



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada



A Toast to your Health!

« Enhancing beverages with pulse ingredients »

Joyce Boye

Pulse Symposium

5th February 2009, Toronto

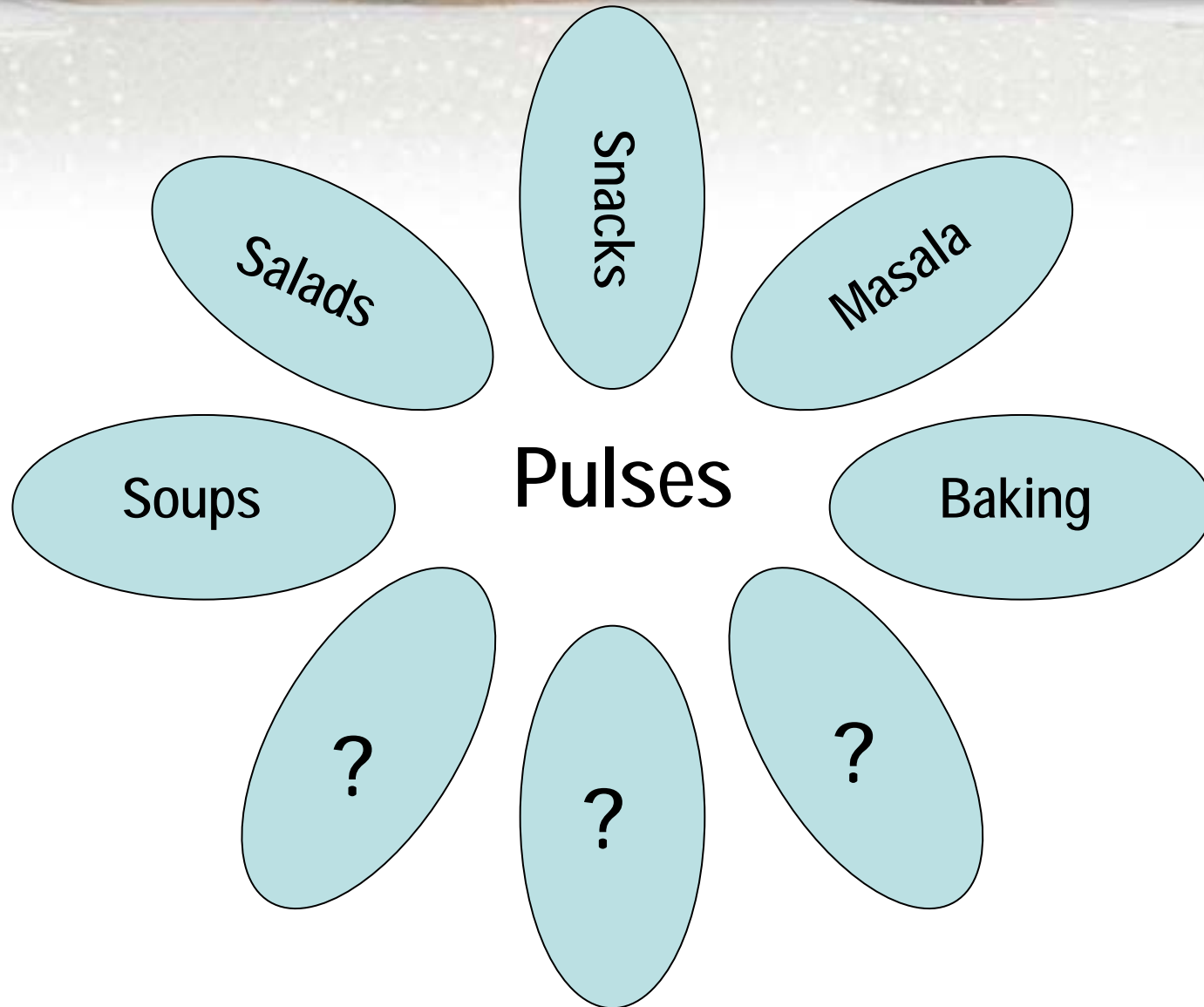
Canada

Outline

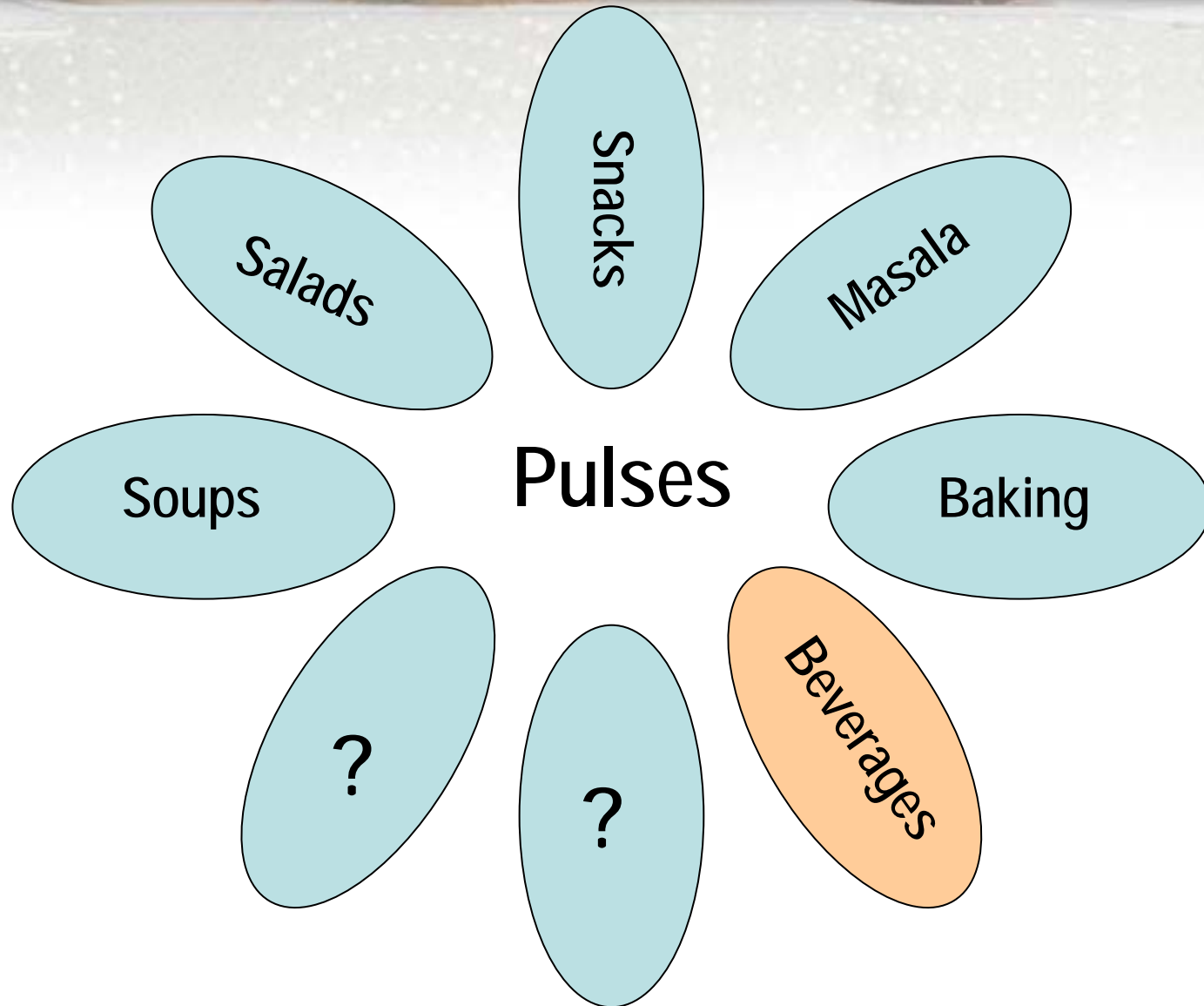
- ➡ ● Market overview and potential
- ➡ ● Pulse ingredients in yogurt formulation
- ➡ ● Pulse ingredients in beverage applications
- ➡ ● Whole grain-based beverages
- ➡ ● Conclusion



