



UR-T1182: Promoting Productive
Transformation and Competitiveness of
Uruguay's Agri-Food Industry based on
Science Technology and Innovation

Food Sector Assessments

DECEMBER 3, 2019

INSTITUTES OF GREEN BIO SCIENCE AND TECHNOLOGY
SEOUL NATIONAL UNIVERSITY

A. Sector Performance, problems and opportunities

Introduction

- Today, the food consumption habits, trends, and preferences of the consumer have changed drastically.
- In order to meet these ever-changing consumer food demands, companies and producers are required to provide quick and efficient response to shifting food market preferences.
- Consumers are becoming very critical regarding personal dietary preferences, specifically low-fat and high-fiber meals with “clean labels” from natural and organic sources.
- In the Uruguayan food sector, approximately 300 researchers and 68 research groups are directly associated with.

High Potential for R&D Innovation in Uruguayan Food Industry

- ❖ The Uruguayan food industry has a large potential for R&D innovation due to many food research groups

❖ **The food process technologies in Uruguay need continuous searching for niches in the global food market with competition and diversification.**

SWOT Analysis of the Food Sector

Strategies

- Develop natural & functional (medicinal) compound bank
- Develop microorganism culture collection for future innovative R&D
- Develop special story telling food products focusing on function (antioxidant activity and anti-inflammatory activity)

此酒 釀造之法 實與 西國 葡萄酒 不同 且其 氣味 清香 且能 養血 補氣 誠為 補品 中之 冠也 凡 飲此 酒者 必能 精神 百倍 誠 補品 中之 冠也 凡 飲此 酒者 必能 精神 百倍 誠 補品 中之 冠也



아내가 권하는 술

- 10가지 한약재를 넣어 빚습니다.
- 전통 누룩만을 사용합니다.
- 인공감미료를 사용하지 않습니다.
- 생쌀 발효법으로 빚어 뒤끝이 깨끗합니다.

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Strategies

- Develop natural & functional (medicinal) compound bank
- Develop microorganism culture collection for future innovative R&D
- Develop special story telling food products focusing on function (antioxidant activity and anti-inflammatory activity)
- R&D+I for Well-Aging

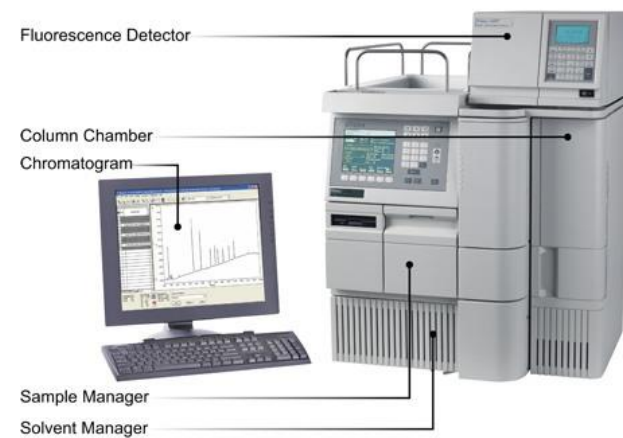
❖ **Mission:** Plays the role of National Core Institute for Food BT R&D

❖ **Function:**

- 1) Secure BT competitiveness in the food sector
- 2) Provide technical solutions for main problems in the food sector
- 3) Technical support for local food industry to share the global BT food market
- 4) Establish a National Food BT R&D and Education Program

❖ **Organization:**

- 1) 6 Research Labs [Citrus(fruits) Products, Fermentation on Non-Dairy Products, Fermentation on Dairy Products, Low Calorie Products, Vegetable (Plants) Products, Food Safety)]
- 2) Research Facility: Fermentation Facility and Related Equipment (up to Pilot Scale), Several Food Processing Facilities, Analyses Facilities, Microorganism Bank & Natural Compounds Bank Facilities, etc.
- 3) Planning & Administrative Support Team (Market Research, Project Design, R&D Support, etc.)
- 4) Education Team



C. Food Sector R&D Development Roadmap.

- ❖ The 'Uruguayan Food Sector' needs continuous development of food products that meet the dynamic demands made by both the national and international food markets.

