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CENTRE FOR Hospitality & Culinary Arts | Food Innovation & Research Studio

R&D Case Study & Budget Planner

FOOD STARTER

Building great food businesses

Presented by:

Winnie Chiu M.Sc.

Food Innovation & Research Studio

A Little Ice Breaker

How Bitter Are You???

25% of the population

Credit Marvel Entertainment

WHO ARE YOU?

WHAT'S YOUR PRODUCT?

WHAT FOOD BUSINESS EXPERIENCE DO YOU HAVE?

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Who is FIRSt?

FIRSt is a Technology Access Centre, housed at George Brown College, staffed by industry experts from the food & beverage sector, that help form partnerships and leverage the innovation resources of business, government and academia.

https://youtu.be/UsxLWCr1ZLk

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FIRSt offers complementary services to Food Starter and as an enabler to help commercialize food products.

We do Applied Research

- Prototypes creation
- Formula optimization according to new or existing technology
- Accelerator to commercialization

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Sensory Booths

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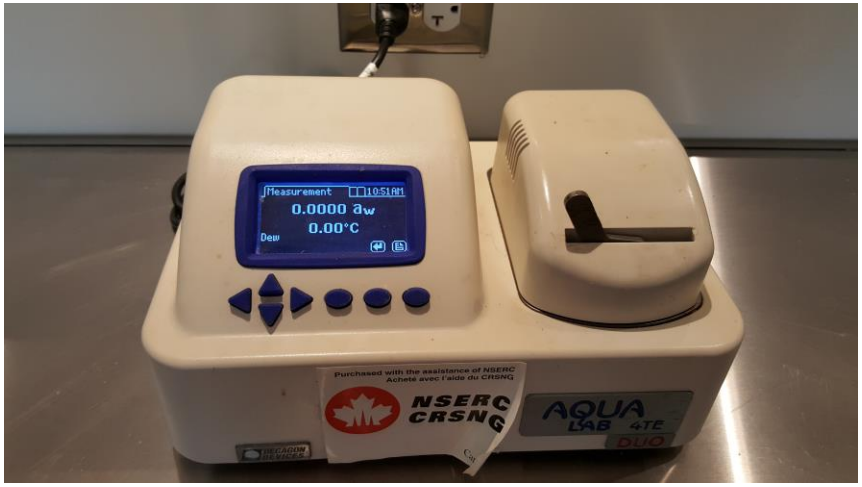

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Environmental Chamber

Shelf-life testing

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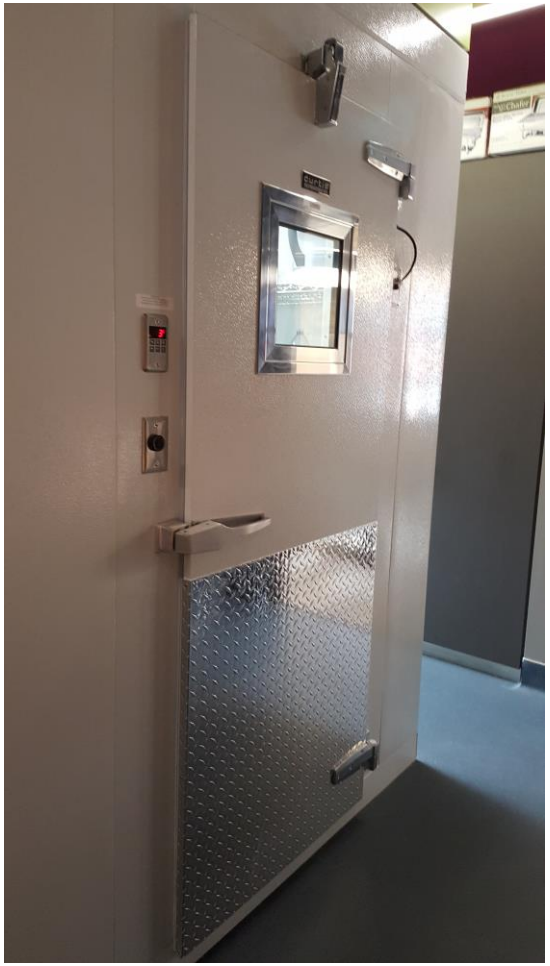