The Growing Pulse Food Industry



The Growing Pulse Food Industry



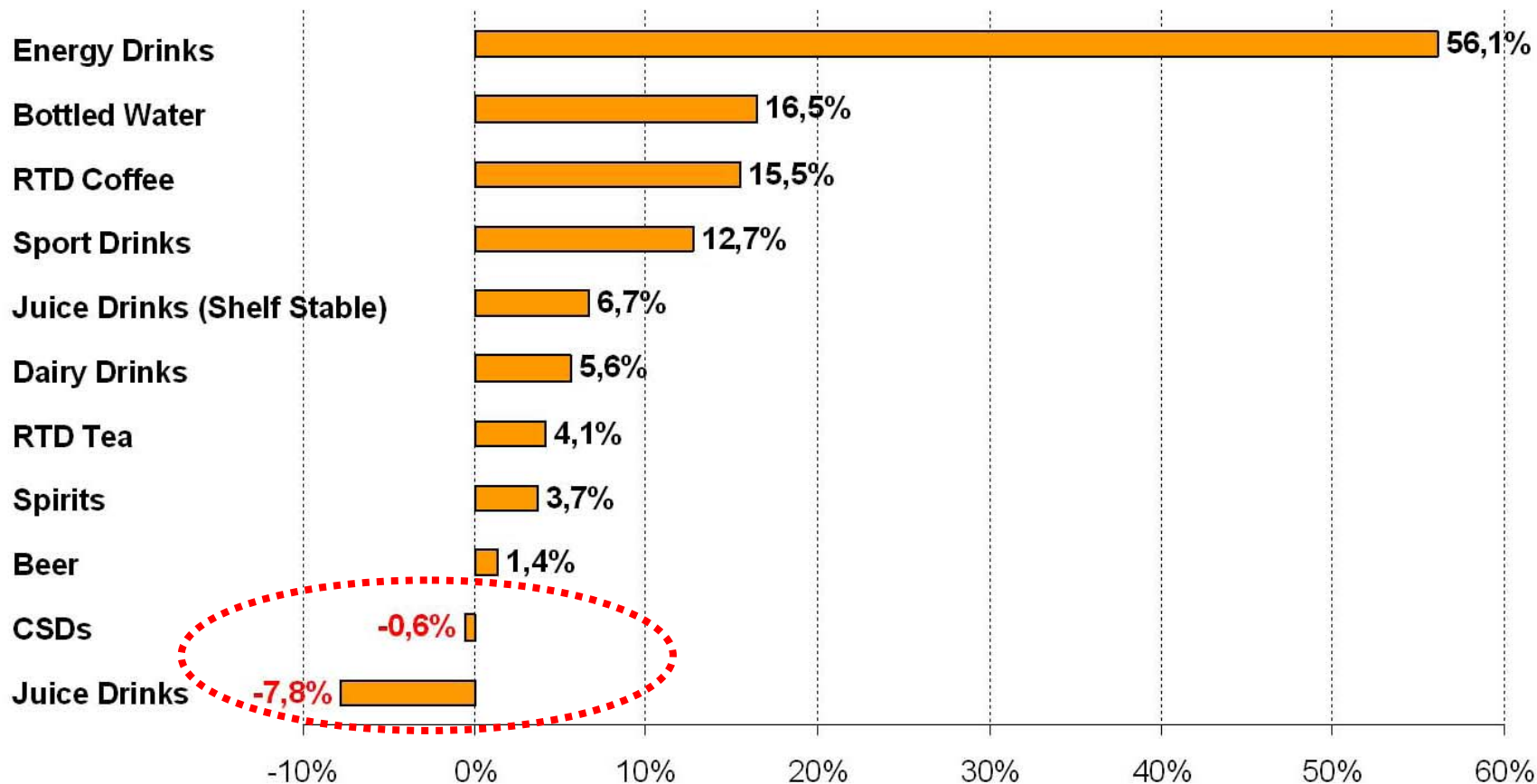
Beverages



Types:

- Soda
- Hot beverages
- Dairy and **non-dairy** (e.g., soy) products }
}
- Alcoholic beverages
- Liquid nutrition (e.g., Ensure) }
}
- Sports/energy drinks }
}
- Protein powders/mixes }

US beverage consumption pattern for the year 2006 (volume growth in %)



Source : Beverage Digest Fact book, 2007

A row of four appetizers, possibly sliders or small sandwiches, is shown on a white tablecloth. The background is a light blue gradient.

Health issues on soft drinks consumption

- Obesity
- GI distress
- Calcium crises
- Hypertension
- Dental problems
- Kidney disorder
- Malnutrition
- Post menopausal syndrome

Beverages

Trends:

- On-the-go
- Better 4 U
- Kids health
- Reduced calories
- Sports/health/energy
- Environmental consciousness





Abbott Nutrition Canada

High protein

High fibre



Nutrition for
Infants & Toddlers



Nutrition for
Adults



Nutrition for People
with Diabetes



Health Care
Professionals

- Excellent source of calcium and vitamin D
- Gluten- and lactose-free
- No trans fat
- Kosher



Abbott Nutrition Canada



Nutrition for
Infants & Toddlers



Nutrition for
Adults



Nutrition for People
with Diabetes



Glucerna is a pleasant-tasting nutritional supplement specifically designed for people with diabetes. It has a unique slow-release carbohydrate system and is clinically proven to provide more consistent blood glucose levels compared to a standard medical nutritional drink or snack bar.^{1,2}



OUR PRODUCTS
add energy to your lifestyle



Select the BOOST that's right for you!

- BOOST Drink
- BOOST Smoothie
- BOOST High Protein
- Kid Essentials
- BOOST Glucose Control

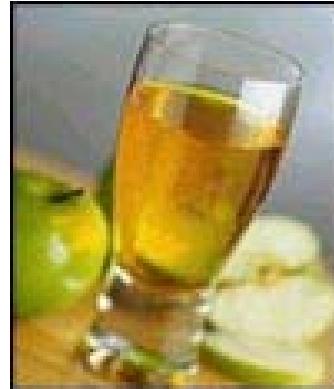


http://www.boost.com/Products/ourproducts_boostplus.aspx



Research Question

Could pulses, their proteins, starches and fibres be used as ingredients in the development of different beverages?





Pulse-based beverages

Potential Markets:

- Lactose-free/dairy-free
- Vegetarian
- High fibre/high protein drinks
- Heart health
- Sports drinks
- Non-allergenic/Hypo-allergenic

Probiotic/high fibre/high protein beverages

Opportunity:

High protein

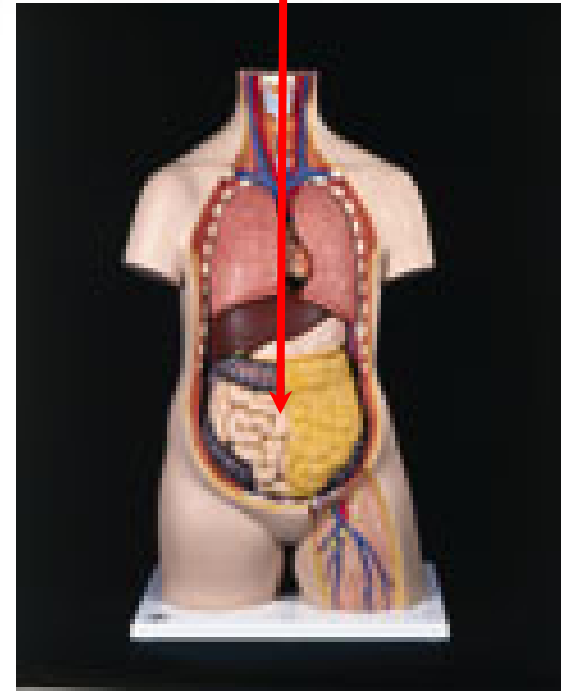


Probiotics/Prebiotics



Bacteria
Fibre

Fibre – Legumes



Colonic health



Yoghurt/Probiotic Applications

Objectives:

- Study of the acidification rate of yoghurt cultures in the presence and absence of selected pulse fractions during an 18-hour incubation period.
- Same study as above but with probiotic cultures to determine if pulse fractions have any **supressive effects**.



Experimental plan

- Two commercial **yogurt cultures** :
commercial brands name (Yogourmet and Yogootherm)
- Two **probiotic cultures** provided from supplier:
 - 1-L.b rhamnosus
 - 2-L.b acidophilus
- Acidification rate was studied at:
 - 42 °C
 - 18 hours incubation
- Each culture was tested in triplicate