Current R&D+I **Well-Aging** Subjects & Activities

	Target Specific Subjects & Activities													
	Diversification *	Uniqueness	Originality	Functionality	Scientific studies*	Safety	Low calories	By-product	Functional foods	Cosmetics	Commodities	Pharmaceutical	Lactose intolerance	packaging
Citrus (fruits) products		v		v	v	v		v			v		-	v
Fermentation products (Non-Dairy)	v	v	v	v	v	v		v			v		-	
Dairy products	v	v		v		v	v				v		v	v
Low calorie products	v						v				v			
Vegetable (plants) Products	v	v	v	v	v	v		v	-	-	v	-	-	-
Food Safety	v	v	v	v	v	v								v

*Target specific: age, generation, world trend, function and senior-friendly

v: in progress actively
v: in progress

Current R&D **Well-Aging Subjects** & Activities

❖ Based on the analyses of current R&D activities (with Uruguayan Specialist Opinion)

- 1) **Subject of 'Citrus (fruits) production'**: effectively conducting for the scientific aspects, safety, production of commodities and packaging.
 - The uniqueness, functionality of the products, and uses of by-products have many applications.
 - The emphasis of diversification, originality, low calorie and functionality of products.
 - The application of these products in cosmetics and nutraceutical industry need to be focused on
- 2) **Subject of fermentation products of non-dairy**: mostly conducted for wine.
 - The production of value added agri-foods having diversification, uniqueness, originality, functionality, scientific studies, safety, commodities production, and by products uses may be considered.
 - The consideration of low calories of products and their function
- 3) **Subject of dairy fermented products**: focused mainly on safety and product packaging.
 - Diversification, uniqueness, functionality, low calories, commodities production, lactose intolerance of product are also in progress but not completed.
 - Originality, scientific studies, by products uses should be given adequate attention.
 - The applications of fermented products in functional foods, cosmetic, and nutraceuticals
- 4) **Subject of low-calorie products**: Provide consumers with many benefits both psychologically and physiologically
 - Low calorie products in Uruguay foods have great potential for diversification of commodities
- 5) **Subject of Food safety**: actively invested in Uruguay foods.
 - Food safety regarding future food products of diversification, uniqueness, and functionality, and products as functional foods, cosmetics, and pharmaceuticals
- 6) **Subject of vegetables with enhanced functionality, and uses of by-products**: have many applications in future R&D initiatives and activities
- 7) **Subject of vegetal protein**: obtained from several crops for human consumption, providing high nutritional attributes minimizing environment impact.

Necessary Technologies & Activities for **Well-Aging** Specific R&D+I

	Target Specific Necessary Technologies & Activities										
	Packaging	Extraction/ Freeze drying	Analyses of functional components*	Fermentation #	Bio- conversion %	Pilot-scale production	Separation/ Purification	Prebiotic /Synbiotics	Strain improvement/ molecular biological techniques	Target-directed enzyme evolution	Collection of Strain/Component
Citrus (fruits) products	v		v			v			-		-
Fermentation products (Non-Dairy)			v	v	v	v			v		v
Dairy products	v	v	v	v		v	v				v
Low calorie products				-							
Vegetable (plants) Products		v	v	-	-	v	v	-	-	-	-
Food Safety	v	v	v			v					

* Chemicals, functionality, physico-chemical properties

Microbial process

% Enzymatic process

v: in progress actively
v: in progress

Necessary **Technologies** & Activities for **Well-Aging** Specific R&D

❖ Based on current technologies and activities (with Uruguayan Specialist Opinion)

1) For the 'citrus (fruits) product' subject:

- The advanced technology and activity support for packaging, analyses of functional components, and pilot-scale production
- Supports for extraction/drying, fermentation, bio-conversion, and synbiotics

2) For the 'fermentation products (non-dairy)' subject:

- Advanced technology and activity support for analyses of functional components, fermentation and bio-conversion, strain development and improvement, and pilot-scale production
- Extraction/drying, purification, target specific enzyme evolution, and synbiotics

3) For the 'fermentation of dairy products' subject:

- The advanced technology and activity support for packaging, fermentation, analyses of functional components, and pilot-scale production
- Supports for strain development and improvement, target specific enzyme evolution, and synbiotics

4) For the 'low calorie product' subject:

- The advanced technology and activity support for packaging
- Supports for extraction/drying, purification, analyses of functional components, fermentation, bio-conversion, enzyme evolution, and synbiotics

5) For the 'food safety' subject:

- The advanced technology and activity support for packaging, analyses of functional components, extraction/purification, and pilot-scale production
- Supports for fermentation, bio-conversion, and synbiotics

6) **Vegetables (Plants) Products:** With enhanced functionality and uses of by-products