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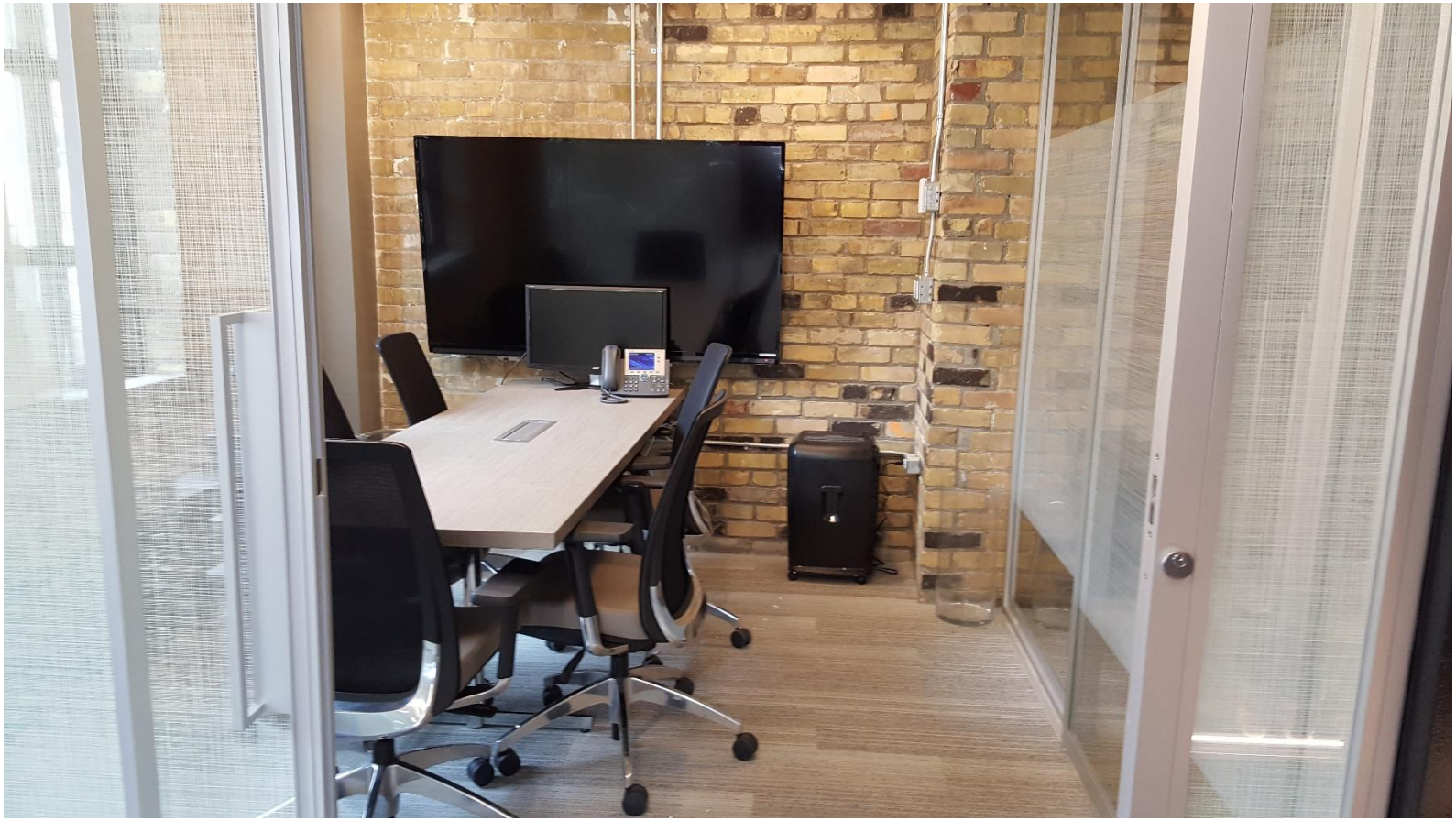

Research

- Focused on concepts and ideas and find an answer to a problem.

e.g. need to increase protein level in an energy bar – research on type of protein (animal, veg, insect)

Development

- Focused on having results, and applying learnings to create an end product.

e.g. how to incorporate protein into the product and make it taste great etc.

The Fuzzy Front End (FFE)

Entrepreneur's Assumption of what Consumers Want

What Consumers Want

How much time needed to develop concepts?

- Smucker's Platescapers: 3 weeks 7 concepts
- General Mills Pizza Pops: 8 weeks 5 concepts
- Uncle Ben's: 18 weeks from concept to launch
- Entrepreneur client preserve type product: 14 weeks 3 concepts

How Much Does R&D Cost??

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Type of Work	Range of Cost
Market Assessment	$1,500
Qualitative Consumer Study	$2,000 - $10,000
Quantitative Consumer Sensory Evaluation	$3,500 - $10,000
Prototype Development	$2,000 - $4,000 / sku + materials
Formula Optimization	$4,000 - $7,000 / sku + materials
Factory Scale up – “Plant Trial”	$125 / hour (8 hours and up) + materials
Regulatory Work	$150 / hour
Nutritional Work	$150 - $3,000 (theoretical calculation vs. Lab testing)
Quality Plan	$150 / hour (8 hours and up)
Laboratory Analysis (microbiological testing)	Test range between $12 - $100 per test
Shelf-Life Testing	$1,000 per product and up

