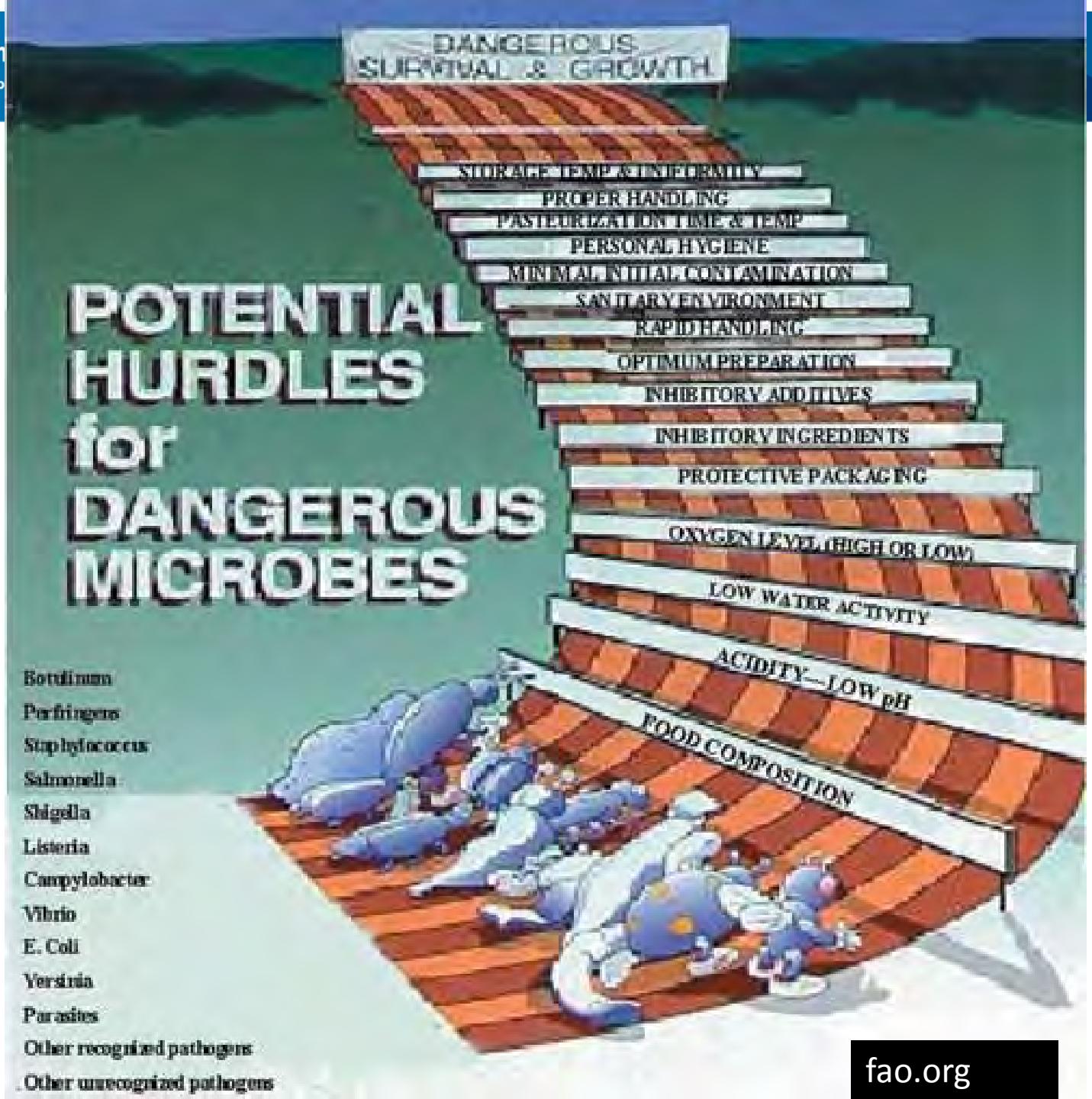

DANGEROUS SURVIVAL & GROWTH
STORAGE TEMP & INTEGRITY
PROPER HANDLING
PASTEURIZATION TIME & TEMP
PERSONAL HYGIENE
MINIMAL INITIAL CONTAMINATION
SANITARY ENVIRONMENT
RAPID HANDLING
OPTIMUM PREPARATION
INHIBITORY ADDITIVES
INHIBITORY INGREDIENTS
PROTECTIVE PACKAGING
OXYGEN LEVEL (HIGH OR LOW)
LOW WATER ACTIVITY
ACIDITY—LOW pH
FOOD COMPOSITION
POTENTIAL HURDLES for DANGEROUS MICROBES
Botulinum
Perfringens
Staphylococcus
Salmonella
Shigella
Listeria
Campylobacter
Vibrio
E. Coli
Yersinia
Parasites
Other recognized pathogens
Other unrecognized pathogens

fao.org

start by collecting some data

- EASY: google search and google scholar
- HARDER: OVID / PubMed [define search criteria & hits]
- Search books; specific journals; government/organizational authorities
- Talk to colleagues, e-mail authors in the field

The question:

Is there any information on shelf stability for typical fresh and partially dried pasta products?

http://betterwithbutter.com/pasta-procrastination/

Ingredients in pasta[1,2]

- Flour (semolina, farina, wheat flour)
- Water
- Eggs (sometimes)

Hazards in these ingredients[3]

- *Salmonella*
- *Staphylococcus aureus*
- Spoilage moulds

1. University of Illinois Extension Service. Making fresh pasta. In: U.S. Department of Agriculture, editor. p. 1-3.
2. Pasta. 2013 [cited 2013 Sep 20]; Available from: http://www.madehow.com/Volume-2/Pasta.html
3.ICMSF Members. Microbial ecology of food commodities. 2nd edition. ed. Roberts TA, Pitt JI, Cordier JL, Gram L, Tompkin RB, Gorris LGM, et al., editors. New York: Kluwer Academic/Plenum Publishers; 2005.

What else do you need to know?

- A_w – water activity [3,4]

Fully Dried Pasta	Partly Dried Pasta	Fresh Pasta
A_w = 0.4 to 0.6 [6]	…in between…	A_w = 0.92 to 0.99 [3,4]
Shelf-stable room temperature	? …check blog sites…	Refrigerated 2 to 3 days Longer if preservatives added [5]

4. Costa C, Lucera A, Mastromatteo M, et al. Shelf life extension of durum semolina-based fresh pasta. International Journal of Food Science & Technology. 2010;45(8):1545-51.
5. Del Nobile MA, Di Benedetto N, Suriano N, et al. Use of natural compounds to improve the microbial stability of Amaranth-based homemade fresh pasta. Food Microbiology. 2009;26(2):151-6.
6. Vahavipe. Barrier paper container - foods. 2004 [cited 2013 Sep 23]; Available from: http://81.209.16.114/Aineistopankki/PDF/Dry%20Foods/pasta.pdf.

What else was found?