Potential Research Projects

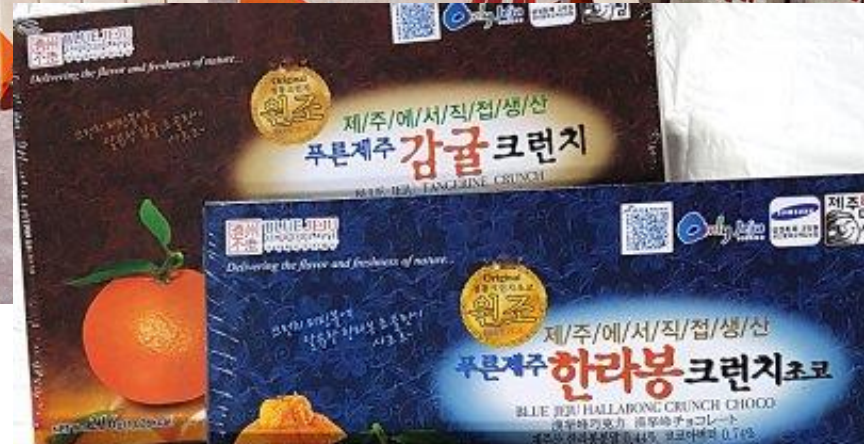
Food Sector

Research Subjects	Research Projects
Citrus (fruits) products	<ul style="list-style-type: none">● R&D of Citrus Fruits, Deciduous Fruits and Their By-products for High Value Added Commodities
Fermentation products (Non-Dairy)	<ul style="list-style-type: none">● R&D for Value-Added Well-Aging Non-Dairy Agricultural Products by Using Advanced Fermentation and/or Biotransformation Techniques
Fermentation of dairy products	<ul style="list-style-type: none">● R&D for Value-Added Well-Aging Dairy Agricultural Products by Using Fermentation and/or Biotransformation Techniques
Low calorie products	<ul style="list-style-type: none">● R&D for Functional & Value-Added Low-Calorie Commodities of Well-Aging
Vegetable (plants) Products	<ul style="list-style-type: none">● R&D for Value-Added Sustainable, Healthy, and High-Protein Food Products Designed for Well-Aging
Food Safety	<ul style="list-style-type: none">● R&D for Food Safety and Industrial Applications

1) For the subject of 'Citrus (fruits) production',

- the uniqueness, functionality of the products, and uses of by-products
- the emphasis of diversification, originality, low calorie and functionality of products
- the application of these products in cosmetics and nutraceutical industry