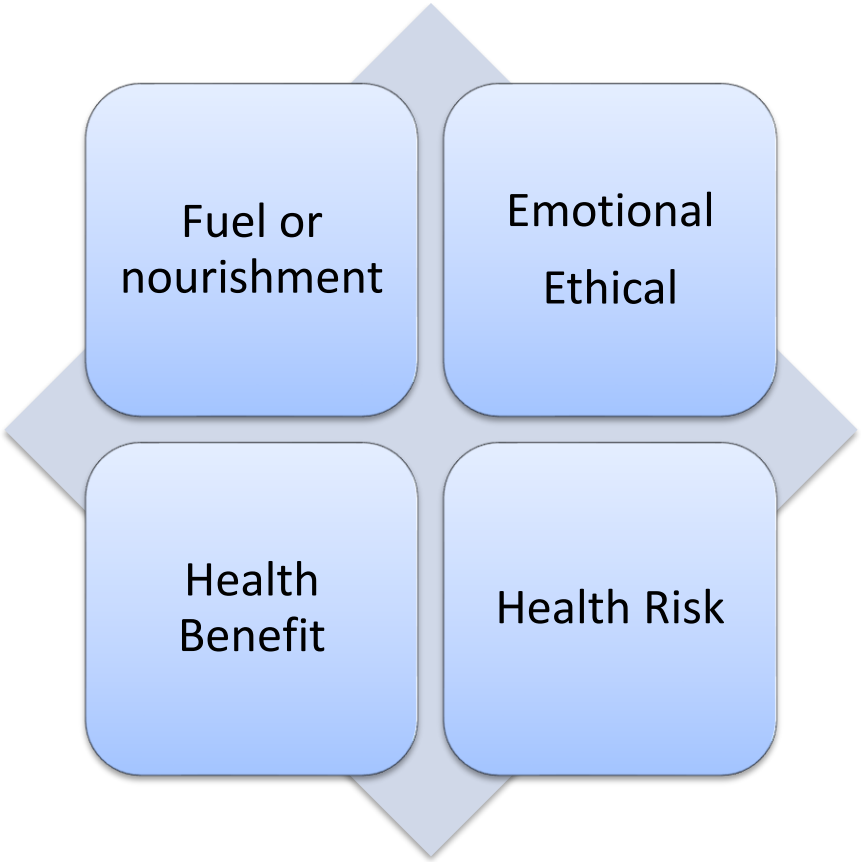
Market Assessment

- using market intelligence database (e.g. Datamonitor, Mintel etc) – *environmental scan*
- Market overview and review (size, target consumer insight, behaviour, growth trend) – e.g.*is there a need for this product, frequency of use, specialty market offerings*
- Competitive analysis – *against market leaders*

Qualitative Consumer Study

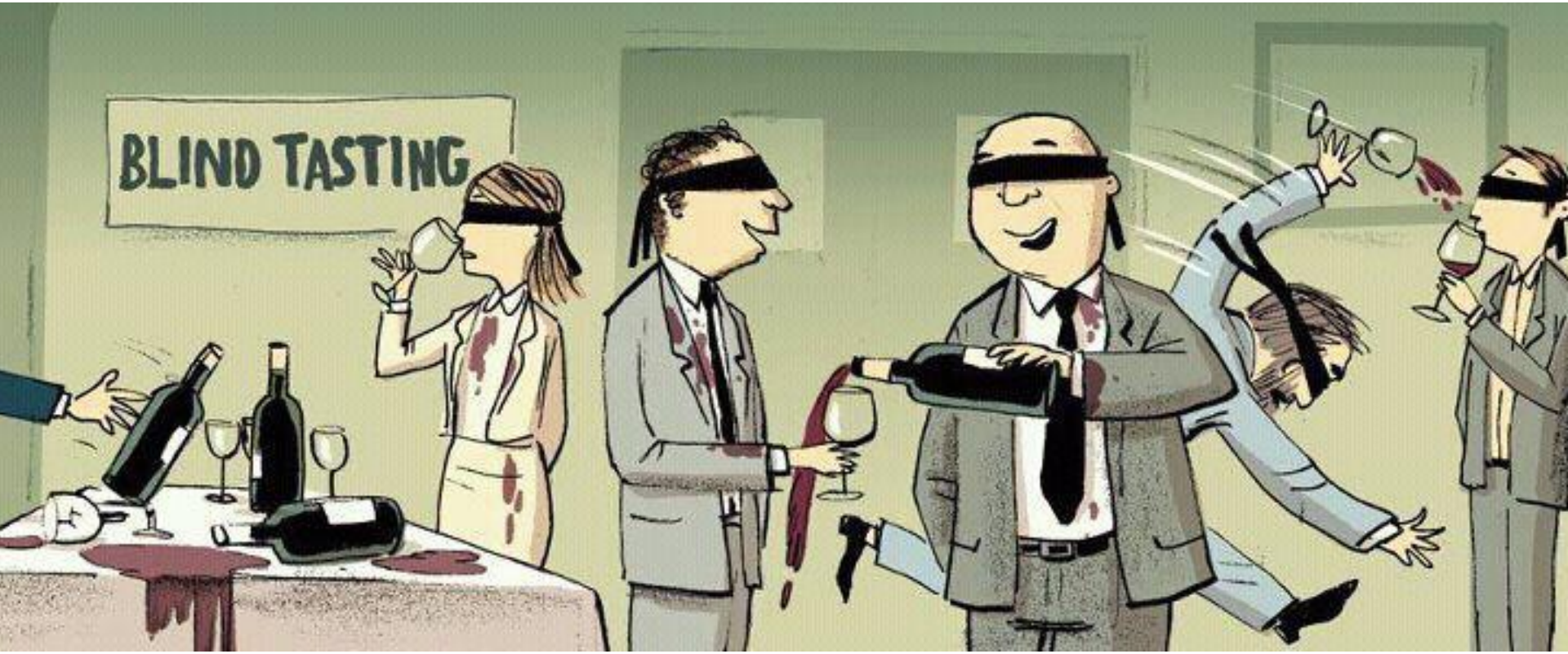
- Focus Groups (8 panelists)
- Facilitated discussion
- Would the concept appeal to you? How? Why?
- At ideation phase or commercialization phase