- Very little documentation on best practices for partially dried pasta;
- Room temperature drying a risk for growth of *Salmonella* and heat stable *S. aureus* enterotoxin;[3]
- Commercial pasta dried ≥55°C;[2]
- Moisture resorption an issue; spoilage from mould/bacteria; pH drops from spoilage; coliforms increase after 3-4 days[3,5]
- Water activity more important than temperature for controlling moulds.[7]
- CFIA says the manufacturer must establish the shelf-life[8]

7. Sautour M, Soares Mansur C, Divies C, et al. Comparison of the effects of temperature and water activity on growth rate of food spoilage moulds. J Ind Microbiol Biotech. 2002 2002/06/01;28(6):311-5.
8. Canadian Food Inspection Agency. Food safety practices guidance for fresh non-filled alimentary paste manufacturers. 2013 [cited 2013 Sep 20]; Available from: http://www.inspection.gc.ca/food/safe-food-production-systems/haccp-generic-models-and-guidance-documents/guidance-non-filled-alimentary-paste/eng/1364412028942/1364414870197?chap=0#s11c5

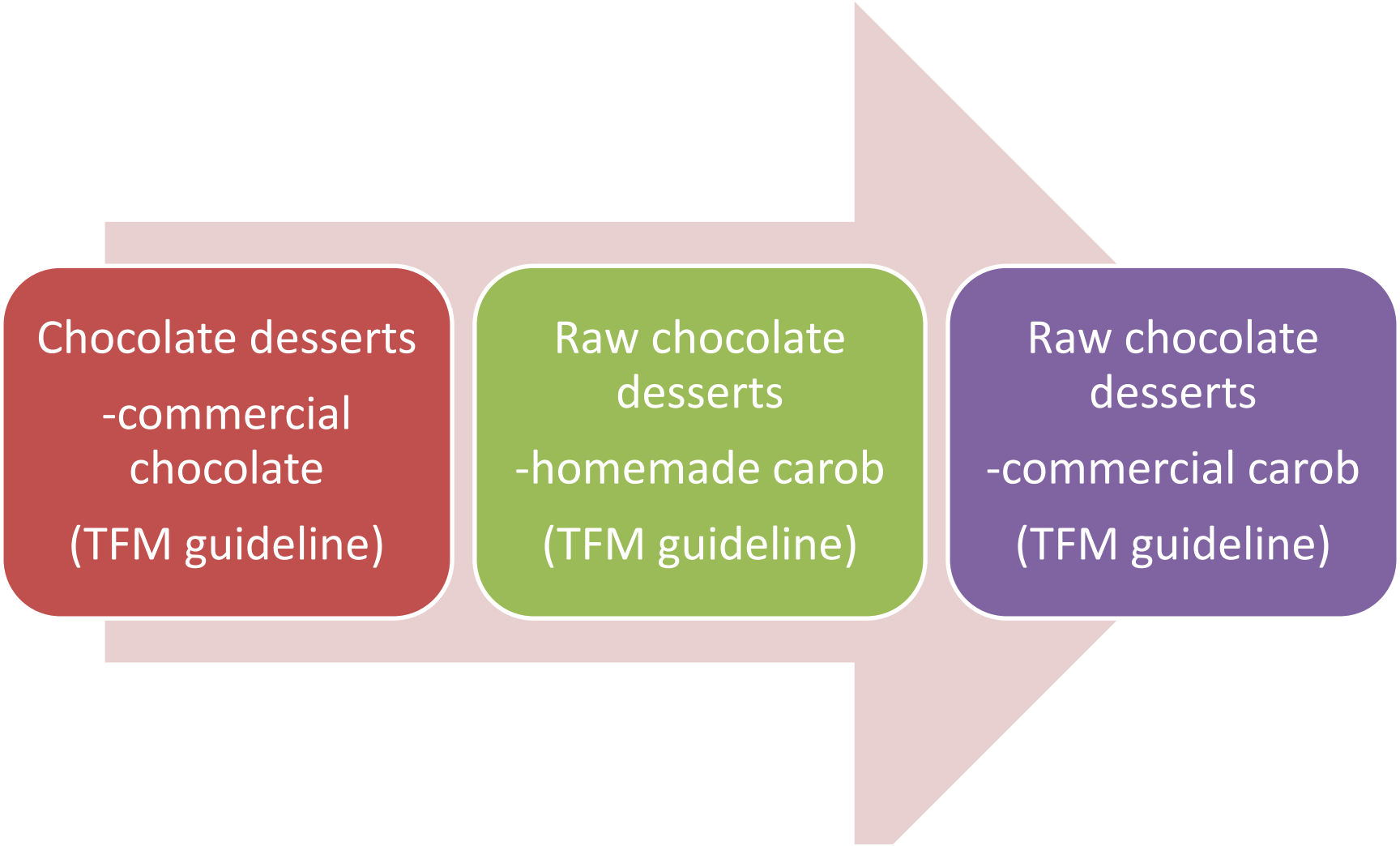
(evaluate evidence) →Recommendations

- Measure the A_w
  - < 0.6, store RT for several months
  - > 0.6, store refrigerated for one week (7 days)
    - Refrigeration prohibits growth of moulds, spoilage bacteria
    - Test coliforms of pasta, at 0, 7 and 14 days to establish shelf-life if hold longer than one week
- Dry above 55°C to prohibit growth of bacteria
- Use pasteurized eggs to control for *Salmonella*
- Proper hygiene (& past. eggs) to control for *S. aureus*

The question:

Can raw food desserts be made with raw cocoa/carob for sale in farmers' markets?

http://michaelarthurfood.com/category/sweet-dishes/raw-brownie/


Chocolate desserts
-commercial chocolate
(TFM guideline)
Raw chocolate desserts
-homemade carob
(TFM guideline)
Raw chocolate desserts
-commercial carob
(TFM guideline)
Sep 10, 2013
Sep 25, 2013
Mar 21, 2014

Guidelines prior to 2014

Appendix 1 listing:

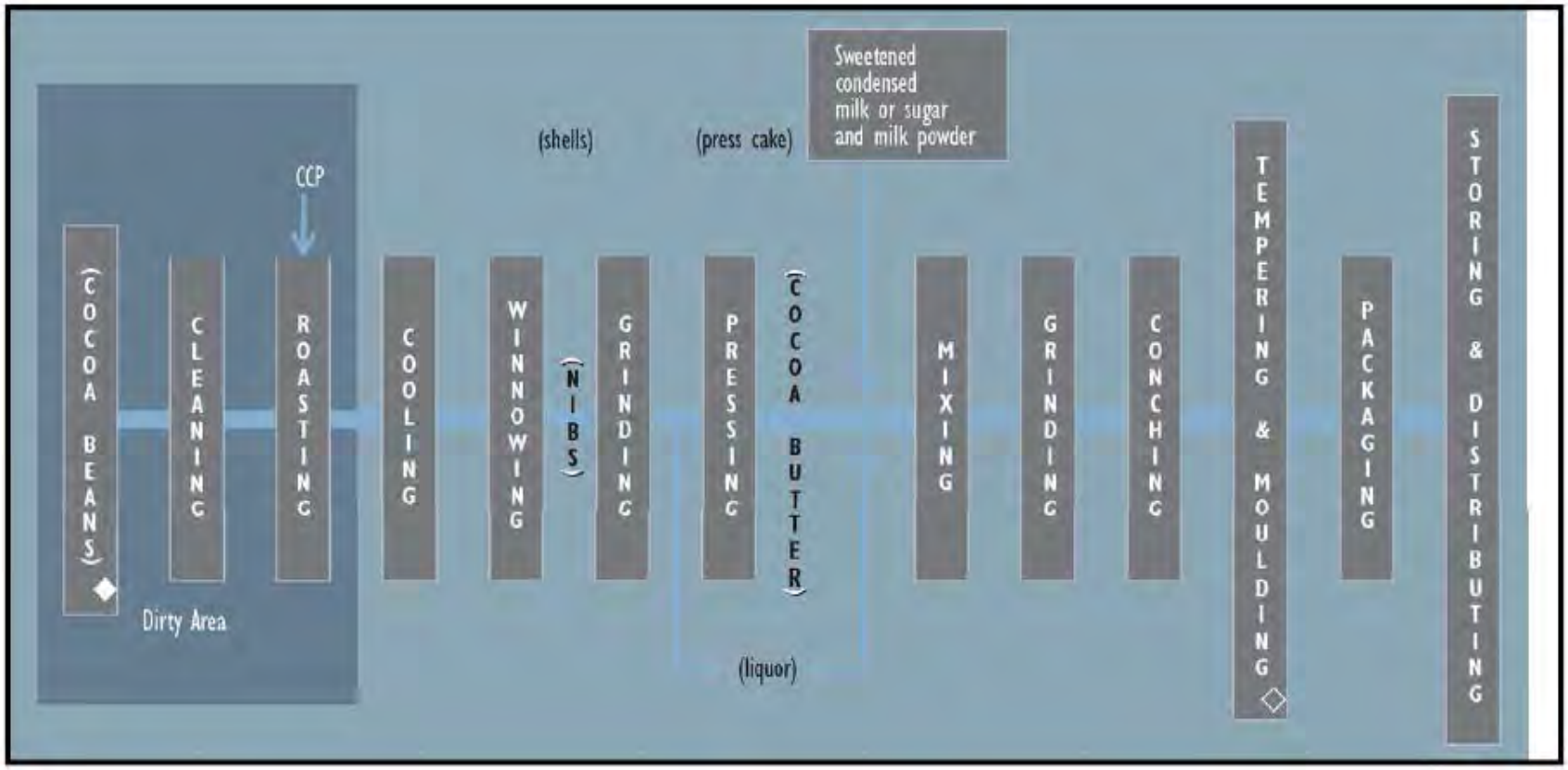
chocolate (provided it is used as an ingredient in a food that has undergone cooking to at least 71°C (160°F)

Guidelines in 2014

Appendix 1 listing:

chocolate (provided it is used for re-melted or re-molded products only and (1) not purchased from bulk bins; (2) sourced from a chocolate manufacturer that can provide a certificate of assurance that chocolate is free from *Salmonella).*

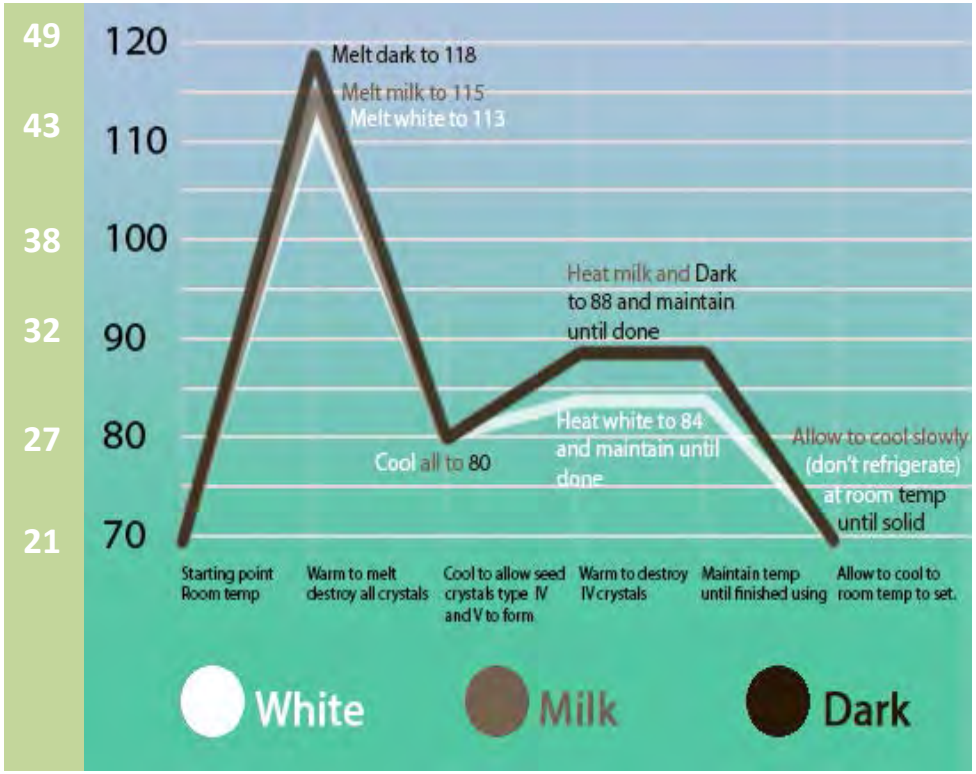
HACCP and process overview for milk chocolate manufacture



National Confectioner's Association, www.candyusa.com/files/CocoaChocolateGMPs.pdf

Chocolate manufacturing facts:

- Water activity low, between 0.37 to 0.5 (low moisture food) [3,5]
- D-value during conching, 1292 min (approx one day) at 60°C to 584 min at 50°C [3]
- In the majority of outbreaks, contaminated cocoa seeds, and a failure to control *Salmonella* during roasting occurred.[4-6]



thecookinggeek.com

3. Nascimento MdSd, Brum DM, Pena PO, et al. Inactivation of Salmonella during cocoa roasting and chocolate conching. International Journal of Food Microbiology. 2012;159(3):225-9.
4. Cordier JL. HACCP in the chocolate industry. Food Control. 1994;5(3):171-5.
5. Podolak R, Enache E, Stone W, et al. Sources and Risk Factors for Contamination, Survival, Persistence, and Heat Resistance of Salmonella in Low-Moisture Foods. Journal of Food Protection. 2010;73(10):1919-36.
6. Beuchat LR, Komitopoulou E, Beckers H, et al. Low Water Activity Foods: Increased Concern as Vehicles of Foodborne Pathogens. Journal of Food Protection. 2013;76(1):150-72.

Recommendations for commercial chocolate:

- Chocolate sourced from reputable suppliers with certificates stated product tested and found free of *Salmonella*
- Chocolate not purchased from bulk-food bins
- Hygienic control in the process, education of operators
- Melted and re-molded chocolate CANNOT be re-molded again, but could be used in baked products
- Reword the TFM guidelines

Back to the original question:

Can raw food desserts be made with raw cocoa/carob for sale in farmers' markets?

http://michaelarthurfood.com/category/sweet-dishes/raw-brownie/

Carob - *Ceratonia siliqua* [1]

- Chocolate substitute
  - Low caffeine
  - Low theobromine
- Made from beans[2]
  - "locust" beans, also used to make a food gum

http://publicphoto.org

Food process[2,4]

1. Wikipedia. Ceratonia siliqua. 2013 [cited 2013 Oct 16]; Available from: http://en.wikipedia.org/wiki/Ceratonia_siliqua.
2. Savarino G, Barbagallo RN. Carob processing in Sicily: technological aspects and products. Industrie Alimentari. 2009;48(496):36-45.
4. Yousif AK, Alghzawi HM. Processing and characterization of carob powder. Food Chemistry. 2000;69(3):283-7.