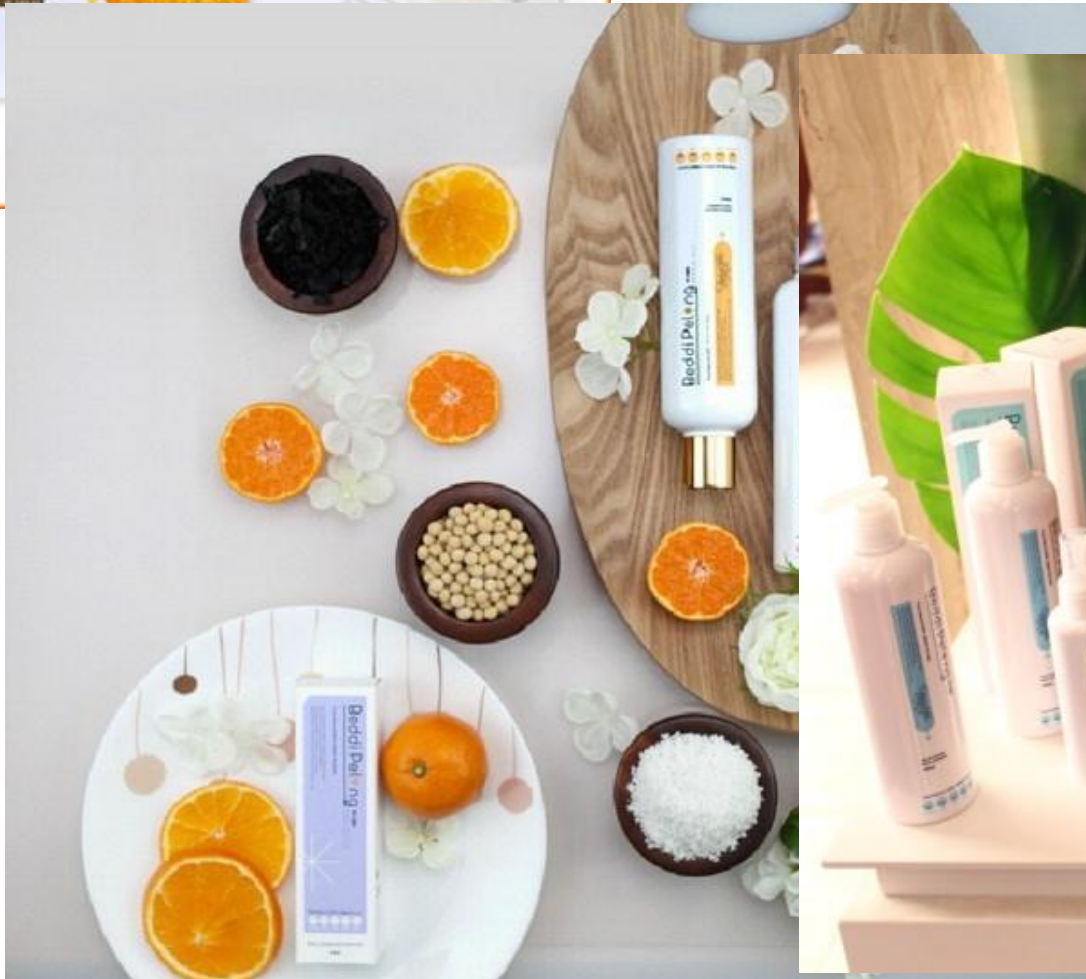






(주)휴림이 보여준



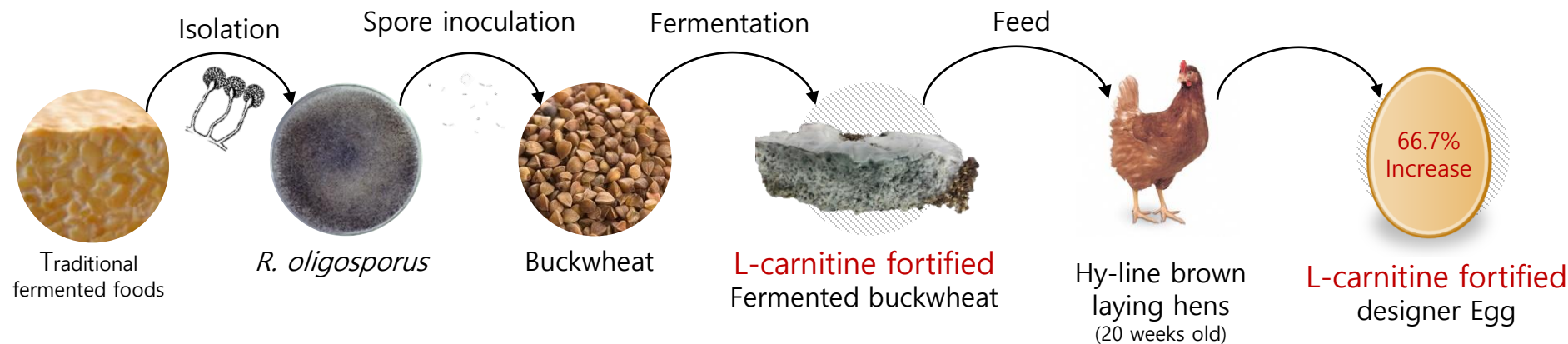


2) Fermentation products of non-dairy

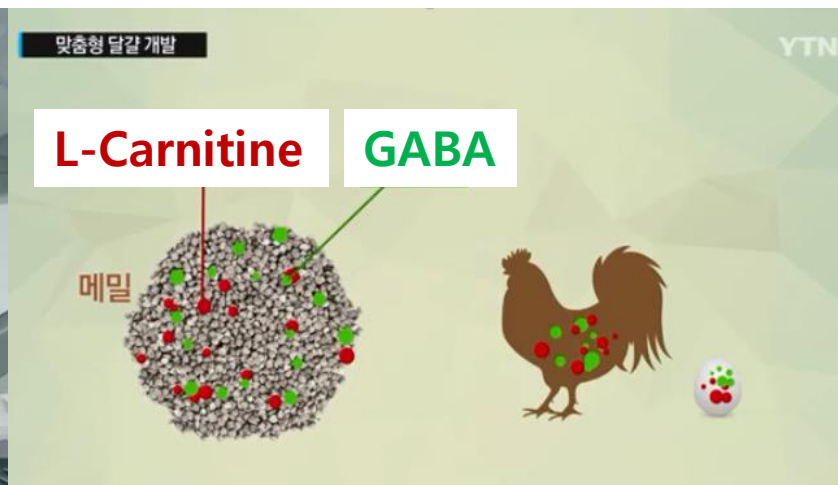
- other fermented foods including bread, beverages (kombucha, kefir), fruits, meat & fish, soy
- the production of value added agri-foods having diversification, uniqueness, originality, functionality, scientific studies, safety, commodities production, and by products uses
- low calories of products and their function