How Consumers Perceive Food



Credit IFT / adapted from Rowe 2008

Testing your market



Source Pinterest

Quantitative Consumer Sensory Evaluation

- 50, 75, 100 panelists
- Attribute testing
- Statistically significant

PROTOTYPING/GOLD STANDARD

Source Google Images

Prototype Development

- Lab scale, benchtop development
- Determine initial specifications of product
- Assess ingredient usage and interaction
- Standardize the recipe to a formulation

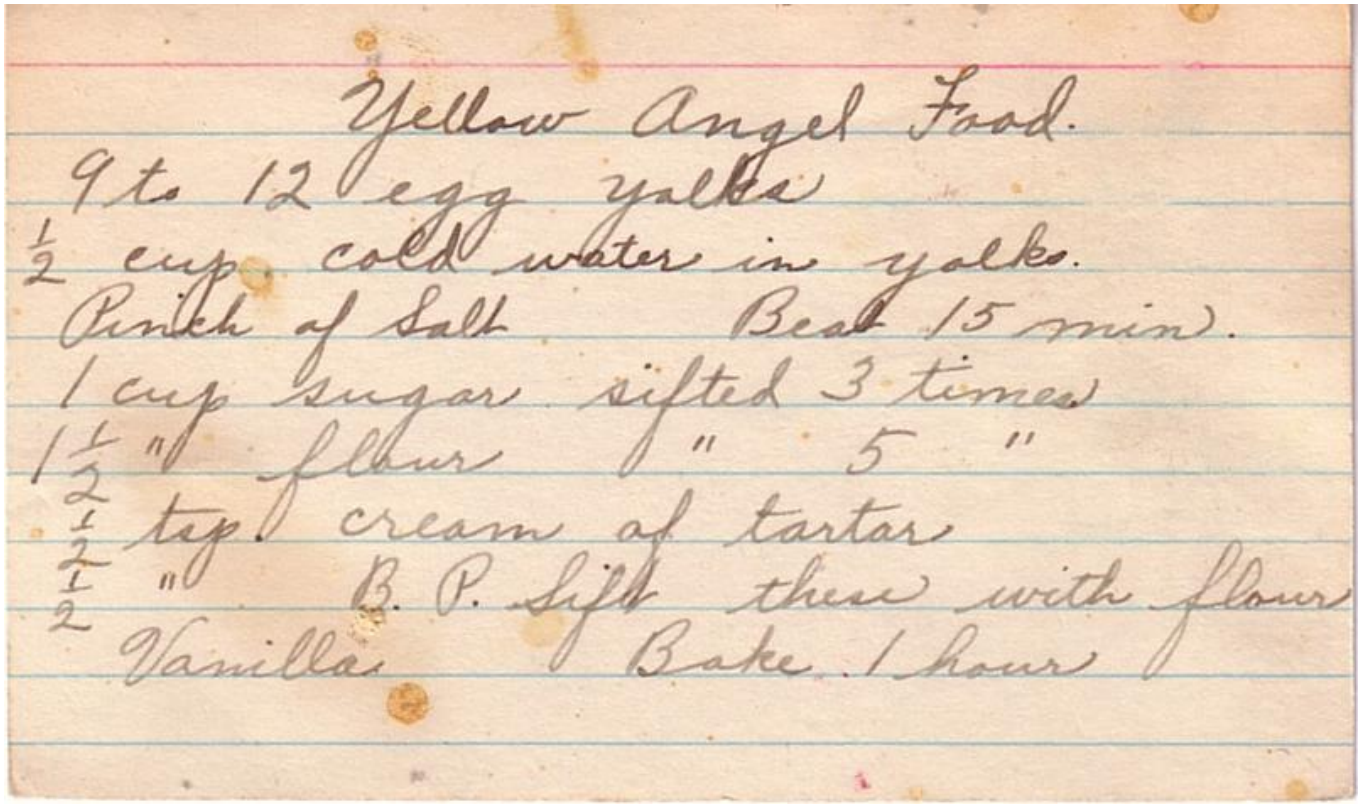
Recipe ---→ Formulation

Ingredients:

1 tbsp	(15 mL)	Butter
1 tbsp	(15 mL)	Vegetable oil
2 each		Onions, finely chopped
1 tsp	(5 mL)	Sugar
1 tsp	(5 mL)	Red wine vinegar
2 cups	(500 mL)	Vegetable stock
1 tbsp	(15 mL)	Dijon mustard
1 pinch		Black pepper
To taste		Salt

Method:

1. In a small sauce pot on low heat, melt butter and add the vegetable oil.
2. Add onions and cook on low heat until they are browned and soft. Approximately 20 minutes.
3. Add sugar and cook for 2 minutes. Stir in vinegar and stock and cook for an additional 10 minutes or until gravy has reduced by half.
4. Stir in mustard and pepper. Season to taste with salt.
5. Remove from heat and using a hand blender, blend until smooth.



Yellow Angel Food.
9 to 12 egg yolks
½ cup cold water in yolks.
Pinch of Salt Beat 15 min.
1 cup sugar sifted 3 times
1½ " flour " 5 "
½ tsp cream of tartar
½ " B. P. Sift these with flour
½ Vanilla Bake 1 hour

Example of a formulation for scale up

Product Name:	**Elderberry and Apple Fruit Spread with Ginger**			
Declared Weight:			Variation:	**EBG04**
Target Fill Weight:			Effective:	**8-Dec-16**

Changes Made

fruit ratios = 60% elderberry /40% apple
- increase honey by 20%
- increase ACV by 20%
- decrease elderberry/apple by 20%

FRUIT BUTTER FORMULATION:

	Item Code	INGREDIENT DESCRIPTION	Composition (% w/w)	QTYBATCH (g)	SCALING WEIGHT (g)
FRUIT BUTTER PROCEDURE					
STEP 1.		Reduce Apple and Elderberry Puree to 20 brix (approx. __8_____ hours)			
		Elderberry Puree	40.85	6127.50	6128.00
		Apple Puree	27.24	4086.00	4086.00
STEP 2.		Add Vinegar and Honey			
		Honey	22.59	3388.23	3388.20
		Apple Cider Vinegar	9.32	1397.54	1397.50
STEP 3.		Continue to cook for approx. ____8_____ hours until desired Bostwick consistency and Brix are almost reached (Approx. Bostwick = 6.5 cm at 70C, Brix = > 40)			
STEP 4.		Add Ginger and cook until desired Bostwick consistency and Brix are reached			
		Ginger, Ground	0.0006	0.090	0.09
			100.00	**15000.00**	14999.70
STEP 5.		Take Bostwick, pH and Brix			
STEP 6.		Bottle spread in jars and pass through cooling tunnel, label and package			

ADDITIONAL INFORMATION	**Weight (kg)**	
Initial Weight	**15000.00**	
ESTIMATED Final Cooked Weight		
AVERAGE Net Wt per Jar		
Bostwick (~70C) in 30 seconds		liquid
		solid
Brix		
pH		

RAW MATERIAL INFORMATION	
Brix of Elderberry Puree	
pH of Elderberry Puree	
Brix of Apple Puree	
pH of Apple Puree	

It's all in your head, then write it down.