What else was found?

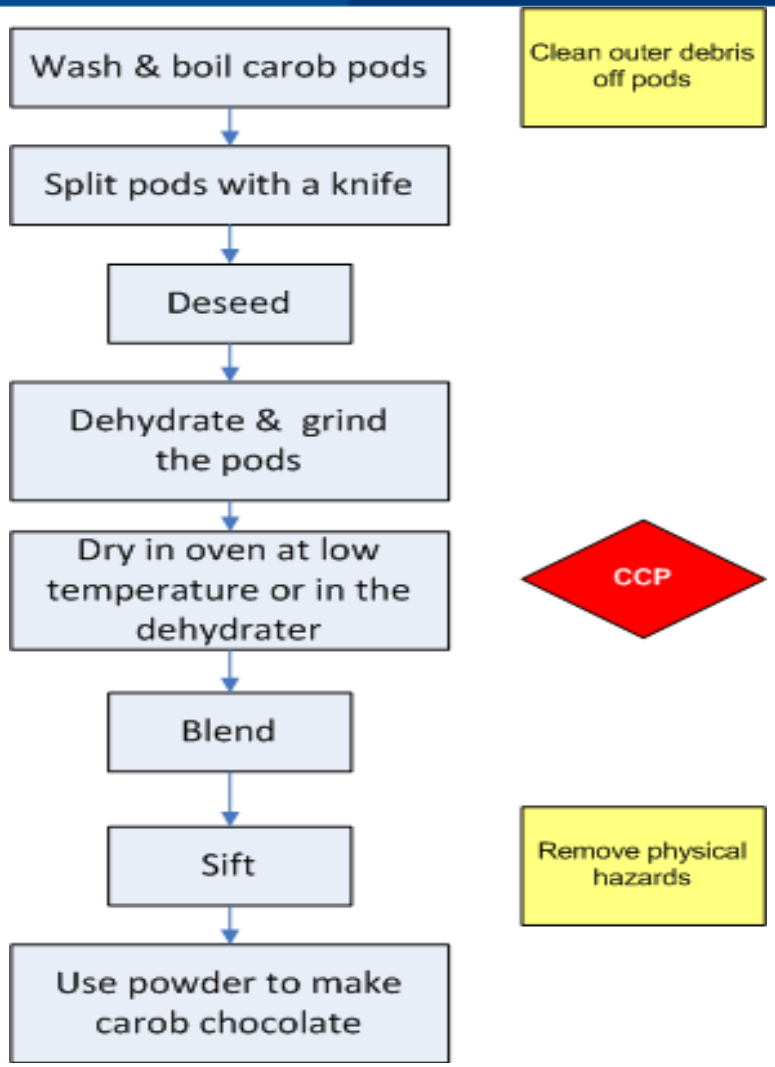
- no outbreaks/illnesses / no Cdn recalls
- Roasting reduces the pH of the pods from pH=6.0 to pH=4.8[4]

HAZARDS (infer from cocoa processing)

Physical [3]	Chemical [3]	Biological
Stones	Mycotoxins	*Salmonella* [5-9]
Metals / woods	Aflatoxins	VTEC [10-11]
	Allergen? Tree-nut	*B. cereus* cereulide [12]

3. Laughter J, Brown DB, Anantheswaran RC. Manufacturing Chocolate for Entrepreneurial Endeavors. Specialty Foods: CRC Press; 2012. p. 157-98. Available from: http://dx.doi.org/10.1201/b12127-8.**5**. Jasson V, Baert L, Uyttendaele M. Detection of low numbers of healthy and sub-lethally injured Salmonella enterica in chocolate. International Journal of Food Microbiology. 2011;145(2–3):488-91. **6.** da Silva do Nascimento M, da Silva N, da Silva IF, et al. Enteropathogens in cocoa pre-processing. Food Control. 2010;21(4):408-11.;**7**. Torres-Vitela MR, Escartin EF, Castillo A. Risk of Salmonellosis Associated with Consumption of Chocolate in Mexico. Journal of Food Protection. 1995;58(5):478-81.; **8.** D'Aoust JY, Aris BJ, Thisdele P, et al. Salmonella eastbourne outbreak associated with chocolate. Canadian Institute of Food Science and Technology Journal. 1975;8(4):181-4.; **9.** Podolak R, Enache E, Stone W, et al. Sources and Risk Factors for Contamination, Survival, Persistence, and Heat Resistance of Salmonella in Low-Moisture Foods. Journal of Food Protection. 2010;73(10):1919-36.;**10**. Baylis CL, MacPhee S, Robinson AJ, et al. Survival of Escherichia coli O157:H7, O111:H− and O26:H11 in artificially contaminated chocolate and confectionery products. International Journal of Food Microbiology. 2004;96(1):35-48.;**11.** Kenney SJ, Beuchat LR. Survival, Growth, and Thermal Resistance of *Listeria monocytogenes* in Products Containing Peanut and Chocolate. Journal of Food Protection. 2004;67(10):2205-11.;**12.** Thorsen L, Azokpota P, Hansen BM, et al. Identification, genetic diversity and cereulide producing ability of Bacillus cereus group strains isolated from Beninese traditional fermented food condiments. International Journal of Food Microbiology. 2010;142(1–2):247-50.

Roasted Carob Powder Food Flow Process



blog site: http://www.instructables.com/id/How-to-Process-Carob/

(evaluate evidence) →Recommendations for home prepared raw carob

- Do not recommend using home-prepared raw carob powder without any roasting or heating step in the process
- Hygienic process (equipment and personnel), including washing & disinfecting pods before use
- Sift powder for physical hazards
- Caution for chemical hazards, inspect for moulds (mycotoxin/aflatoxin) / allergen issues

RAW FOOD
What if the raw carob powder was purchased commercially?

SunFoods stated that “the carob pod is air dried for no more than a few seconds, dependent upon the humidity, and the air temperature is between 122/140 F. The carob itself remains at a lower temperature than the air, it is not roasted or toasted”.