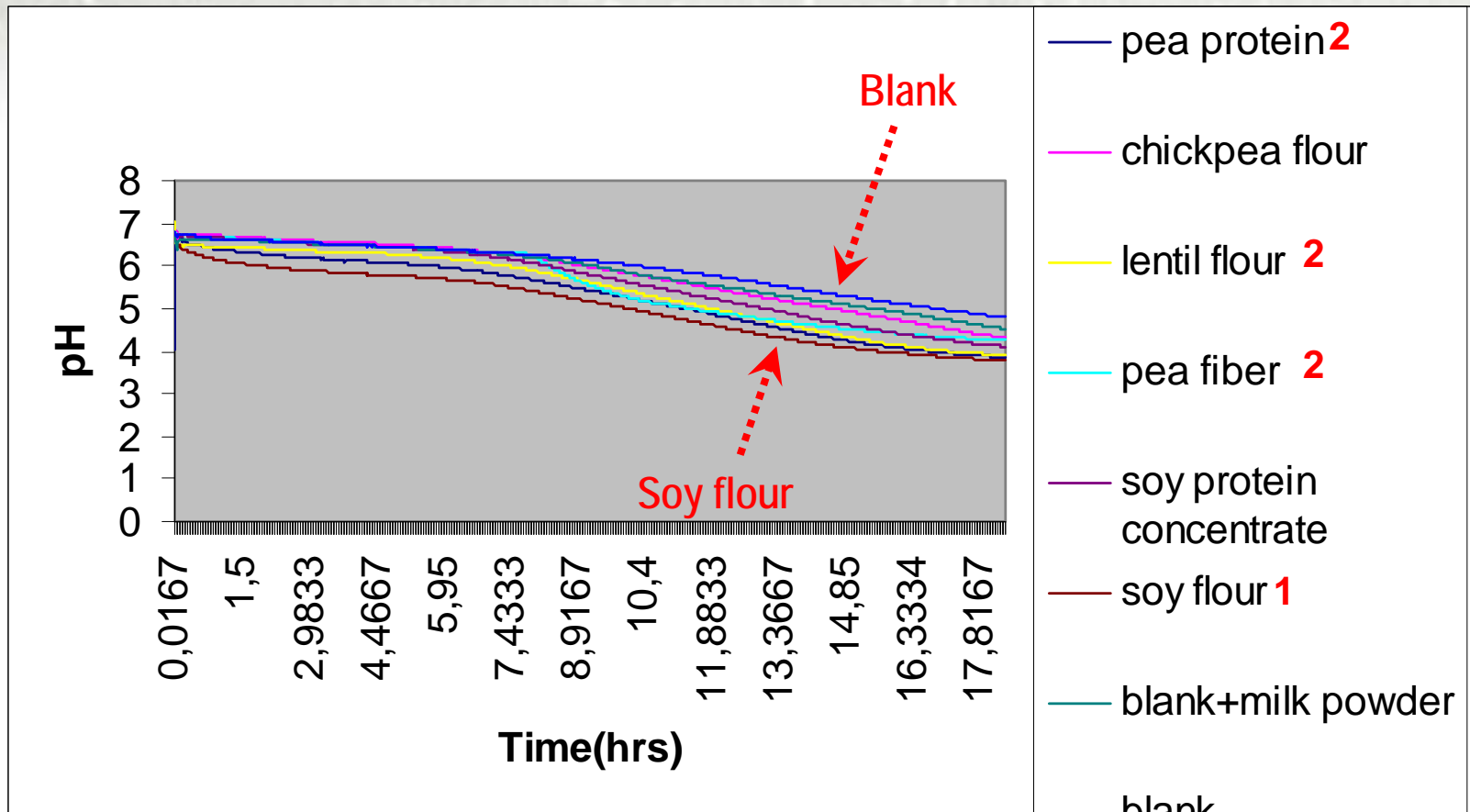


Experimental plan

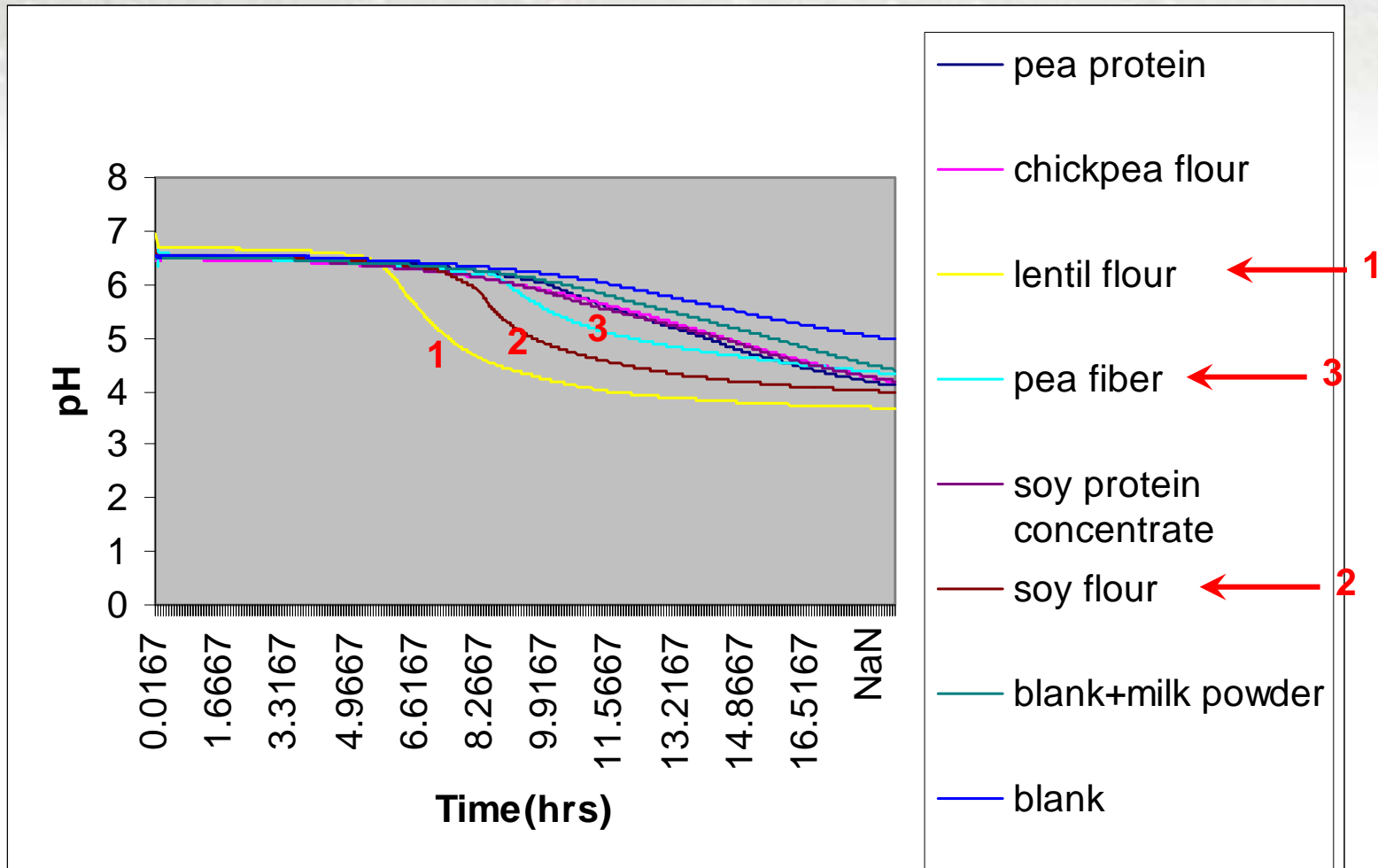
6 Pulse fractions added (at 2%) to skim milk fortified with milk powder as yoghurt media.

- Samples:
 - pea protein
 - chickpea flour
 - lentil flour
 - pea fibre
 - soy protein concentrate
 - soy flour
 - two blank samples ((a)with and (b)without extra milk powder)

Acidification rate: Probiotic culture(L.b rhamnosus)



Acidification rate: Probiotic culture (L.b acidophilus)



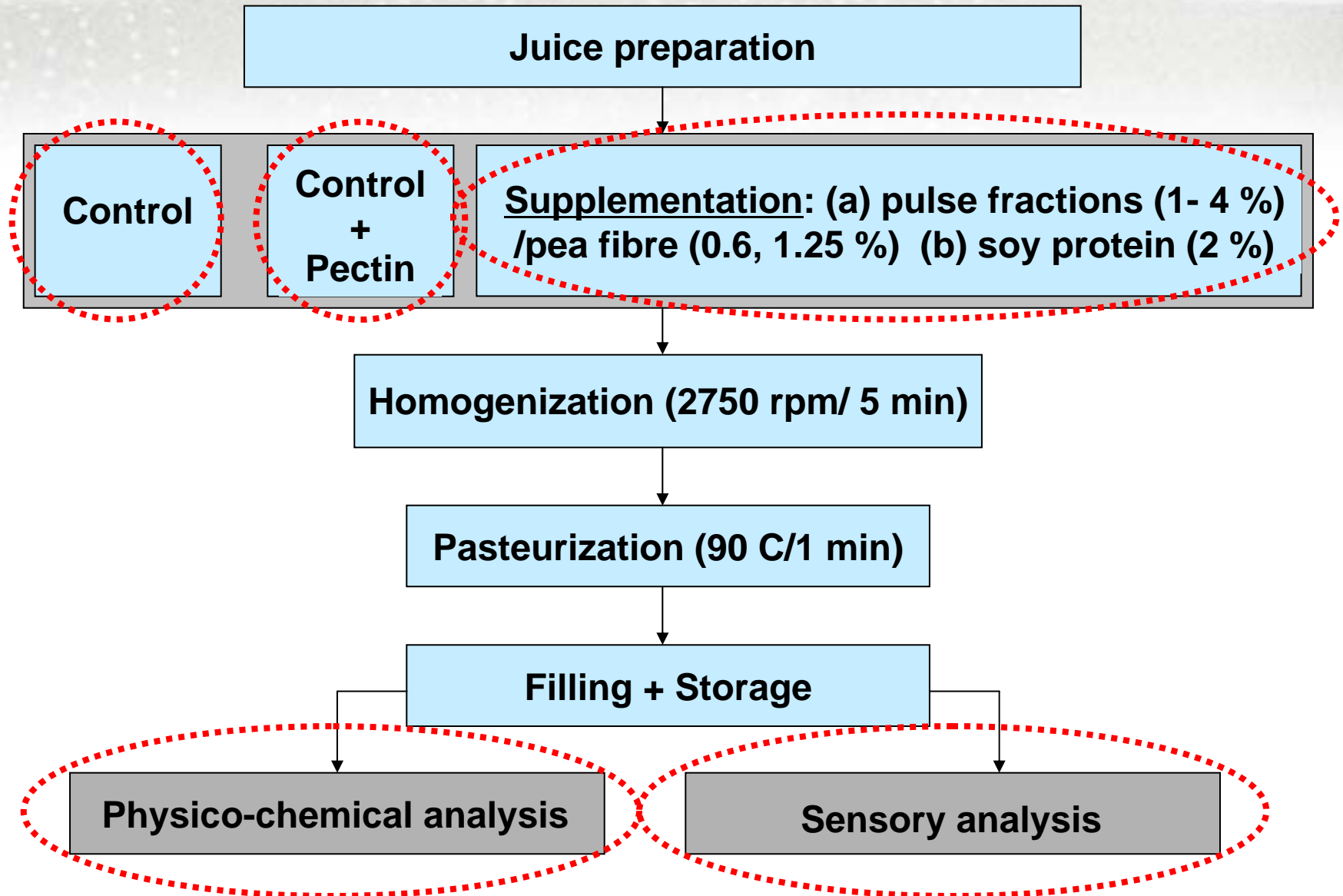
Experimental Design for Beverage Development