Credit Naija News

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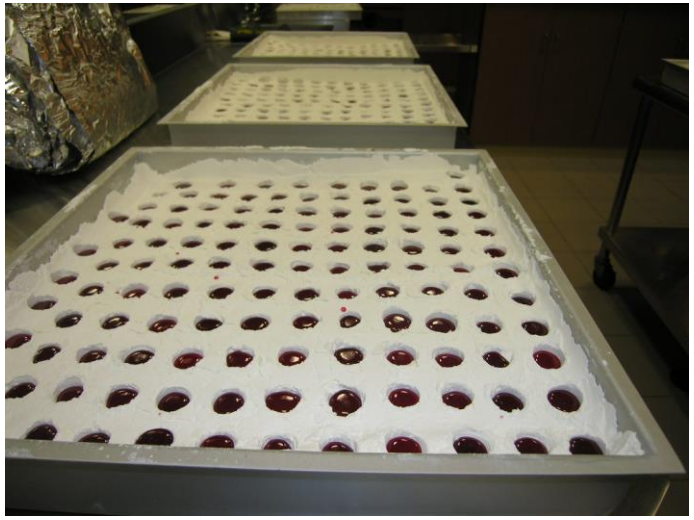
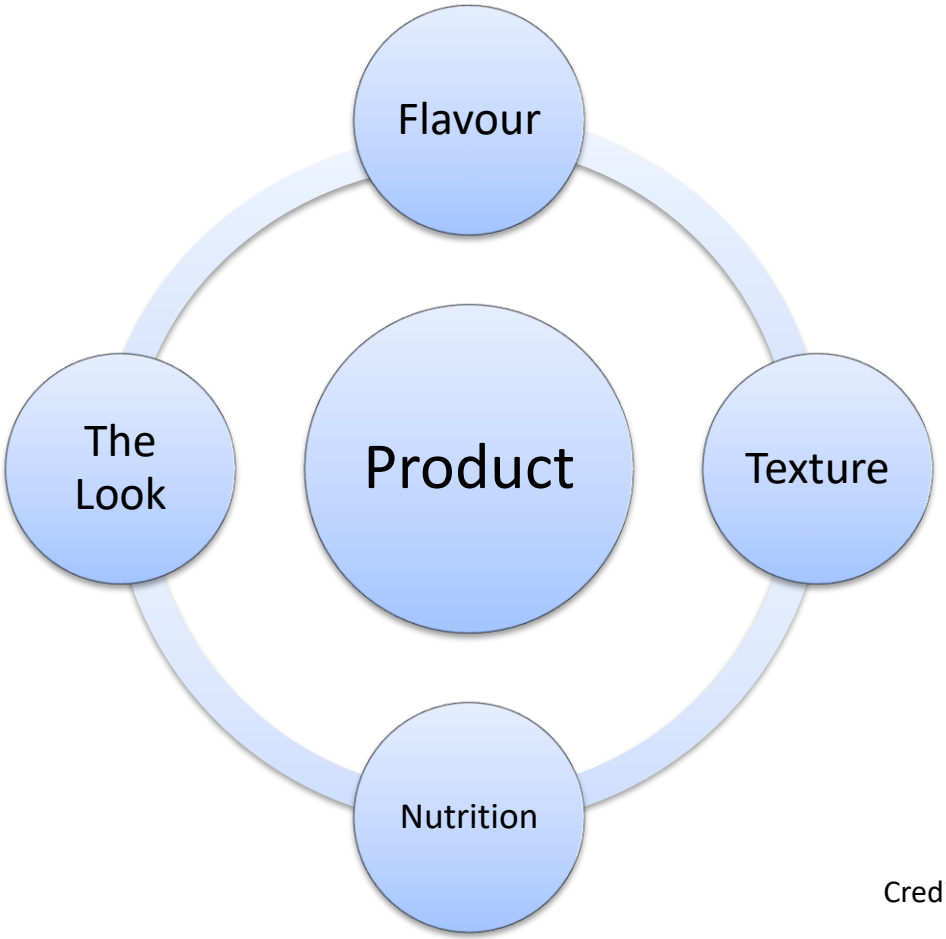


Formula Optimization

- Commercially available bulk ingredients – *might have long lead time to procure*
- Process oriented
- Equipment usage
- Set specification parameters (pH, Aw, Brix, Bostwick etc)
- Costing of formulation

It's All About Balance



Credit IFT / G Smith Kansas State U

Other Things to Balance

Please choose 2

Speed

Quality

Cost

Factory Scale up – Plant Trial

- Design the process to suite equipment
- Design equipment to suite the process
- Ingredient usage (perishable, most expensive)
- Incoming raw material in bulk
- Packaging

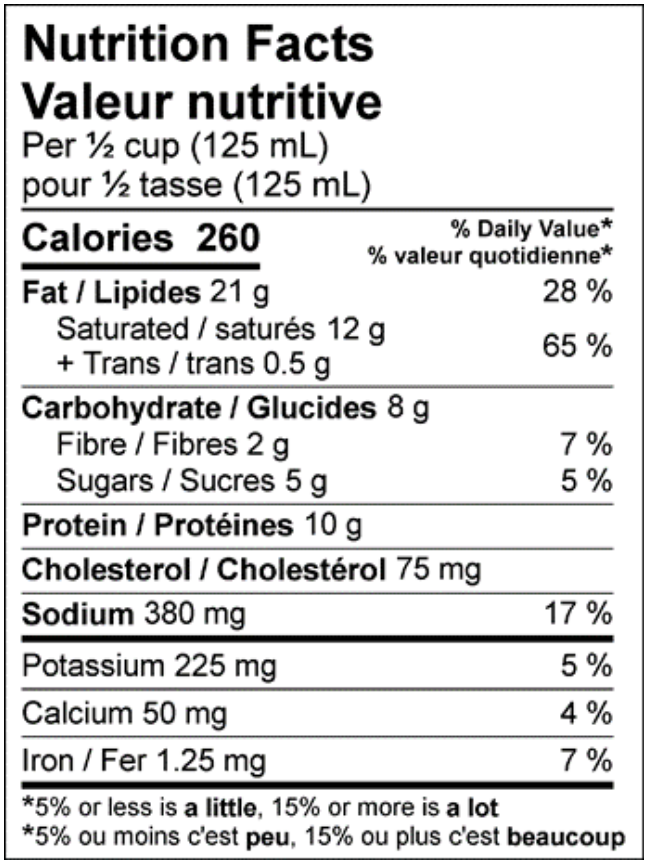
Regulatory Work - Compliant

- CFIA
- Health Canada
- FDA
- USDA
- Gluten Free Certification
- Organic
- Kosher
- Halal
- Vegan