DATE
CUST ID
INV #
ORD #
LOT #
MFRG
EXP

Sunfood SUPER FOODS

Certificate of Analysis & Technical Data Sheet

PRODUCT Carob Powder, Organic, Raw
SKU #
SHELF LIFE 2 Years

ANALYSIS	SPECIFICATION/RESULTS	
Botanical Name	Ceratonia siliqua	
Origin	Italy	
Parts Used	Carob (Fruit) Pods	
Product Name	Carob Powder	
Solubility	Partially Soluable	
Presentation	Hygroscopic Powder	
PHYSICAL & CHEMICAL CHARACTERIZATION I		
Color	Brown / Light Coco	
Odor	Characteristic	
Taste	Characteristic	
Aspect/Appearance	Hygroscopic Powder (Fine)	
Added Ingredients	None	
PHYSICAL & CHEMICAL CHARACTERIZATION II		
pH	Conform	5.5
GMO Status	GMO FREE	Free from GMO's
Granulometry	80 Mesh	Conform
PHYSICAL & CHEMICAL CHARACTERIZATION III		
Moisture	%	2.6
Ash	%	2.9
Protein	%	3.8
Fat	g/100g	1
Saturated Fat	%	0
Trans Fat	%	0
Total Carbohydrates	g/100g	89
Dietary Fiber	%	159
Total Sugars	g/100g	49
PHYSICAL & CHEMICAL CHARACTERIZATION IV		
Organochlorine Pesticides	%	ND
Organophorphorrus Pesticides	%	ND
PHYSICAL & CHEMICAL CHARACTERIZATION V		
Total Plate Count	840	cfu / 1g
Mold	240	cfu / 1g
Yeast	< 20	cfu / 1g
Total Coliform	Negative	/ 1g
E. Coli	Negative	/ 1g
Salmonella	Negative	/ 25g
TOXICOLOGICAL ANALYSIS VI		
Aflatoxins	Negative / 50g	
VITAMINERAL ATTRIBUTES VII		
Vitamin A	IU	14
Vitamin C	mg/100g	0.2
Calcium	mg/100g	348
Iron	mg/100g	2.94
Potassium	mg/100g	827
Magnesium	mg/100g	54
PURPOSES VII		
Food Industry	Food / Food Consumption	
CHARACTERISTICS IX		
Please see FALCPA Annex for allergen information. Vitamineral & Nutritional Analysis available upon request. Individual TDS per Lot # updated for client based on Shipment		

**ND: Not Detected **TBD: To Be Determined based on Shipment Request

(evaluate evidence) →Recommendations for raw carob purchased commercially

Raw carob or cocoa purchased from a commercial supplier may still be higher risk than traditionally manufactured carob/cocoa

- …acceptable for use in products if vendors provide a COA from their suppliers. As with lower risk foods, all items must have pH <4.6 or A_w<0.85.

- Preparation of foods with raw carob and cocoa must be done with processes that minimize any amplification of existing hazards (e.g., *Salmonella*), …. sanitary and hygienic …no CCP downstream to …eliminate bacterial hazards

- We would further recommend consumer disclosure …and that market managers are aware of the labelling requirements for these products.

RAW FOODIE ISSUES

Each ***raw food application*** must be evaluated individually and include the following:

- ✓ Raw ingredients must be sourced from suppliers that can provide a COA that demonstrates all ingredients are free from pathogens of concern for that ingredient
- ✓ Raw ingredients must not be purchased from bulk bins
- ✓ Recipes including quantities and process steps must be written out. We recommend all applicants chart out the food flow in a diagram and create a food safety plan for food safety assessment.
- ✓ All process steps must be designed to limit amplification of potential bacterial hazards. Examples of process steps that increase likelihood of bacterial hazards multiplying in raw foods:
  - ✓ Soaking dry ingredients in water at temperatures above 4°C
  - ✓ Dehydrating raw food mixtures in the temperature danger zone: specifically between 4°C and 55°C
  - ✓ Not providing anaerobic conditions for lactic acid fermentation to occur properly

The question:

Is it an unsanitary practice when bakeries do not wash their proofing linens ?

Image: http://brickovenbaker.com/oven-and-baking-tools/bannetons/imported-professional-bakers-flax-linen-couche-32-x-34-inches

Bakery linen, or bakers couche[1,2,3]

- A product used for allowing bread dough to rise (forms a surface crust)

- FLAX LINEN – shouldn't be washed
  - Changes structure and performance
- COTTON CANVAS – should be washed
  - Flour and iron before re-use

http://www.bakerscouche.com/

Hazards with this "ingredient"/utensil[2,3]

- moulds

1. https://www.youtube.com/watch?v=hZAwSV1VakA
2. http://www.thefreshloaf.com/node/9713/caring-your-couche
3. http://cooking.stackexchange.com/questions/24524/what-happens-if-i-wash-my-bakers-couche

Top: couche, used for proofing shaped breads, 50 years old

Right: couche hanging up to dry at end of day

https://foodstartuphelp.blogspot.com

What else was found?

Lean Dough	Rich dough
Yeast Low fat	Yeast Eggs Oils Butter

- Linen couche used with lean dough only
- Bakeries traditionally do not use wet cleaning methods (wet flour=glue)
- No illnesses related to use of bakers couche were found

Summary of PubMed search information

PubMed: "foodborne illness" AND "bakery"=2 hits, not related to breads. "illness" AND "bread"=63 hits, 8 related to gastrointestinal illness and bread consumption, but none to baking equipment issues. [3 from food handlers (2 norovirus, 1 *Salmonella* Thompson); 3 from cross-contamination issues with eggs (all *Salmonella* Enterititis); 1 stuffed bread, agent not specified; 1 *S.* Typhimurium from cross contamination with chicken].

(evaluate evidence) →Recommendations

- Scrape down and dry both types of cloths between use
- Discard if visibly mouldy
- Flax linen couches should not be washed, but can be if required (blog sites differ)
  - Use only with lean dough (no eggs)
- Cotton canvas couches can be washed if needed, flour and iron before re-use

The question:

Is the sous vide cook process for shell eggs used by operator X acceptable?

http://vineelasiva.blogspot.ca/

Backgrounder to this question:

- 2 SE illnesses linked to premise
- Bakery items made with sous vide style cooked egg glaze
- Caesar salad made with raw shell eggs

Hazard assessment / what we know about SE:

- ~ 6.3 billion table eggs sold in Canada in 2005 (7 billion now?) [5]
- 1.7 million SE contaminated table eggs sold in Canada annually [6]
- estimation of annual SE illness reduction with egg pasteurization in the US [9]

None	3 log	5 log
130,000	41,000	19,000

- Vertical transmission from hen (81%); environmental transmission (19%). [1]
- Contamination in egg yolk interior as well as various layers of egg, cracks, condensation, and other factors allow pathogens in. [2,3]

2. De Buck J, Van Immerseel F, Haesebrouck F, et al. Colonization of the chicken reproductive tract and egg contamination by Salmonella. J Appl Microbiol. 2004;97(2):233-45.; 3. Messens W, Grijspeerdt K, Herman L. Eggshell penetration by Salmonella: a review. World's Poultry Science Journal. 2005;61(01):71-86. 5. Health Canada. Health Canada Guidance on Reducing the Risk of *Salmonella* Enteritidis in Shell Eggs Produced in Canada2013 Contract No.: September. Available from: http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/salmonella-enteritidis-eng.php.; 6. DeWinter LM, Ross WH, Couture H, et al. Risk assessment of shell eggs internally contaminated with Salmonella Enteritidis. International Food Risk Analysis Journal. 2011;1(1):40-81.; 9. Schroeder CM, Latimer HK, Schlosser WD, et al. Overview and summary of the Food Safety and Inspection Service risk assessment for Salmonella enteritidis in shell eggs, October 2005. Foodborne Pathog Dis. 2006 Winter;3(4):403-12.