- Juice supplementation with pulse fractions (1-4% w/v)
 - Apple juice (Unfiltered, unpasteurised)
 - Orange juice (Freshly squeezed)
 - Carrot Juice
 - Tomato juice
- Whole legume beverage development
 - Lentil flour
 - Chickpea flour
 - Pea protein



- Acidic
- Neutral

Pulse Supplementation:



Sensory evaluation



No of panellist: 25 (Untrained)

Volume of sample: 15 ml

Method of analysis: 9-point Hedonic scale

Parameters tested: **Flavour**
Mouthfeel
Overall rating

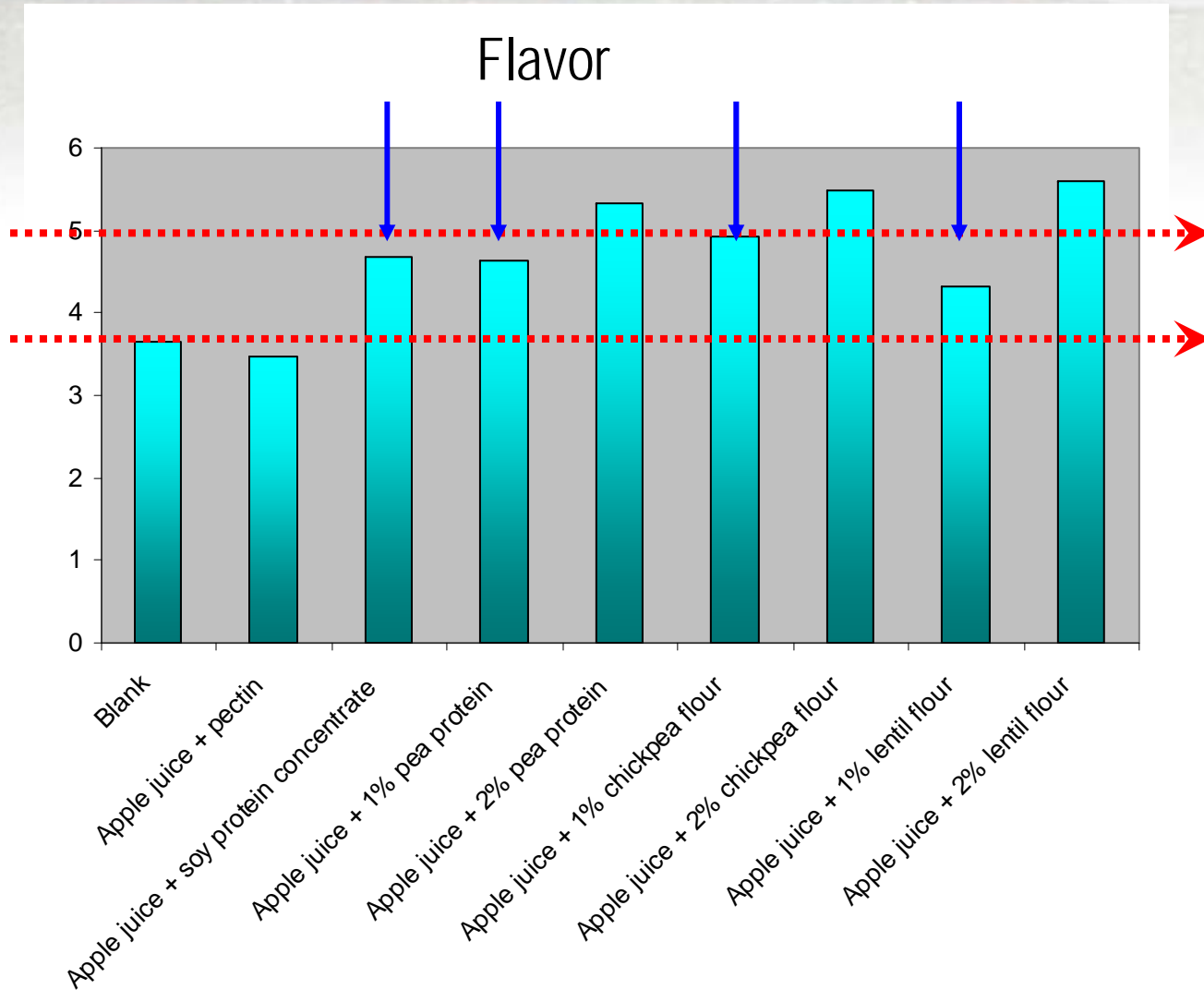
Questionnaire for sensory evaluation

	Like extremely	Like very much	Like moderately	Like slightly	Neither like nor dislike	Dislike slightly	Dislike moderately	Dislike very much	Dislike extremely
Flavour	1	2	3	4	5	6	7	8	9
Mouth feel	1	2	3	4	5	6	7	8	9
Global rating	1	2	3	4	5	6	7	8	9

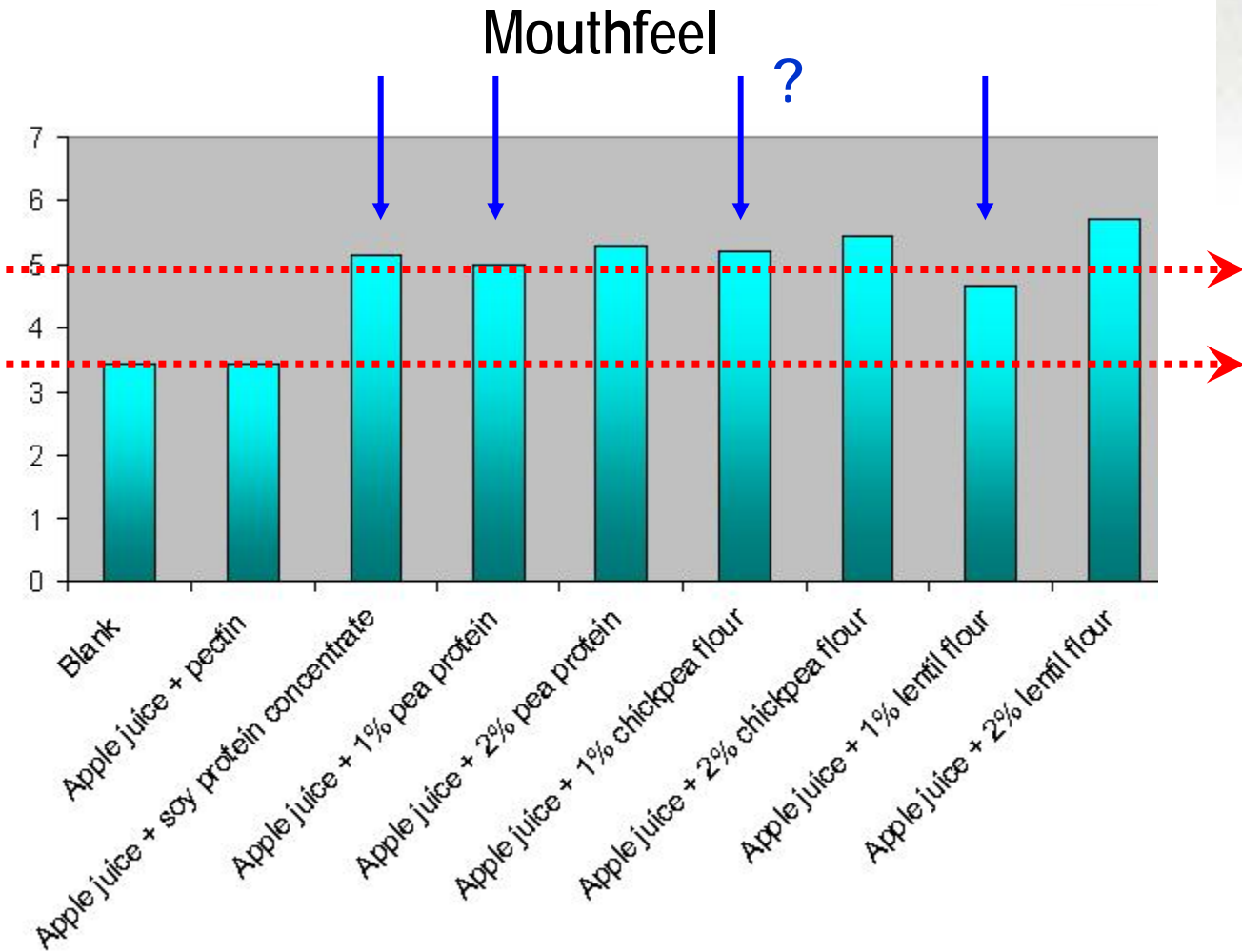
Additional Comments:



Sensory test results: Apple Juice

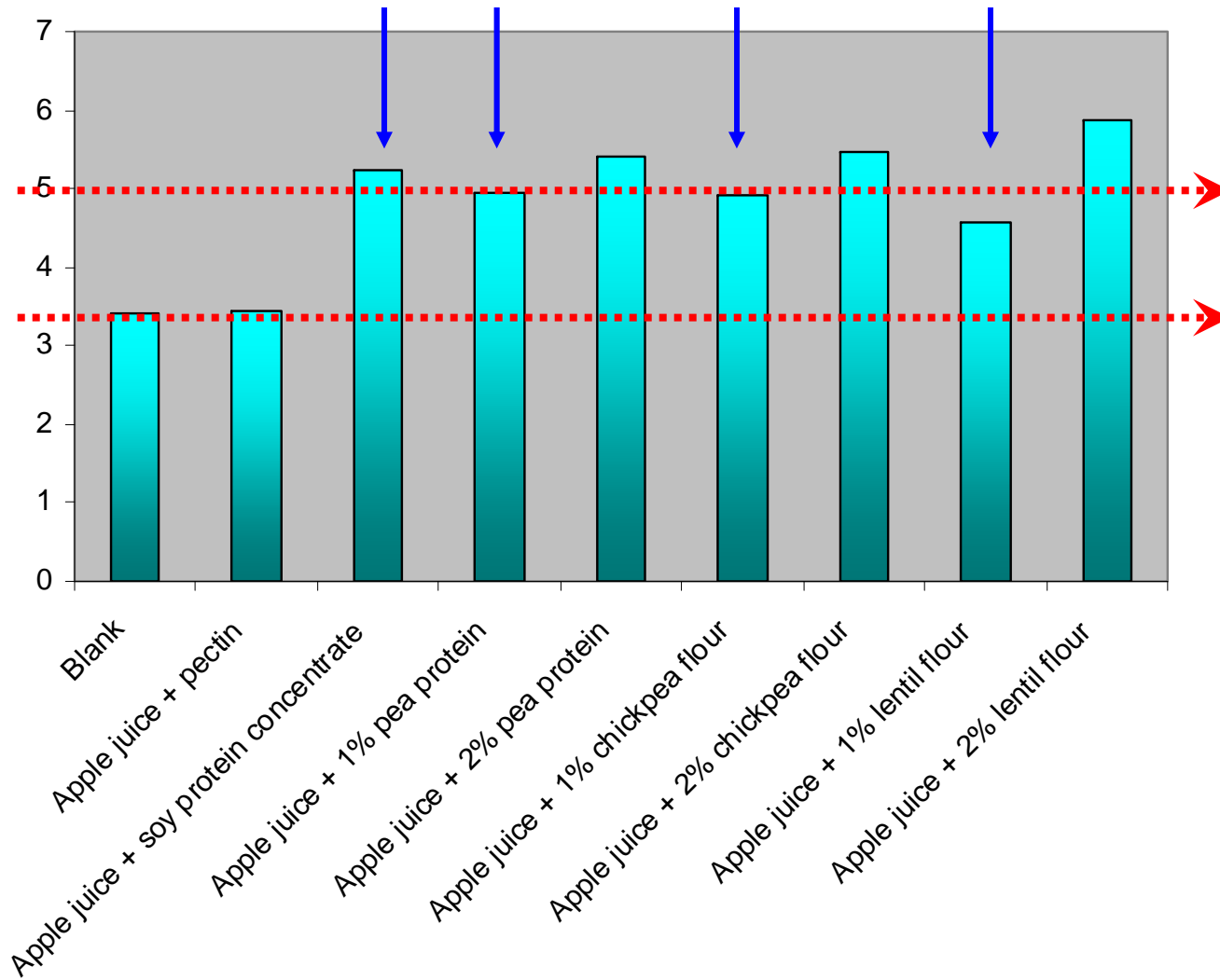


Sensory test results: Apple Juice



Sensory test results: Apple Juice

Overall acceptance



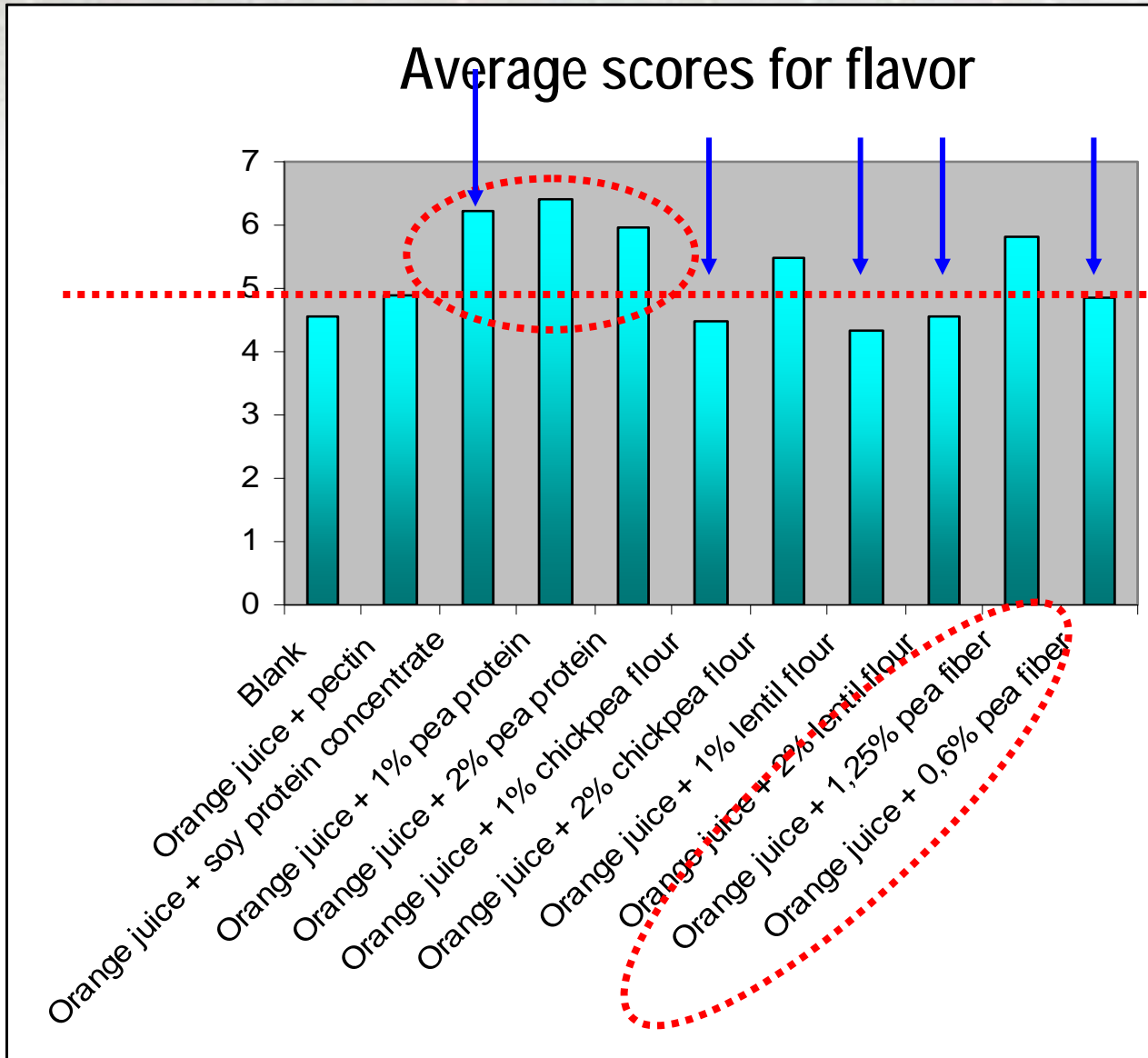
Summary :