Nutritional Work

- CFIA compliant Nutrition Facts Panel (NFT)
- Nutrient claim
- Health claim

New Format NFT



Nutrition Facts
Valeur nutritive
Per ½ cup (125 mL)
pour ½ tasse (125 mL)

Calories 260	% Daily Value* / % valeur quotidienne*
Fat / Lipides 21 g	28 %
Saturated / saturés 12 g + Trans / trans 0.5 g	65 %
Carbohydrate / Glucides 8 g	
Fibre / Fibres 2 g	7 %
Sugars / Sucres 5 g	5 %
Protein / Protéines 10 g	
Cholesterol / Cholestérol 75 mg	
Sodium 380 mg	17 %
Potassium 225 mg	5 %
Calcium 50 mg	4 %
Iron / Fer 1.25 mg	7 %

*5% or less is **a little**, 15% or more is **a lot**
*5% ou moins c'est **peu**, 15% ou plus c'est **beaucoup**

Food Laws and Regulations

www.inspection.gc.ca/food/labelling

Core Labelling Requirement

- Ingredient Declarations
- Declared Weight
- NFT

Claims & Statements

- Allergens – intolerance vs allergy
- Nutrient content

Food-Specific Labelling Requirements

- Alcoholic beverages
- Maple products

Quality Plan / HACCP

- SOP – Standard Operating Procedures
- Risk assessment
- Quality assurance
- Documentation

Lab analysis

- Microbiological testing (food safety)
- Nutrient testing (for claims)

Shelf-Life

Shelf-Life

- Food safety
- Product attributes – taste, texture
- Nutritional quality

Factors influencing shelf-life

- Chemical composition
- Initial microbial load
- Processing method
- Packaging format
- Storage condition

Preventative Measures

- Cooking for longer times and/or at higher temperatures
- Using higher quality raw materials
- Reformulating to lower the pH or decrease the water activity
- Adding preservatives, emulsifiers or stabilizers
- Improving cleaning and sanitation practices
- Removing oxygen from the packages headspace
- Changing the packaging format altogether
- Freezing the product quicker

No bake snack - Shelf life Evaluation

Product Names: Hazelnut Cherry & Fruit and Nut Boost
Production Date: September 16th 2014
Date in Incubator: October 18th 2014
Age of product going into Incubator: 1 month (real time) Accelerated storage conditions:
Temperature: 37°C
Humidity: 45 %

Date:	Time in Incubator:	Real time equivalent:	Flavour Evaluated:	CONTROL Pea Protein	Pea Protien #1	Pea Protien #2	Pea Protien #3	Notes:
October 25th	Week 1	2 months	Hazelnut Cherry					
			Fruit & Nut Boost					
November 1st	Week 2	3 months	Hazelnut Cherry					
			Fruit & Nut Boost					
November 8th	Week 3	4 months	Hazelnut Cherry					
			Fruit & Nut Boost					
November 12th	Week 3 ½	4 ½ months	Hazelnut Cherry					
			Fruit & Nut Boost					
November 15th	Week 4	5 months	Hazelnut Cherry					
			Fruit & Nut Boost					
November 18th	Week 4 Day 3	5 months 1 week	Hazelnut Cherry					
			Fruit & Nut Boost					
November 20th	Week 4 Day 5	5 months 3 weeks	Hazelnut Cherry					
			Fruit & Nut Boost					
November 22nd	Week 5	6 months	Hazelnut Cherry					
			Fruit & Nut Boost					

How can cost be offset?

- Apply for govt. funding (need eligibility and process can be quite tedious)
- SR&ED tax credit – Scientific Research and Experimental Development tax credit (must be conducted in a scientific way and well documented)

http://www.cra-arc.gc.ca/txcrdt/sred-rsde/menu-eng.html

Ask the question:

- Is it too expensive to produce?
- What is the volume of ingredients you need to source?
- Is the shelf-life too short for distribution?
- Do you require specialty equipment?
- How quickly will private label copy it?

Protocol for Product Development

Research and Recipe Analysis

1. Literature Search
2. Prepare recipes for evaluation
3. Review / recommend raw materials
4. Conversion of household measurements to bench top formulations (UOM volume vs weight)
5. Assess preparation methods to establish process parameters
6. Preliminary specifications (raws and finished)

Protocol for Product Development

Recipe optimization and internal sensory

1. Sourcing of commercially available raw material
2. Optimize bench top formulations
3. Qualitative sensory evaluation by small expert panel
4. Base on sensory feedback, make necessary changes to formulations
5. Costing
6. Preliminary nutritional calculation