Sous vide style cooking

Sous vide – (fr.) under vacuum

- LTLT
- Low temperature
- Longer times

Foods are

1. Vacuum-packaged,
2. Cooked, using either
   - Water bath = Immersion circulator
     - Water immersion circulator
     - Heating coil
     - Controller
   - Convection steam oven
   - ✗ Bain maries, dishwashers or hot tub not recommended!
3. Finished before service

Photo courtesy of Karen Rehbein, VCH

How the eggs were made

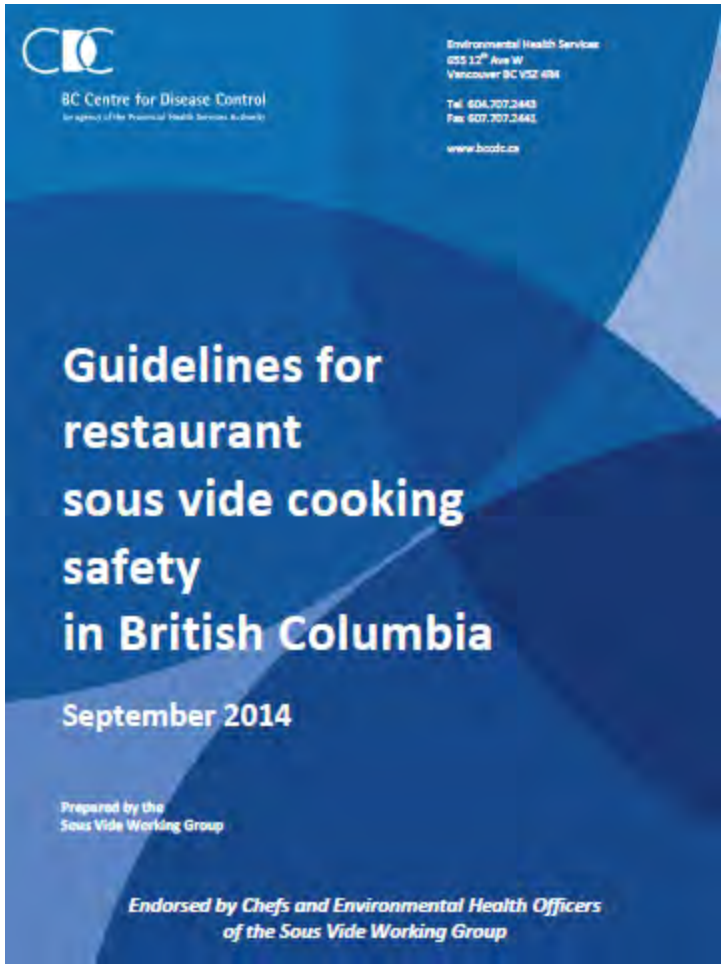
- 60 eggs placed in bowl from refrigerator
- Placed in immersion circulator set to 62.5°C
- Left for 2 hours
- Cooled on cookie sheet at room temperature

→ Inspector tested internal temp of SV egg, 55°C egg yolk yellow and runny; egg white partly translucent

http://thesadpig.com/blog/2013/02/sous-vide/

One Hour Sous vide Eggs

http://www.pepper.ph



Was our guideline giving the correct advice?

http://www.bccdc.ca/foodhealth/foodguidelines/default.htm
http://www.bccdc.ca/NR/rdonlyres/1692F859-D7A8-4B19-8841-C8418DEF412C/0/SVGuidelines_FinalforWeb.pdf

Total cooking time = CUT + PR time

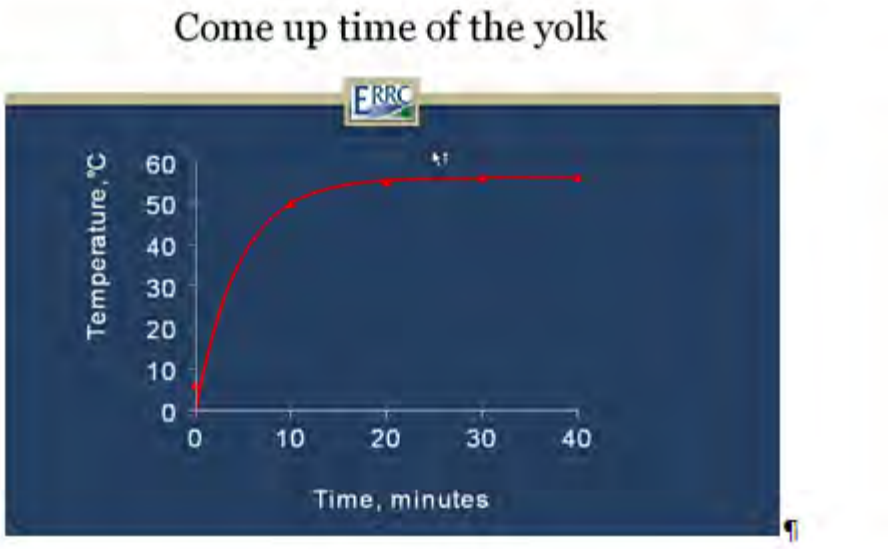
Table 3 – at 62°C, to achieve a 7-log PR of *Salmonella,* hold egg for 12.4 minutes.[11]

Chef sous vide style egg cookery: between 62°C and 65°C, for ~ 45 min (~30 min to equilibrate). [12]

11. BC Centre for Disease Control Environmental Health Services, the BC Sous Vide Working Group. Guidelines for restaurant sous vide cooking safety in British Columbia. BCCDC2014. Available from: http://www.bccdc.ca/NR/rdonlyres/1692F859-D7A8-4B19-8841-C8418DEF412C/0/SVGuidelines_FinalforWeb.pdf.
12. Rahal E. Sous vide style cooking of shell eggs. In: McIntyre L, editor.2015.

What else was found?

- Penetration into intact egg is slow as eggs are not efficient heat conductors. [13]
- Previous studies on shell eggs found CUTs of 24 to 35 min at temps of 57 – 58°C. [14,15]



13. Doyle ME, Mazzotta AS. Review of Studies on the Thermal Resistance of Salmonellae. Journal of Food Protection. 2000;63(6):779-95.
14. Schuman JD, Sheldon BW, Vandepopuliere JM, et al. Immersion heat treatments for inactivation of Salmonella enteritidis with intact eggs. Journal of Applied Microbiology. 1997;83(4):438-44.
15. Figure: Geveke D, editor. The Effect of Hot Water Immersion Pasteurization of Shell Eggs on *Salmonella* Enteritidis and Quality. 2012 Annual Meeting; 2012; Providence, Rhode Island: IAFP. Available from: https://iafp.confex.com/iafp/2012/webprogram/Paper1313.html.