L-Carnitine Enriched Egg



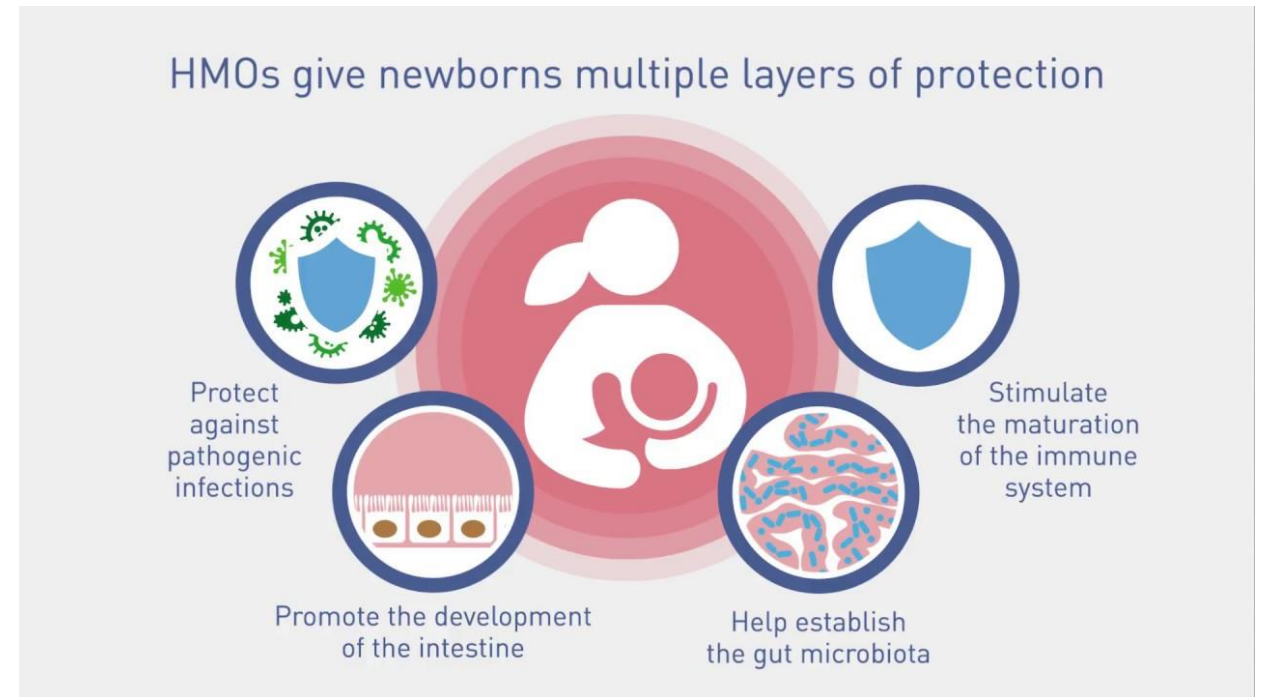
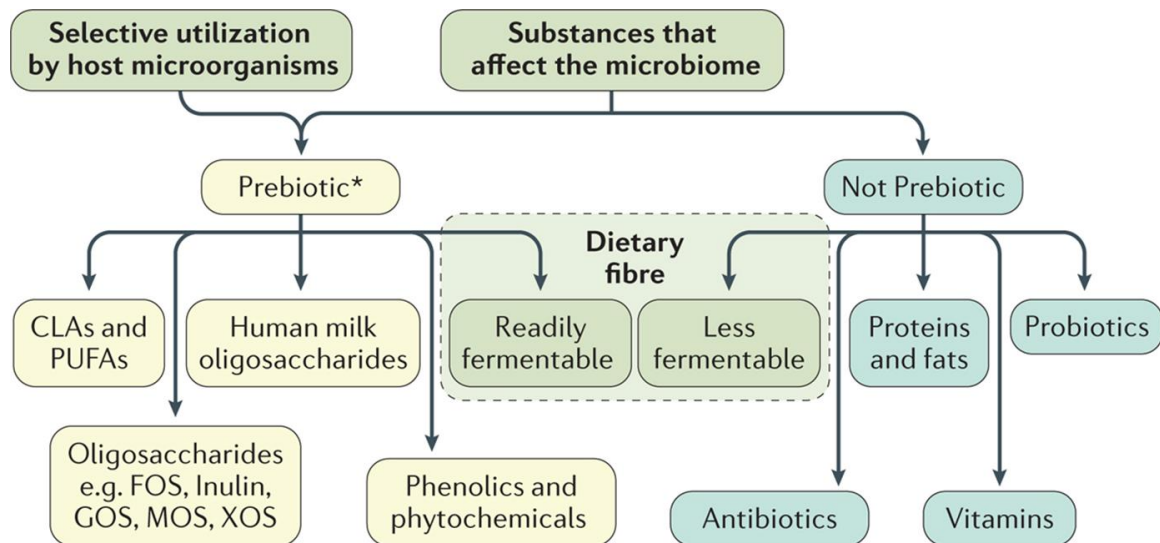
- ✓ Enhances cognitive function.
- ✓ Reduces fatigue and muscle loss.
- ✓ Aids weight loss
- ✓ Antioxidant activities
- ✓ L-carnitine helps the body produce energy. It is important for heart and brain function, muscle movement, and many other body processes.