Protocol for Product Development

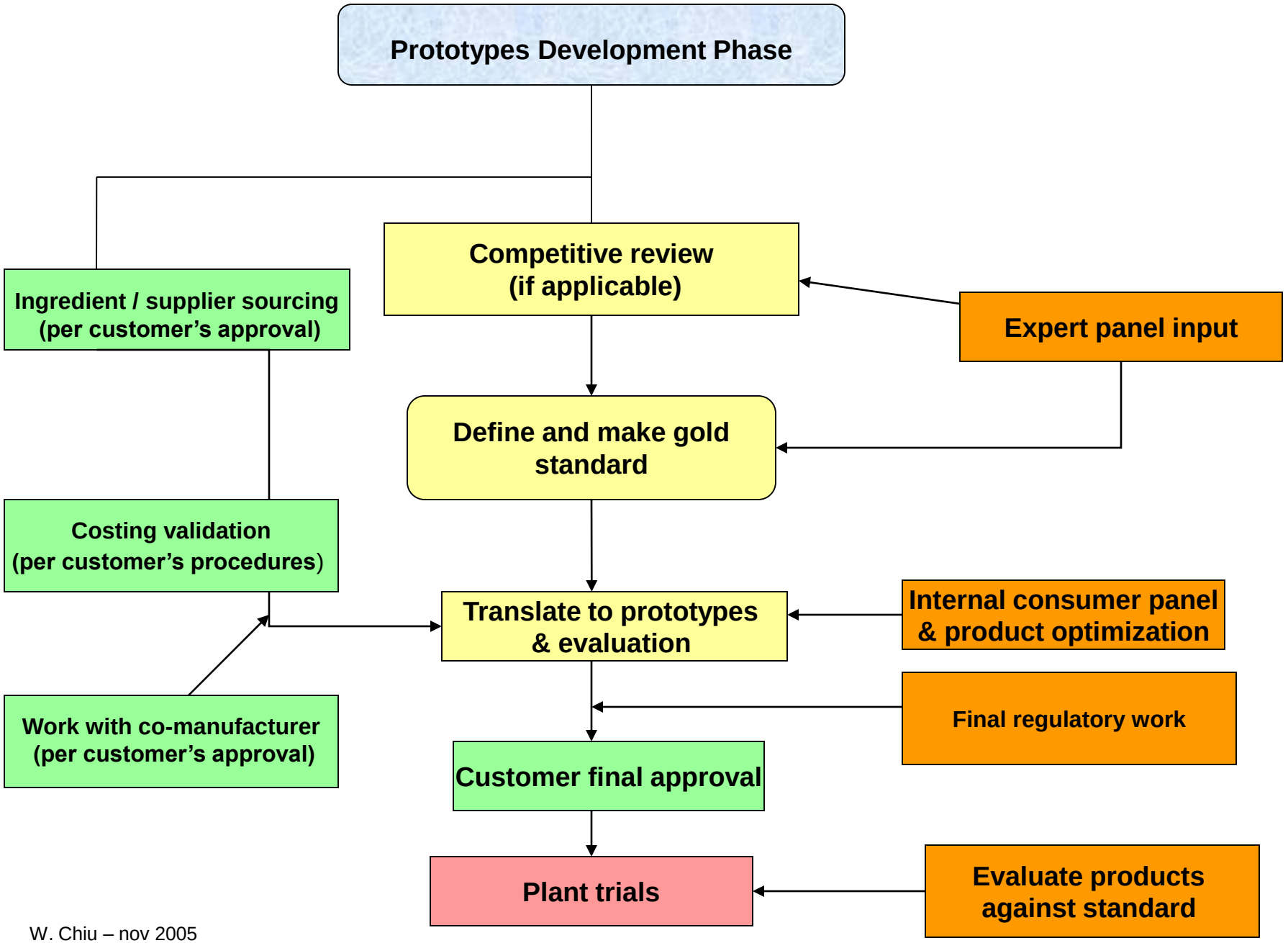
Test run / Line trial

1. Scale up the batch to a larger quantity
2. Larger equipment (e.g. stove top 1 gallon vs 12 gallon jacketed kettle)
3. Incoming raw material may be different (pre-cut, shapes, sizes)
4. How do you scale according to raw material pack size ?

Protocol for Product Development

Quantitative sensory and final tweak

1. 30 panelist for sensory
2. Revision of formulation base on feedback
3. Revision of process where necessary
4. Final nutritional calculation



W. Chiu – nov 2005

https://youtu.be/3gg-h4ET480

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CHECKLIST

- I am ready to be an entrepreneur.
- I can describe my business concept (what my idea is) in one minute.
- I have set up a research binder to file my information.
- I can describe the customer that would buy my product.
- I am learning about the demand for my product.
- I can list my competition and have begun gathering information on them.
- I know what makes my product better or different.
- I have researched other food and beverage manufacturers to see how they succeeded or failed.
- I have contacted industry associations to find experts who can advise me.
- I have a business plan template and have made progress in filling it in.

Takeaways

- Develop a Project Plan into digestible Phases
- Budget
- Focus
- Assumptions (sanity check)
- Risk management
- Accurate timeline – work back from a launch

Questions?

THANK YOU !!

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WWW.GBCFIRST.CA