Issues with the process (evaluate evidence)

- Stainless steel bowl did not allow water to circulate around eggs
- FSP did not specify CUT or PR times at 62°C
- Cooling time on cookie sheet not specified

eggs likely temperature abused for 4+ hrs

Recommendations

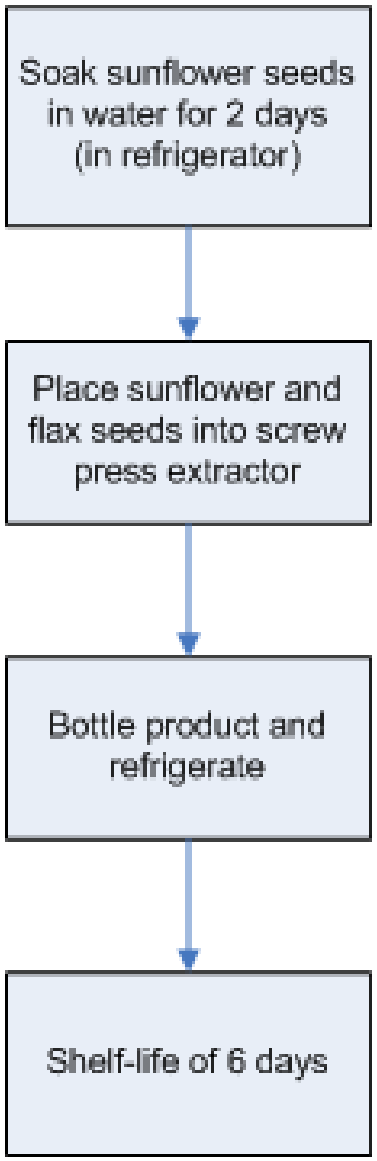
- SV equipment must perform correctly – i.e. water MUST circulate around food item
- Operator MUST use a thermometer to verify temperatures
- Bowls holding eggs must be perforated and eggs must be fully immersed
- Quantity of eggs must not exceed heating capacity of circulator
- Operator must provide a FSP with CUT/PR times and temperatures – follow Table 3 of BC sous vide guidelines
- Operator must define cooling and warming processes

The question:

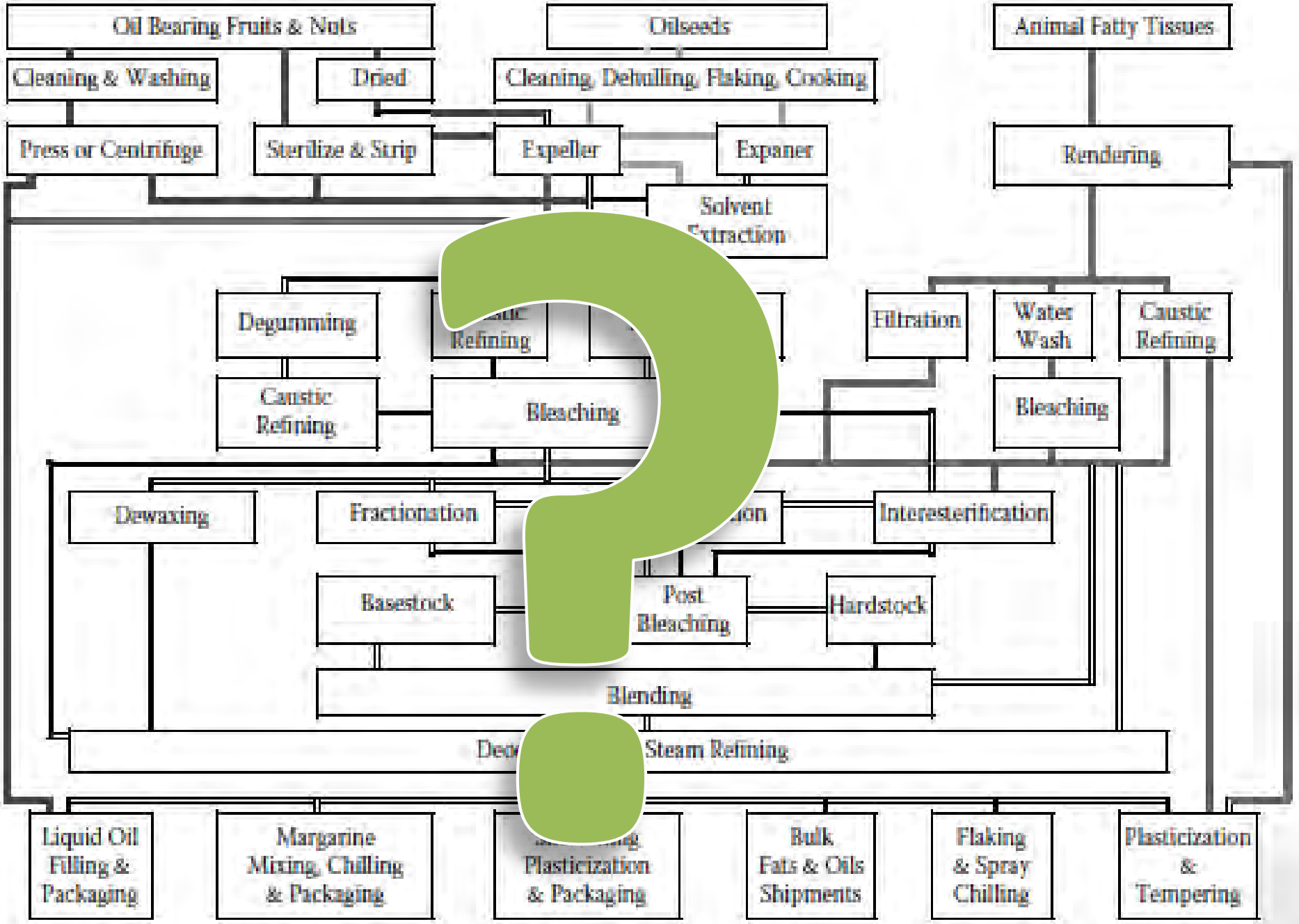
Can a flax and sunflower oil product be sold in farmers' markets?

https://www.piteba.com/eng/index_eng.asp

The operators process:



*add a little water to assist extraction



Fats and Oils Processing. Fats and Oils: CRC Press; 2008. p. 73-196. Available from: http://dx.doi.org/10.1201/9781420061673.ch2.

What else was found?

Sunflower oil[2]	Flax seed oil (linseed oil)[3]
Helianthus annus L.	*Linum usitatissimum*
High linoleic fatty acids	Polyunsaturated fats: Linolenic fatty acids (57%) Linoleic acid (16%)

Very little information about hazards – most removed during processing.

	Physical	Chemical	Biological
General hazards	Seed casings, stones, dirt, leaves[1]		***Clostridium botulinum?***
Sunflower Oil		Allergen	
Flaxseed Oil		Cyanide [3] Linatine, Phytic acid [3]	

1. Fats and Oils Processing. Fats and Oils: CRC Press; 2008. p. 73-196. Available from: http://dx.doi.org/10.1201/9781420061673.ch2.
2. Raw Materials. Fats and Oils: CRC Press; 2008. p. 1-72. Available from: http://dx.doi.org/10.1201/9781420061673.ch1.
3. Morris DH, Vaisey-Genser M. FLAXSEED. In: Editor-in-Chief: Benjamin C, editor. Encyclopedia of Food Sciences and Nutrition (Second Edition). Oxford: Academic Press; 2003. p. 2525-31. Available from: http://www.sciencedirect.com/science/article/pii/B012227055X014024.