3) Dairy fermented products

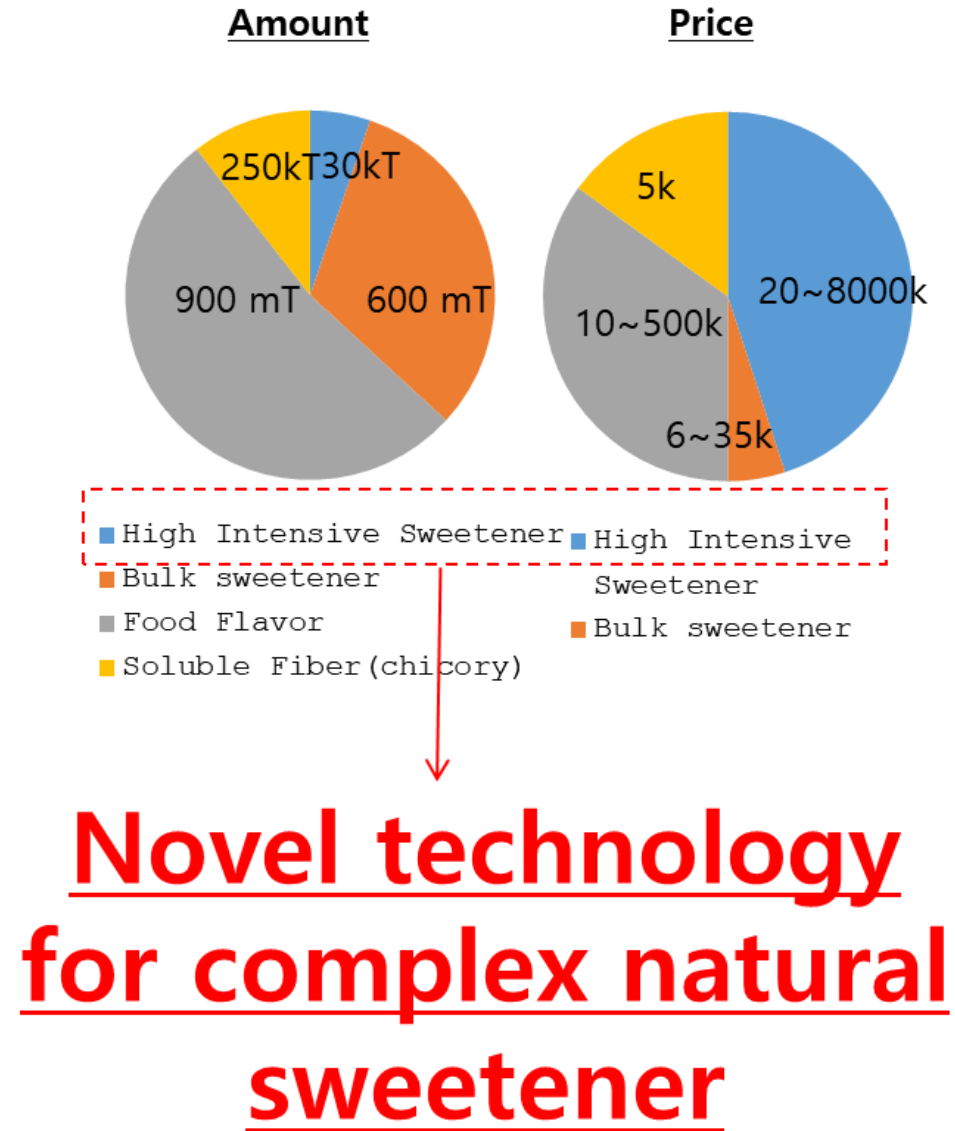
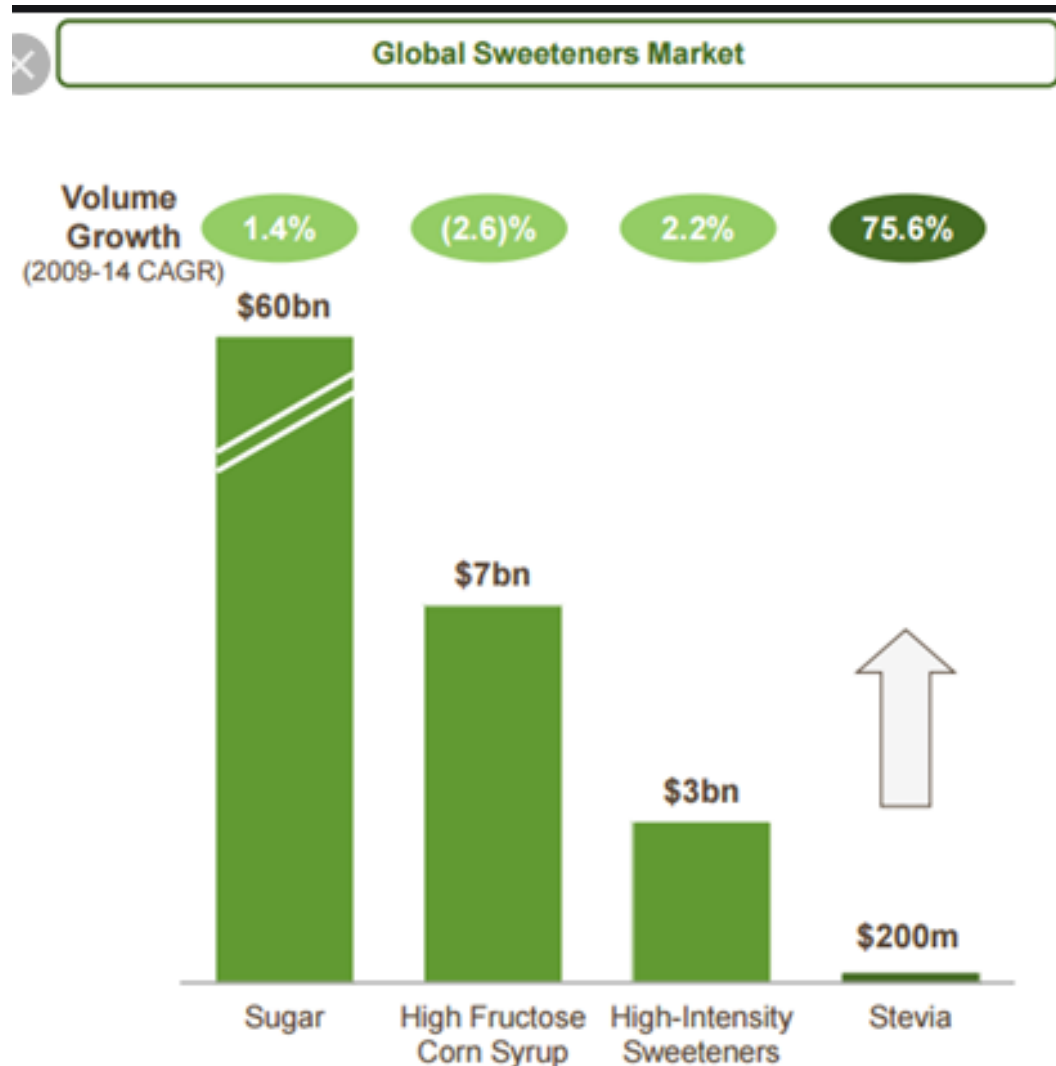
- own yogurts, fermented sour milk, and cheeses
- diversification, uniqueness, functionality, low calories, commodities production, lactose intolerance of product
- originality, scientific studies, by products uses
- the applications of fermented products in functional foods, cosmetic, and nutraceuticals



4) Low calorie products

- low calorie products - weight maintenance, the management of diabetes, reduction of dental caries, and reduction in the risks associated with obesity.
- diversification of commodities.