Apple Juice Supplementation

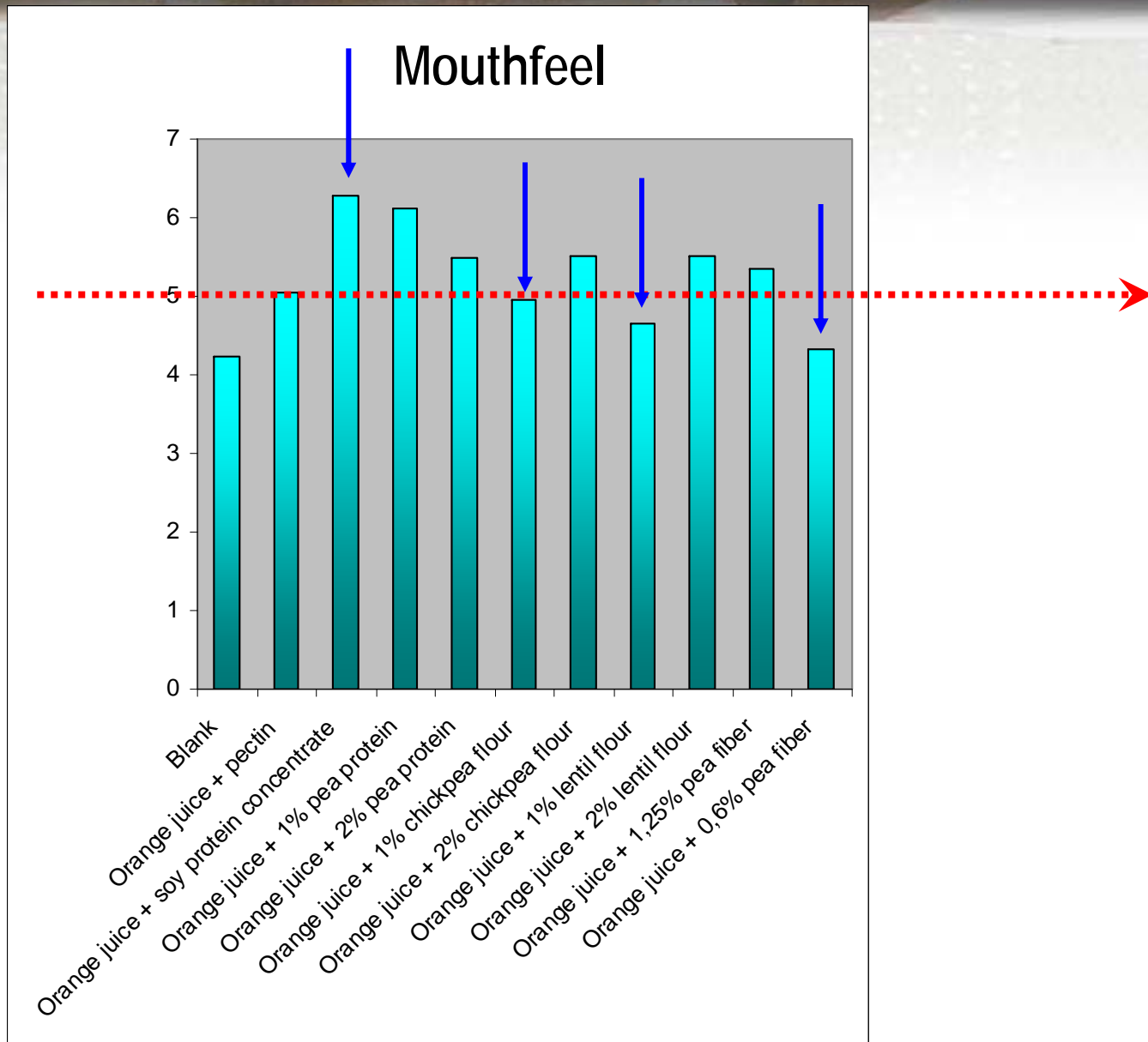
Particle size/solubility?

Sample	Flavor	Mouth feel	Global Rating
→ 1% pea protein	✓	✓	✓
2% pea protein	X	X	X
→ 1% chickpea flour	✓	✓	✓
2% chickpea flour	X	X	X
→ 1% lentil flour	✓	✓ (X)	✓ (X)
2% lentil flour	X	X	X

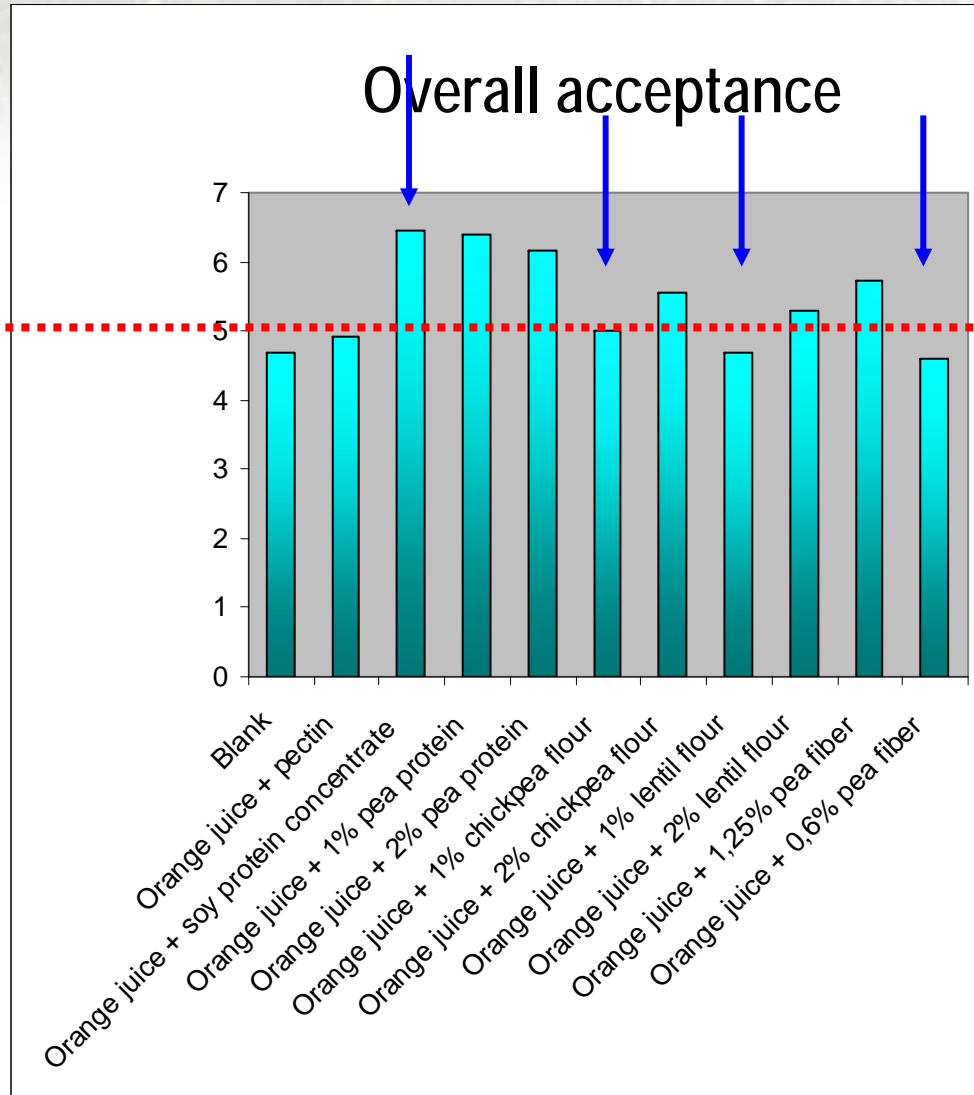
Sensory test results: Orange juice



Sensory test results: Orange juice



Sensory test results: Orange juice



Summary :

Orange Juice

Particle size & solubility

Sample	Flavor	Mouth feel	Global Rating
1% pea protein	X	X	X
2% pea protein	X	X	X
1% chickpea flour	✓	✓	✓
2% chickpea flour	✓	X	X
1% lentil flour	✓	✓	✓
2% lentil flour	✓	X	X
0.625% pea fiber	✓	✓	✓
1.25% pea fiber	X	X	X



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- **Whole grain-based beverages**
- **Conclusion**