What else was found?

Crude oil extractions can contain:[2,3]

- Phosphatides, phosholipids
- Mucilaginous matter
- Waxes
- Tocopherols, sterols, resins, carbohydrates, pesticide, trace metals and pigments

2. Raw Materials. Fats and Oils: CRC Press; 2008. p. 1-72. Available from: http://dx.doi.org/10.1201/9781420061673.ch1.
3. Morris DH, Vaisey-Genser M. FLAXSEED. In: Editor-in-Chief: Benjamin C, editor. Encyclopedia of Food Sciences and Nutrition (Second Edition). Oxford: Academic Press; 2003. p. 2525-31. Available from: http://www.sciencedirect.com/science/article/pii/B012227055X014024.

Procedural gaps to control for food safety hazards

- No washing or disinfecting of seeds before grinding or use;
- No heating or cooking of seeds before grinding;
- No separation step to remove surface water from oil before bottling;
- No filtering of extracted oil to remove water through clay membrane; and,
- No filtering of extracted oil to remove physical particulates

(evaluate evidence) →Recommendations

Product is low risk, but not zero risk:

1. Seeds should be screened for dirt, sticks and other physical debris before using

2. Sunflower seeds could be hulled and seeds separated before using to reduce risk of seed hull splinters getting into the final product

3. Oil could be grossly refined by the following:
   - Pass through a fine metal mesh screen to remove particulate debris
   - Separate out water from oil components

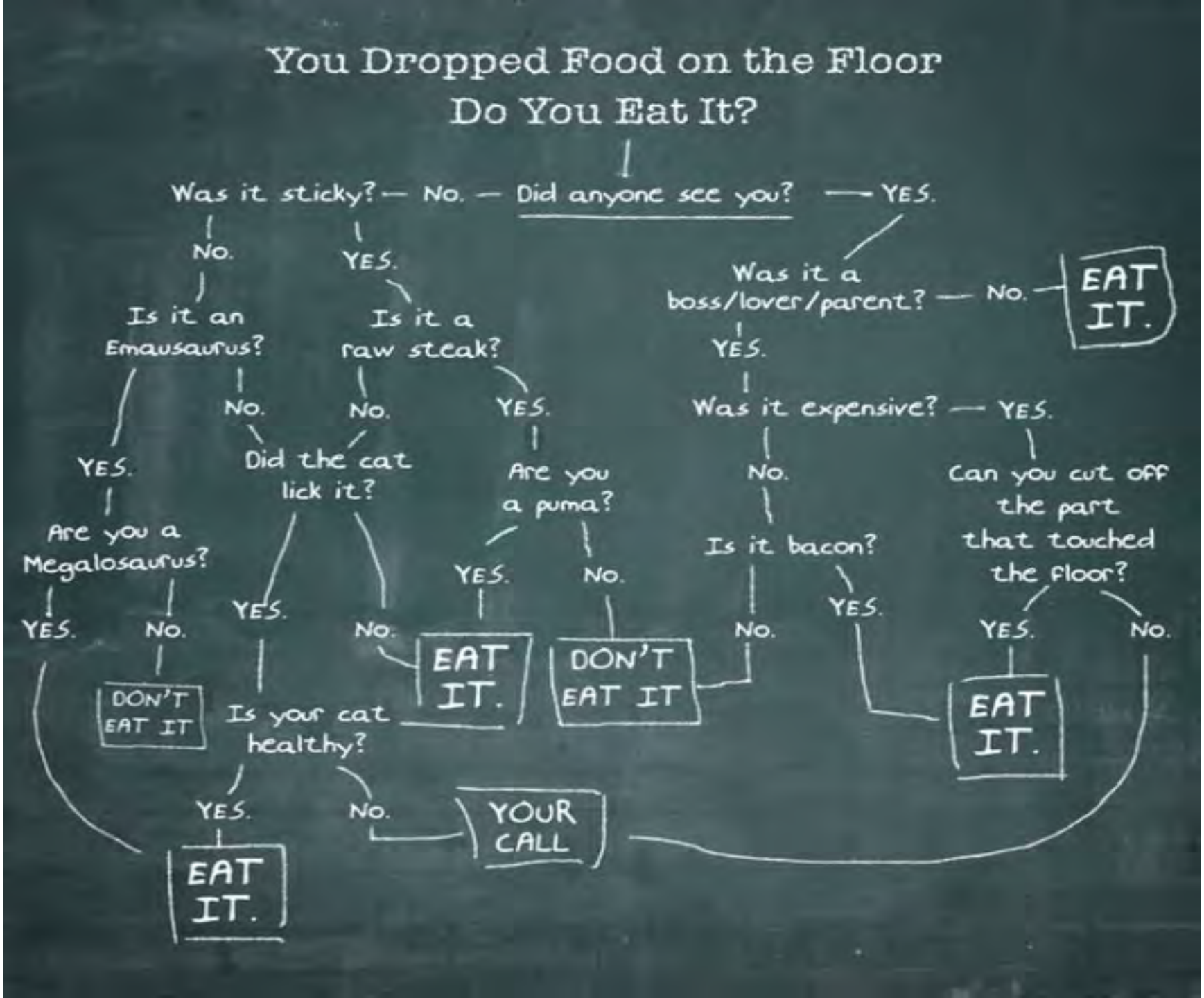
4. Include the statement “keep refrigerated at all times” or something similar on the label.

5. Reduce the shelf-life to 4 days (from 6 days)

Assessment from Health Canada BMH

Our comments are focused only on the microbiological hazards associated with this product. Health Canada does not have specific guidelines on flax/sunflower oil production. Cold-pressed oils (such as some olive oils) are common in the marketplace and do not usually have an aqueous phase that would permit the growth of *C. botulinum*. Oils have very little to no available water to allow for bacterial growth.

As long as good manufacturing and proper sanitation/hygienic practices are satisfied along with an added separation step to remove any water, we do not foresee any microbiological issues with this sunflower-flax seed oil mixture. If these conditions were met, refrigeration is not necessary for this product from a safety perspective.


You Dropped Food on the Floor
Do You Eat It?
Did anyone see you?
No.
YES.
Was it sticky?
No.
YES.
Was it a boss/lover/parent?
No.
EAT IT.
YES.
Is it an Emausaurus?
Is it a raw steak?
No.
No.
YES.
Was it expensive?
YES.
YES.
Did the cat lick it?
Are you a puma?
No.
Can you cut off the part that touched the floor?
Are you a Megalosaurus?
Is it bacon?
YES.
No.
YES.
No.
YES.
No.
YES.
No.
YES.
No.
DON'T EAT IT
EAT IT.
DON'T EAT IT
EAT IT.
Is your cat healthy?
YES.
No.
YOUR CALL
EAT IT.

http://forcefreegundog.com/where-to-find-training.html

lorraine.mcintyre@bccdc.ca Ph: 604.707.2458

Docs will be http://www.bccdc.ca/foodhealth/foodguidelines/default.htm

links to NCCEH contact@ncceh.ca

http://www.happy-mothering.com/03/household/pros-and-cons-of-hang-drying-your-laundry/