4) Low calorie products



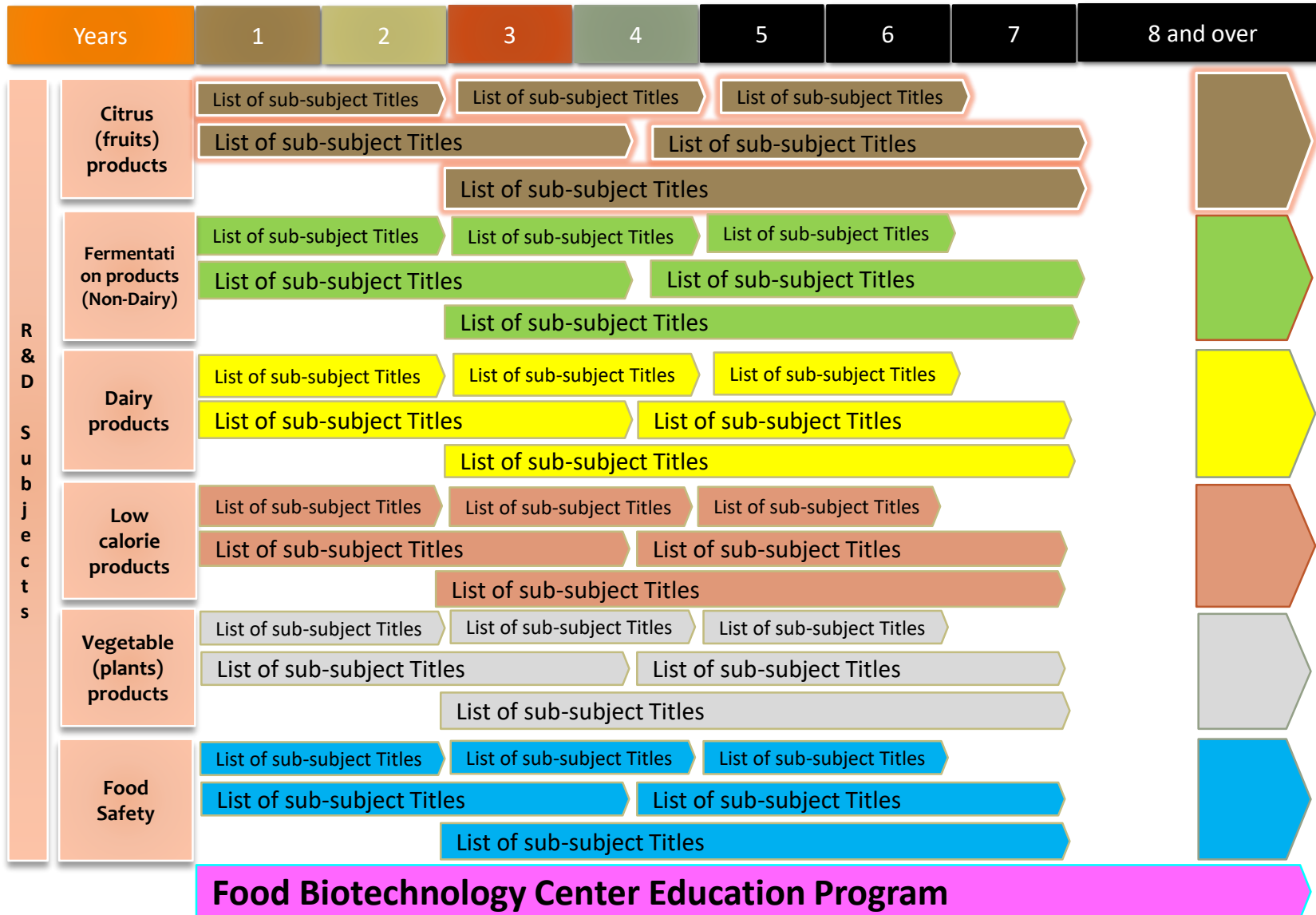
5)Vegetables products

- enhanced functionality, and uses of by-products
- vegetal protein obtained from several crops for human consumption, providing high nutritional

6)Food safety

- food safety regarding future food products of diversification, uniqueness, and functionality,
- safety for products as functional foods, cosmetics, and pharmaceuticals

Roadmap for Well-Aging Specific R&D+I of Food Sector in Uruguay



Uruguay



Men



Uruguay

The most Uruguayan product is global:
the uniqueness, originality & diversity



Well-Aging

Life expectancy = Healthy Life

Posterior distribution of projected change in life expectancy at birth from 2010 to 2030