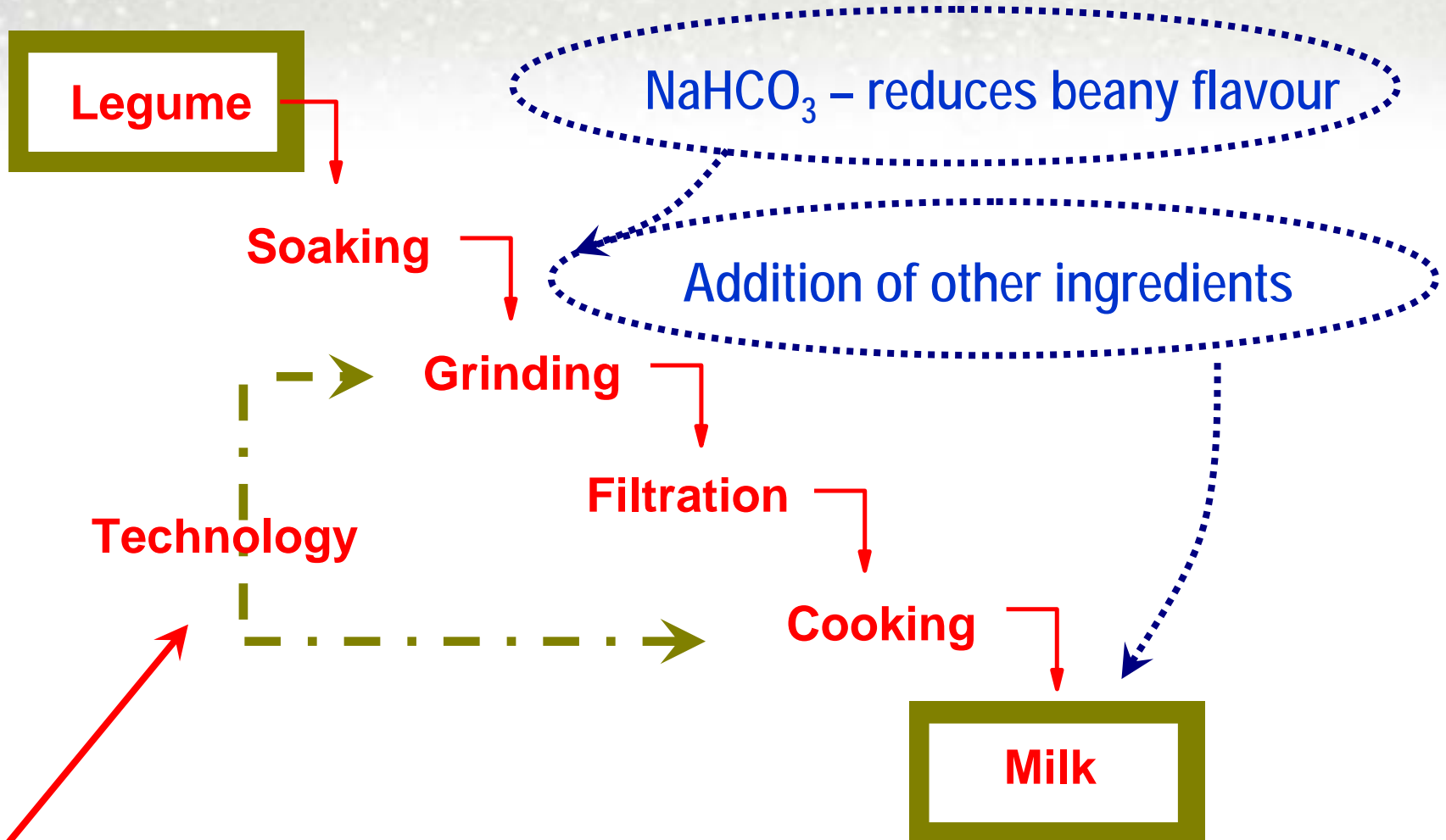


Technical Considerations

Grain-based beverage processing:

- Enzyme inhibitors
- Beany flavor 
- Long cooking times
- Color (comparison to milk)
- Viscosity (high starch/fibre) 

Processing of grain-based beverages



Technical Considerations

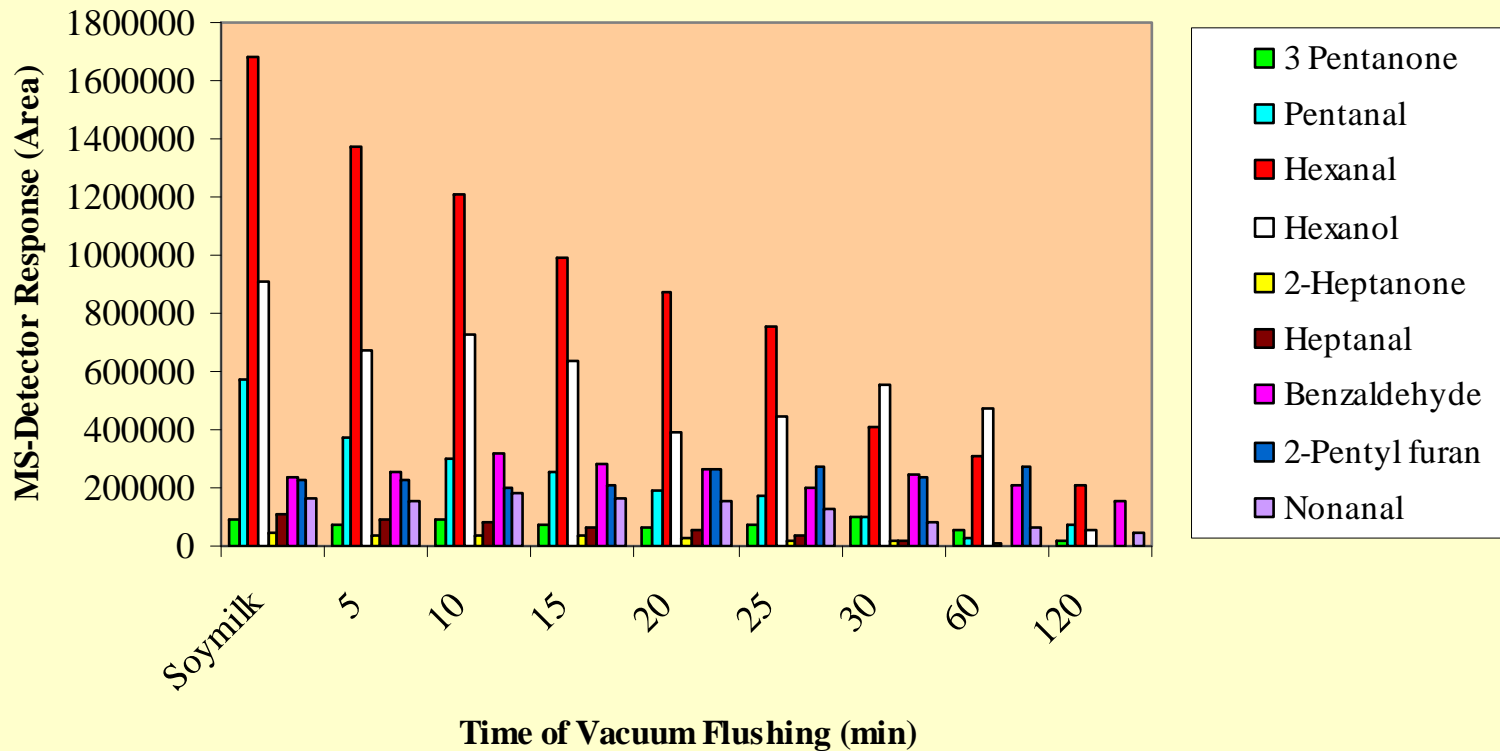


Processing:

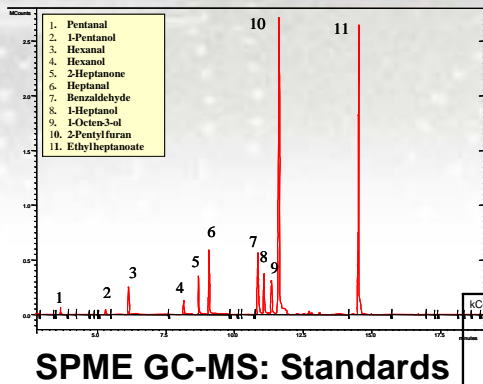
- Heat inactivation
- Airless processing
- Deodorisation
- Masking agents
- Flavouring agents

Soymilk Flavour Profile

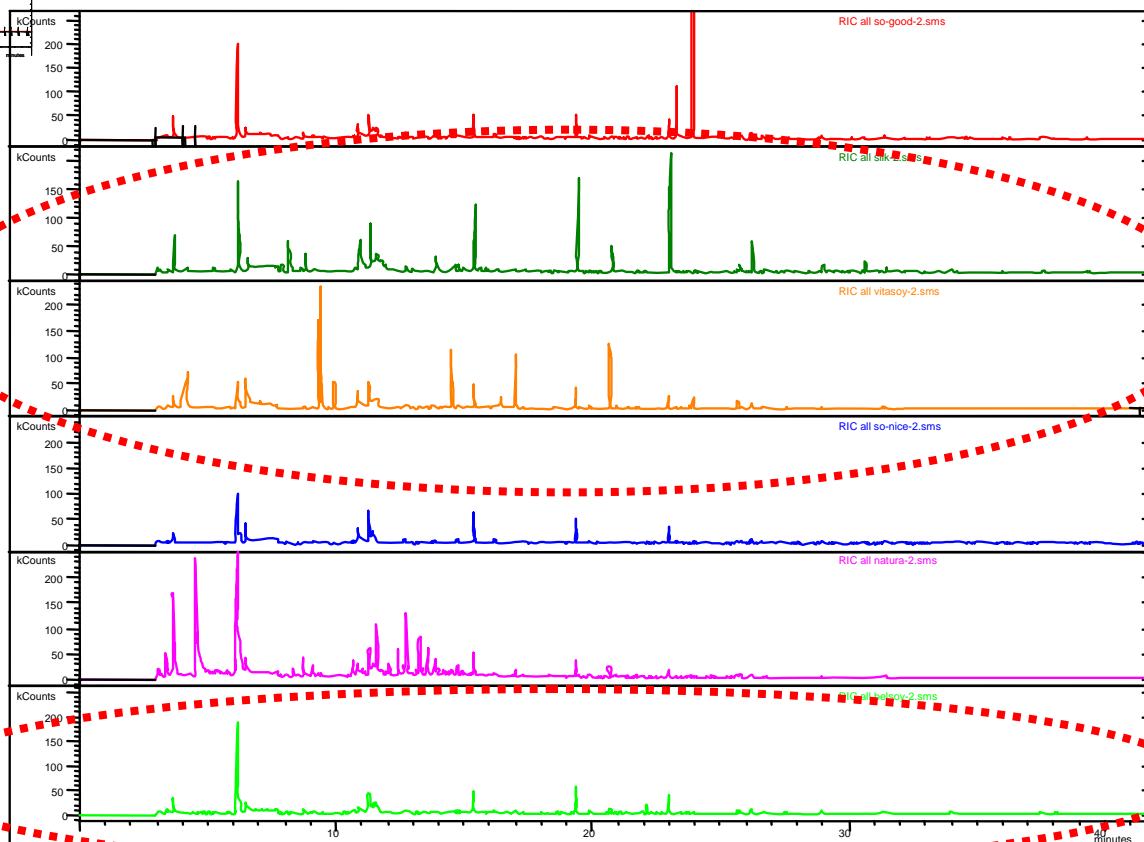
Effect of vacuum flashing:




Soymilk Flavour Profile



SPME GC-MS: Commercial soymilks





Characteristics of a Chocolate Beverage from Germinated Chickpeas

MARIA LUZ-FERNANDEZ DE TONELLA and JAMES W. BERRY

ABSTRACT

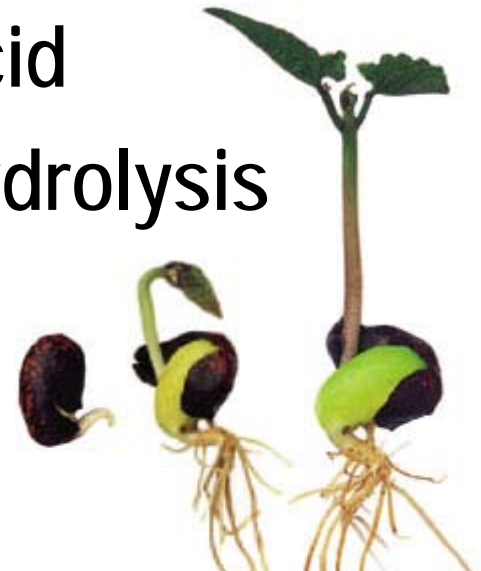
A chocolate flavored beverage was developed using germinated chickpeas (*Cicer arietinum*). The formulation included the legume at a level of 10% along with sugar, cocoa, salt, vegetable oil and water as main ingredients. Beverage prepared from germinated chickpeas showed reduced viscosity and improved consistency when compared with a control formulated from ungerminated chickpeas. A reduction of 15% in starch occurred during germination and probably accounted for most of the observed decrease in viscosity. The acceptability of the beverage was established by sensory evaluation. A paired preference test indicated no significant difference between germinated chickpea beverage and a commercial chocolate milk.



Grian germination

Benefits:

- Reduction in enzyme inhibitors
- Increase in limiting amino acids
- Increase in vitamins/ascorbic acid
- Increase in α -amylase/starch hydrolysis
- Improvements in functionality



Outline

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- **Conclusion**



Partnering

Beverage from Pulse Legumes

Objective: USDA-ARS is currently looking for companies with expertise in food ingredient manufacturing and food product development.

Overview: ARS researchers in California have developed a way to produce **legume-based flours and powders** using both conventional and non-conventional ingredients. This food processing technology can be used to produce **pulse legumes, pulse legume based flours and protein powders** directly and/or as **nano particles suspended in liquid to form beverages**. This technology could be used to make a line of nutritional or functional food products. Lactose and dairy-free beverages, such as grain-based products, like soy, are experiencing considerable demand as an increasing number of consumers ...



Partnering

Beverage from Pulse Legumes

.....This technology could open international markets for an underutilized commodity. Additionally, **new markets for lactose and dairy-free, nutritional and healthy vegetarian** and **grain based beverages** will benefit the health status of consumers.

Industry Type: The **ideal partner** will have **expertise in developing sports drinks and nutritional drink supplements**, and the ability to contribute both intellectually and financially to the project.



Complete Liquid Nutrition

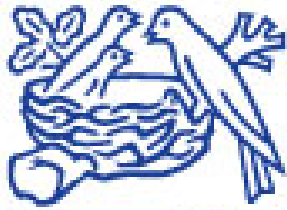
NUTREN Fibre with Prebio¹



NUTREN Fibre with Prebio1 contains 8.8 grams/1000 ml pea fibre and 5.2 grams/1000ml of Prebio1, a unique blend of FOS/Inulin, to facilitate feeding tolerance throughout the colon.

Indications

- Ideal for long-term tube feeding
 - Mild vanilla taste for oral use
- Ready-to-use cans and pre-filled non-air-dependent UltraPak®.
- Patients who would benefit from fibre and prebiotics: living with chronic diarrhea and patients on antibiotic therapy.



Nestlé

Good Food,
Good Life



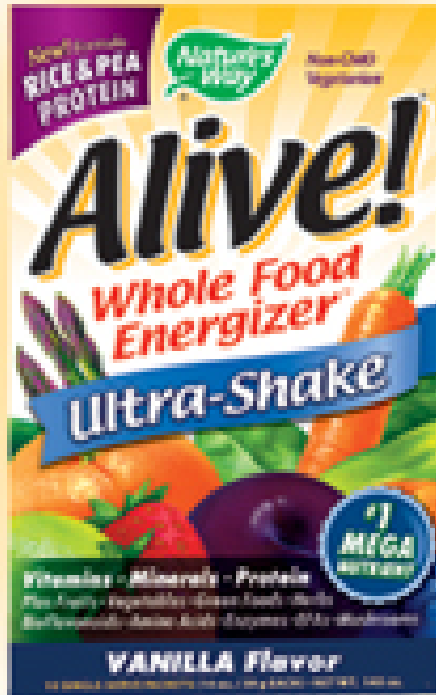
NUTREN

Junior Fibre with Prebio¹

Ingredients

WATER, MALTODEXTRIN, SUGAR (SUCROSE), SOYBEAN OIL, MILK PROTEIN CONCENTRATE, WHEY PROTEIN CONCENTRATE (FROM COW'S MILK), CANOLA OIL, MEDIUM-CHAIN TRIGLYCERIDES (MCT SOURCE: FRACTIONATED COCONUT AND PALM KERNEL OIL), **PEA FIBRE**, SOY LECITHIN, DIPOTASSIUM PHOSPHATE, CALCIUM CITRATE, OLIGOFRUCTOSE, SODIUM CHLORIDE, INULIN, ARTIFICIAL VANILLA FLAVOUR, MAGNESIUM CHLORIDE, CHOLINE CHLORIDE, SODIUM ASCORBATE, POTASSIUM CITRATE, POTASSIUMHYDROXIDE, DISODIUM PHOSPHATE, CARRAGEENAN, TAURINE, INOSITOL, L-CARNITINE, FERROUS SULPHATE, ZINC SULPHATE, DL-ALPHA TOCOPHERYL ACETATE, NIACINAMIDE, CALCIUM PANTOTHENATE, FOLIC ACID, MANGANESE SULPHATE, THIAMINE MONONITRATE, COPPER SULPHATE, PYRIDOXINEHYDROCHLORIDE, RIBOFLAVIN, BETA-CAROTENE, RETINYL ACETATE, BIOTIN, POTASSIUM IODIDE, CHROMIUM CHLORIDE, SODIUM SELENATE, SODIUM MOLYBDATE, CHOLECALCIFEROL, CYANOCOBALAMIN.

Product examples



Alive! Vanilla Protein Shake,
Rice & **Pea Protein,**
Nature's Way, 1.3 lb

Protein isolate/concentrate alternatives



Protein powders



Protein shakes
(just add water)

Proteins of
soy/pea/rice



Conclusion

The beverage industry's response

With these strong drivers of growth, it is not surprising that the beverage industry in **India** has **begun to respond** with products that are marketed clearly on a **health and wellness platform**.

In the end, beverage suppliers who **unlearn** many of the long-held misconceptions about Indian consumers and **respond** instead to their changing needs and priorities will be best placed to maximize the health and wellness opportunity in this **large** and **growing market**.

<http://www.frost.com/prod/servlet/market-insight-top.pag?docid=85178298>

Conclusion



Further research:

- **Economical processing techniques**
- **Product stability during storage**
- **Bioavailability of active ingredients**
- **Flavour studies and improvement**
- **Consumer acceptability studies**
- **Marketing strategies**

Acknowledgements

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Canada